INFANT AND TODDLER CARE AND DEVELOPMENT

Amanda Taintor
ASCCC OERI Program

LibreTexts™

Infant and Toddler Care and Development

Amanda Taintor, Todd LaMarr, Wendy Ruiz,
Martina Marquez, Emily Elam, Amy Carnahan
& Adrienne Seegers

This text is disseminated via the Open Education Resource (OER) LibreTexts Project (https://LibreTexts.org) and like the hundreds of other texts available within this powerful platform, it is freely available for reading, printing and "consuming." Most, but not all, pages in the library have licenses that may allow individuals to make changes, save, and print this book. Carefully consult the applicable license(s) before pursuing such effects.

Instructors can adopt existing LibreTexts texts or Remix them to quickly build course-specific resources to meet the needs of their students. Unlike traditional textbooks, LibreTexts' web based origins allow powerful integration of advanced features and new technologies to support learning.

The LibreTexts mission is to unite students, faculty and scholars in a cooperative effort to develop an easy-to-use online platform for the construction, customization, and dissemination of OER content to reduce the burdens of unreasonable textbook costs to our students and society. The LibreTexts project is a multi-institutional collaborative venture to develop the next generation of open-access texts to improve postsecondary education at all levels of higher learning by developing an Open Access Resource environment. The project currently consists of 14 independently operating and interconnected libraries that are constantly being optimized by students, faculty, and outside experts to supplant conventional paper-based books. These free textbook alternatives are organized within a central environment that is both vertically (from advance to basic level) and horizontally (across different fields) integrated.

The LibreTexts libraries are Powered by NICE CXOne and are supported by the Department of Education Open Textbook Pilot Project, the UC Davis Office of the Provost, the UC Davis Library, the California State University Affordable Learning Solutions Program, and Merlot. This material is based upon work supported by the National Science Foundation under Grant No. 1246120, 1525057, and 1413739.

Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation nor the US Department of Education.

Have questions or comments? For information about adoptions or adaptions contact info@LibreTexts.org. More information on our activities can be found via Facebook (https://facebook.com/Libretexts), Twitter (https://twitter.com/libretexts), or our blog (http://Blog.Libretexts.org).

This text was compiled on 12/13/2023

TABLE OF CONTENTS

9: Theories of Cognitive development

10: Cognitive Development- Strategies in Group Care

11: Overview of Language Development

12: Theories of Language Acquisition

16: Social Development

17: Supporting Social and Emotional Development in Group Care

18: Attachment and Reciprocal Relationships

19: Temperament

20: Influences on Development

21: Licensing and Regulations

22: Caregiving Practices- Primary Care

23: Caregiving Practices- Small Group Size and Low Ratios

24: Caregiving Practices- Continuity of Care

25: Caregiving Practices- Routines

26: Inclusive Caregiving

27: Indoor Environment

28: Outdoor Environment

29: Introduction to Observation

30: Documentation

31: Assessment

32: Introduction to Curriculum

How this Book is Organized

Not your ordinary textbook

In the following pages, what you will find is not a textbook in the traditional sense. Instead, this book is a compilation of created and remixed resources for use in various courses supporting the care and development of infants and toddlers. This textbook is intended to be pulled apart, remixed, reshared, and redistributed in the form that best meets your individual needs. For this reason, this resource has unique characteristics not typical of other textbooks.

- Each chapter or section is stand-alone. No chapter references another or makes statements such as “as you previously read.” This intentional design choice allows you to remix every section without concern about referencing a section you did not copy over.
- The chapters were created around topics we felt should be stand-alone and therefore had different length requirements. For this reason, you will notice a chapter might be 20 pages or 2.
- Chapters contain multiple sections to remix easily and create new and unique chapters for your individual needs.
- You might find repeat information within sections. Since each section is intended as a stand-alone section, information might be repeated within sections to give context to the subject matter. The beauty of OER is you have permission to delete and add as needed.
- We’ve made every effort to keep the original source with the content, as you remix be aware of the license types on each resource.

To best use a small window of time to complete this resource, we decided to forgo many of the extra “bells and whistles” one might find in traditional textbooks. Including call-out boxes with additional resources, robust vignettes, and reflection questions. While we feel this resource contains much of the content needed for multiple infant and toddler courses, we eagerly await each improvement upon this resource the infant and toddler educator community brings forth.

Licensing

*A detailed breakdown of this resource's licensing can be found in **Back Matter/Detailed Licensing**.*

An Open Educational Resource Supported by the Academic Senate for California Community Colleges Open Educational Resources Initiative

The Academic Senate for California Community Colleges Open Educational Resources Initiative (OERI) was funded by the California legislature in trailer bill language during the summer of 2018. The OERI's mission is to reduce the cost of educational resources for students by expanding the availability and adoption of high quality Open Educational Resources (OER). The OERI facilitates and coordinates the curation and development of OER texts, ancillaries, and support systems. In addition, the OERI supports local OER implementation efforts through the provision of professional development, technical support, and technical resources.

Please bring all such errors and changes to the attention of Academic Senate of California Community Colleges OER Initiative via e-mail (oeri@asccc.org).

Academic Senate for California Community Colleges
One Capitol Mall, Suite 230
Sacramento, CA 95814

CHAPTER OVERVIEW

1: Infants and Toddlers An Introduction

1.1: Introduction

Care and Development of Infants and Toddlers: An Introduction

When you think about infants and toddlers, what words and images come to mind? William James imagined infants as experiencing a “blooming, buzzing confusion” (James, 1890). More recent and more accurate images consider infants and toddlers as young scientists making sense of their world as they actively engage with it (Gopnik, 2012; Gopnik, Meltzoff & Kuhl, 1999). The goal of this section is to briefly introduce you to infants and toddlers by presenting demographic information, guiding principles of infant/toddler care and education and to demonstrate why quality care and education for infants and toddlers is so important.

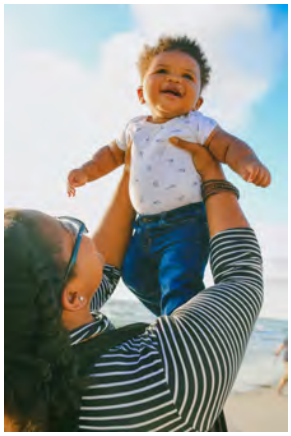


Figure 1.1.1: Infant enjoying a caregivers playfullness (Image by Larry Crayton on Unsplash.)

1.2: Who are Infants and Toddlers?

Infants and Toddlers

As a collective, the term “infants and toddlers” refers to children from birth to three years of age. More specifically, infancy refers to children between birth and one year of age, while toddlerhood refers to children between 1 and three years of age. In many texts, infants and toddlers are perceived as a homogenous group (i.e., Maguire-Fong, 2014); however, recent research highlights the importance of recognizing the individual differences between children under three years of age (Frank, Braginsky, Yurovsky & Marchman, 2021; Kidd, Donnelly & Christiansen, 2018; Pérez-Edgar, Vallorani, Buss & LoBue, 2020). It is now undeniable one cannot consider all infants or toddlers to be developmentally similar or to have similar experiences. There are important, early forming and long-lasting individual developmental differences (Marchman & Fernald, 2008).

Infants and toddlers in the U.S. represent a diverse group demographically. The organization *Zero to Three* conducts a large annual report revealing state and national data on infants and toddlers (Keating et al., 2021). Across the years, the data have revealed a few general findings that are noteworthy when considering who infants and toddlers are and their individual differences (each year’s data may be different so this list presents average findings across the years that data has been collected so far):

- Over 50% of the nation’s children under three years of age are children of color.
- About 40% of infants and toddlers live in households where the income is less than twice the federal poverty level (about $50,000 a year for a family of four in 2018).
- Approximately 20% of infants and toddlers live with a single parent.
- Infants and toddlers have the highest rates of abuse and neglect of any age group.
- Approximately 20% infants and toddlers have already been exposed to one adverse childhood experience and about 7% have experienced two or more.
- Less than 40% of infants and toddlers are read to every day.
- There are racial/ethnic disparities across several critical domains, such as prenatal care, preterm birth rates, breastfeeding rates and crowded housing.
- There are disparities based on family income, such as maternal mental health, breastfeeding rates, neighborhood safety, adverse childhood experiences, book reading frequency, and developmental screenings.
- States differ greatly in offering positive learning experiences in child care settings and in the homes of families.

1.3: What does Care and Education of Infants and Toddlers mean?

Care and Education of Infants and Toddlers

What does care and education of infants and toddlers even mean? Perhaps it is most clear to start by describing what it is not. Care and education of infants and toddlers is not babysitting. Babysitting, or keeping an eye on a child and making sure they are safe, is hardly even the minimum of what this means. The first three years of a child's life are a critical foundation for later development, so caregivers need to implement research-supported strategies to create secure and stimulating experiences with quality relationships in the classroom.

Figure 1.3.1: The fun of play Image by Antoine Hawa on Unsplash

Care and education of infants and toddlers is not preschool. Although there are many different preschool pedagogical approaches, they often revolve around schedules of table top activities, circle time and indoor/outdoor play. Should this be similar for infants and toddlers? For some, infant and toddler education is just like preschool—or at least the goal is for it to be as similar to preschool as possible. The activities might differ and the allotment of time devoted to activities may be different, but many infant and toddler programs attempt to be replications of preschool curricula, using a diluted approach.

Care and education of infants and toddlers is and should be very different from preschool curriculum. The term curriculum is being used more frequently in reference to infants and toddlers, but it carries a different meaning than what is commonly considered when people think about curriculum. What do you think about when you consider the term curriculum? Do you envision a curriculum book that lays out day-by-day activities with weekly and monthly themes? This is common in many preschool settings. Curriculum for infants and toddlers is different. Curriculum for children under three years of age focuses on relationships while closely observing and reflecting upon the interactions and experiences that unfold.

1.4: Guiding Principles of Infant and Toddler Care and Education

Principles of Care

Decades of research and theory have produced some general guiding principles that are an important starting place for understanding infant and toddler care and education.[1]

Principle #1: Children are active participants in shaping their own development.

Infants and toddlers seek out information from their environments and social partners through eye gaze, communication/language, physical touches and manual manipulations of objects. Specific types of information attract infants' attention and provide unique access into helping them understand how the world works. For example, infants prefer to listen to infant-directed language and this type of language exposure from adults helps infants acquire language (García-Sierra, Ramírez-Esparza, Wig & Robertson, 2021; Graf Estes & Hurley, 2013). A great example of how active participation shapes personal development comes from motor development. Even after toddlers begin to walk, there is still much more improvement needed to walk efficiently. In fact, toddlers take an average of 2,368 steps each hour and also fall an average of 17 times (Adolph et al., 2012). Actively engaging in the practice of walking shapes their own developmental process in walking efficiency. Additionally, actively engaging in the practice of walking is related to individual differences in language and cognitive development since walking creates new opportunities to engage with other people, holding objects while being mobile and encountering new objects and experiences (Karasik, Adolph, Tamis-LeMonda & Zuckerman, 2012; Schneider & Iverson, 2021; West & Iverson, 2021).[1]

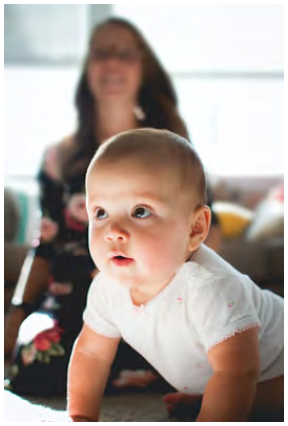


Figure 1.4.1: Infant and Caregiver. (Image by Kevin Gent on Unsplash)

Principle #2: Relationships and experiences are the primary ways development occurs.

Infants and toddlers develop through adult-child and child-child relationships and through exploring their world, both alone and with others. Sensitive, respectful, and stable relationships with caregivers serve as the foundation for the healthy development of infants and toddlers (Bornstein et al., 2020; Li et al., 2022; Raby et al., 2019). These relationships are the starting place for language, social, emotional, and cognitive development—and these relationships are literally shaping the structure of the developing brain (Bernier, Calkins & Bell, 2016; King et al., 2021; Nelson, Zeanah & Fox, 2019).[1]

Principle #3: Development is complex and transactional.

Children and their contexts shape each other in ongoing and cyclical ways—referred to as the transactional model of development (Sameroff, 2009; Sameroff & Mackenzie, 2003). For example, each child is raised in a cultural context that shapes all aspects of development, but the child's particular familial or cultural context may also affect the larger community context over time in complex ways. The same environmental factors can affect different children and families in different ways. Likewise, different environmental factors can have a similar effect on children. For example, toddlers from lower SES homes typically are exposed to less language; however, this is not always the case as even amongst all low SES families, some toddlers are exposed to an abundance of language while others are exposed to much less (Weisleder & Fernald, 2013). Figure 1.4.2 shows how the amount of words toddlers hear in one day differs greatly amongst families. In the graph, each vertical bar represents one child's total amount of words they are exposed to in one day. So even though all these toddlers were from low SES families, there were significant differences in the amount of language from caregivers.[1]

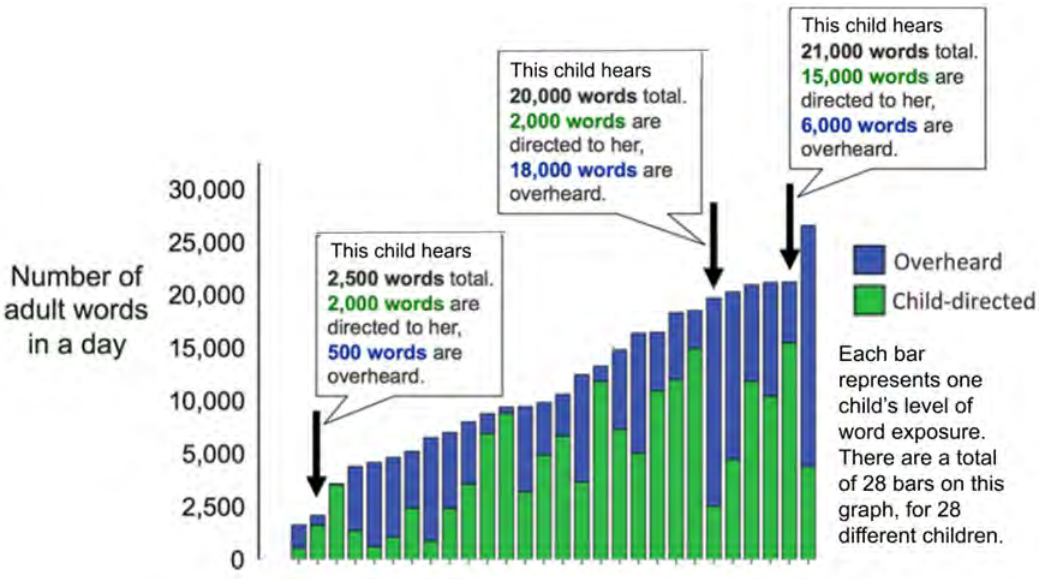


Figure 1.4.2:

Each bar represents one child's level of word exposure. There are total of 28 bards on this graph, for 28 different children. This graph shows the number of words that different kids heard from grownups in 1 day. The bottom section/green part of each bar shows the number of words that grownups said to that kid in 1 day. The top/blue part of each bar shows the number of words that kids overheard when grownups were talking to other people. For example, kid 2 heard 2,500 words total. 2,000 words are directed to her, and 500 words are overheard. Child 23 hears 20,000 words total. 2,000 words are directed to her, 18,000 words are overheard. Child 27 hears 21,000 words total. 15,000 words are directed to her, 6,000 words are overheard.

. (Image adapted from Lew-Williams & Weisleder (2017). How Do Little Kids Learn Language? *Frontiers for Young Minds*, *5*, 45. CC by 4.0)

Principle #4: Development and learning occur in multiple systems or contexts.

Infants and toddlers develop as the result of the direct interactions they have with the people in their world (family, friends, non-parental caregivers), as well as the indirect influences, including community resources, policies in parental work settings, state child care policies, and many more physical, social, and interactional environments (Bronfenbrenner & Morris, 2006; Rowe & Weisleder, 2020). Within these multiple systems and contexts, parents are children's first and most influential caregivers and their primary sources of knowledge. The quality of these various contexts can greatly influence the developmental trajectories of infants and toddlers (Gilkerson et al., 2018; Larose et al., 2021; Shuffrey et al., 2022). [1]

Principle #5: All areas of development are interrelated.

During the infant and toddler period, the domains of development (i.e., physical development, cognitive development, and social development) are interrelated. Development in one domain influences development in other domains. For example, an infant's motor ability to sit independently is related to cognitive and language development (Oudgenoeg-Paz, Volman & Leseman, 2012; Veldman et al., 2019). As a result, developmental domains cannot be considered in isolation from each other. The dynamic interaction of all areas of development must be considered when planning for and interacting with all children, especially infants and toddlers. [1]

Figure 1.4.3:The fun of exploration. (Image by Nandhu Kumar on Unsplash)

Principle #6: There are vast individual differences in rates of development among children.

Each child has a unique rate of growth and development. Some children may have a developmental delay or disability requiring early intervention and/or adaptations to be successful in achieving a particular developmental outcome. Furthermore, early forming individual differences are important because they are often associated with positive outcome benefits. For example, achieving motor milestones earlier (sitting or walking) is related to short-term growth in language abilities (Carina, Leinweber & Ritterfeld, 2019; He, Walle & Campos, 2015). While milestone charts can provide approximates for what is considered typical development, recent research into early individual differences highlights the important role caregivers have for providing high-quality positive care and educational environments for infants and toddlers (Lopez et al., 2020; Ramírez, Lytle & Kuhl, 2020). [1]

Principle #7: Birth to age 3 is a distinct developmental period that is the foundation for later development.

Periods of rapid growth and change, such as during infancy, offer the greatest opportunities for experiences or interventions to influence the course of development (Raikes, Love, & Chazan-Cohen, 2004). The relationships and experiences that influence development from birth through age 3 can have a profound and lasting impact. For example, experiences during infancy affect the architecture of the brain or the way the brain is "wired" (Center on the Developing Child, 2007), as well as how the brain works, including how fast it thinks, how it makes connections and remembers, how it pays attention to information, and how it forms ideas, concepts, and understandings (Fernald, Perfors & Marchman, 2006; Rose, Feldman, Jankowski, & Van Rossem, 2008). Infancy and toddlerhood is characterized by rapid growth and development of concepts, attitudes, skills, and abilities that are foundational for current development, later success in school, and lifelong learning (Domond et al., 2020; Early Head Start National Resource Center, 2012; Losier et al., 2021). [1]

Figure 1.4.4:The fun of exploration (Image by Senjuti Kundu on Unsplash)

[1] Horm et al., (2016). Developmental foundations of school readiness for infants and toddlers: A research to practice report. OPRE Report #2016-07, Washington, DC: Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services. In the public domain.

1.5: Why is Care and Education with Infants and Toddlers Important?

The rapid growth that unfolds during the first three years of a child's life is unprecedented and establishes a developmental foundation for future years to build off of. The experiences infants and toddlers have are related to short-term and long-term growth trajectories. Not only are the infant and toddler years associated with school readiness, but the first three years are also a wise investment for long-term academic and developmental outcomes.

School Readiness for Infants and Toddlers?

Until very recently, the majority of work in school readiness has focused on the preschool period. In fact, the term school readiness itself is controversial when applied to infants and toddlers. School readiness often brings about the idea of formal academics such as letters and numbers presented in ways that are not developmentally appropriate for infants and toddlers. However, as the term school readiness became more broadly defined and the research base documenting the important foundations for later learning established during the first three years expanded, families, programs serving infants and toddlers, and policymakers have increasingly accepted that school readiness begins in infancy.

Several organizations have issued guidance and developed resources for programs, practitioners, and families on how to think about and offer services to support the foundations of school readiness in infants and toddlers. For example, in 2013, the National

Association for the Education of Young Children (NAEYC) published a book entitled Developmentally Appropriate Practice: Focus on Infants and Toddlers devoted to defining and applying the concept of developmentally appropriate practice for teachers and caregivers working in infant and toddler programs (Copple, Bredekamp, Koralek, & Charner, 2013). The Office of Head Start has also provided guidance to programs through developing the Framework for Programs Serving Infants and Toddlers and Their Families and The Parent, Family, and Community Engagement (PFCE) Framework. Figure 1.5.1 presents the Framework for Programs Serving Infants and Toddlers. An important aspect of the Early Head Start framework is the relationship between the provision of high-quality services and children's growth and development. The quality of early childhood service is multidimensional and encompasses not only characteristics of staff but also the quality of the interactions and relationships among staff members and the children and parents with whom they work. States have also published expectations for infants, toddlers, and their caregivers (National Center on Child Care Quality Improvement, 2019). As of 2019, all U.S. states have developed early learning development guidelines for preschool children (3 to 5 years old), and most states, although not all, have early learning development guidelines that either include or are separate for infants and toddlers. [1] [2]

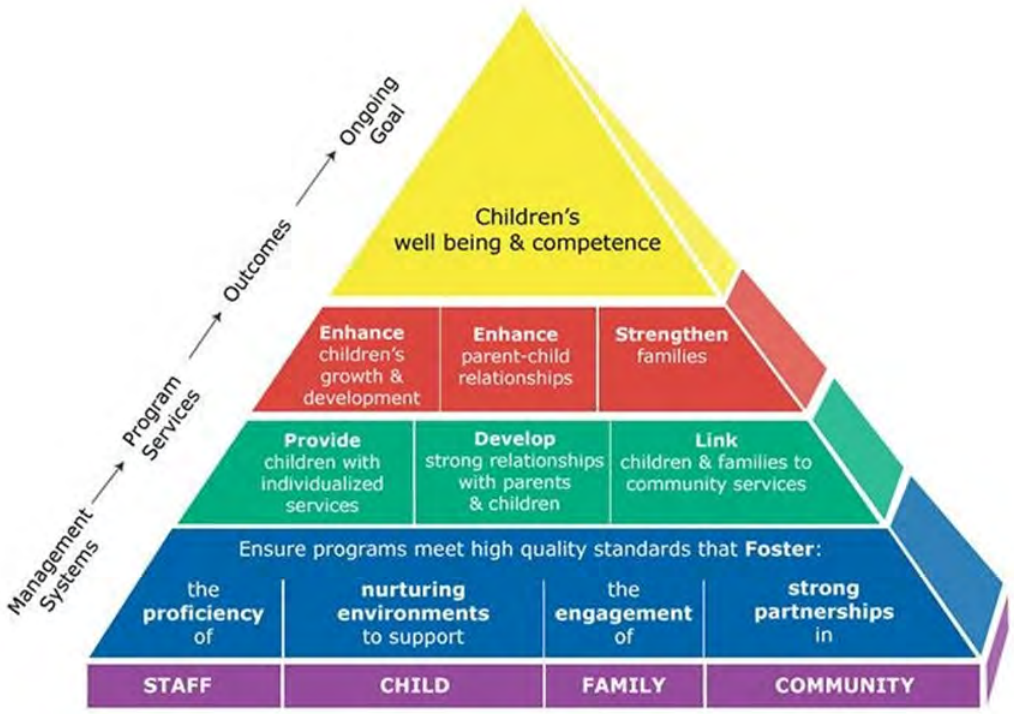


Figure 1.5.1: Children's well-being and competence enhance children's growth and development, enhance parent-child relationships, strengthen families, provide children with individualized services, develop strong relationships with parents and children, link children and families to community services. Ensure programs meet high-quality standards that Foster: the proficiency of staff, nurturing environments to support child, the engagement of family strong partnerships in the community (Image from Vogel et al., (2015). Toddlers in Early Head Start: A portrait of 2-year-olds, their families, and the programs serving them)

The infant and toddler period is an opportunity to support young children's optimal development and to set a positive path for school readiness and life-long success. It is also true that all opportunities involve risk. A risk with applying the concept of school readiness to infants and toddlers is the temptation to funnel practices developed for preschoolers to children under three years of age. To avoid this risk, attention to the unique developmental characteristics of infants and toddlers and purposeful reflection is required to ensure activities and interactions are age-appropriate. [1]

Infant and Toddler Care & Education: A Wise Investment

The experiences infants and toddlers receive during the first three years of life can have a long-lasting impact on their later development, academic achievement and income in adulthood. While there are numerous studies documenting the long-term benefits of investing into the preschool years (Bai, Ladd, Muschkin & Dodge, 2020; Deming, 2009; Fisher, Barker & Blaisdell, 2020; Joo et al., 2020; Knudsen, Heckman, Cameron & Shonkoff, 2006; Nores, Belfield, Barnett & Schweinhart, 2005), more recent studies have revealed that investing into the infant and toddler years has strong, long-lasting benefits as well.

When children attend center-based or family child care programs as infants, they are more likely to graduate high school (compared to dropping out) and less likely to be in poverty as adults (Domond et al., 2020; Gertler et al., 2014; Losier et al., 2021). Attending center-based programs, compared to informal care, such as by a family member, can have a long-lasting, positive impact on a child's social-emotional, language and cognitive development (Davies et al., 2021; Felfe & Lalive, 2014; Gomajee et al., 2018; Hansen & Hawkes, 2009; Luijk et al., 2015; Orri et al., 2019). Infants and toddlers who attended a center-based program for at least one year saw the greatest social and emotional benefits later in childhood (Gomajee et al., 2018). During the COVID-19 pandemic, infants and toddlers who attended group care programs, compared to those in informal care, had higher cognitive abilities (Davies et al., 2021). In Chile, toddlers who attended center-based care had higher cognitive and language scores, compared to toddlers in informal care (Narea, Arriagada & Allel, 2020; Narea, Toppelberg, Irarrázaval & Xu, 2020).

Figure 1.5.2: Caregiver and an infant interacting (Image by Dragon Pan on Unsplash)

The greatest returns on investments into infancy and toddlerhood may be for the children who are most at risk (Felfe & Lalive, 2014). One risk factor for optimal child development outcomes is low socioeconomic status (SES). SES is a multidimensional construct, combining factors such as an individual's (or parent's) education, occupation, and income (McLoyd, 1998). In 2020, there were 37.2 million people in poverty in the U.S., approximately 3.3 million more than in 2019 (United States Census Bureau, 2012). Approximately 40% of infants and toddlers live in households that are low-income or in poverty (Keating et al., 2021). In California, infants and toddlers of color are more likely to be growing up in poverty (Keating et al., 2021). Figure 1.5.3 shows the percentage of children under three years of age in California, by race, who are living in poverty. Compared to only 7% of White children, 39.2% of American Indian/Alaska Native, 31.8% of Black and 22.2% of Hispanic children are growing up in poverty (Keating et al., 2021). [3] [4]

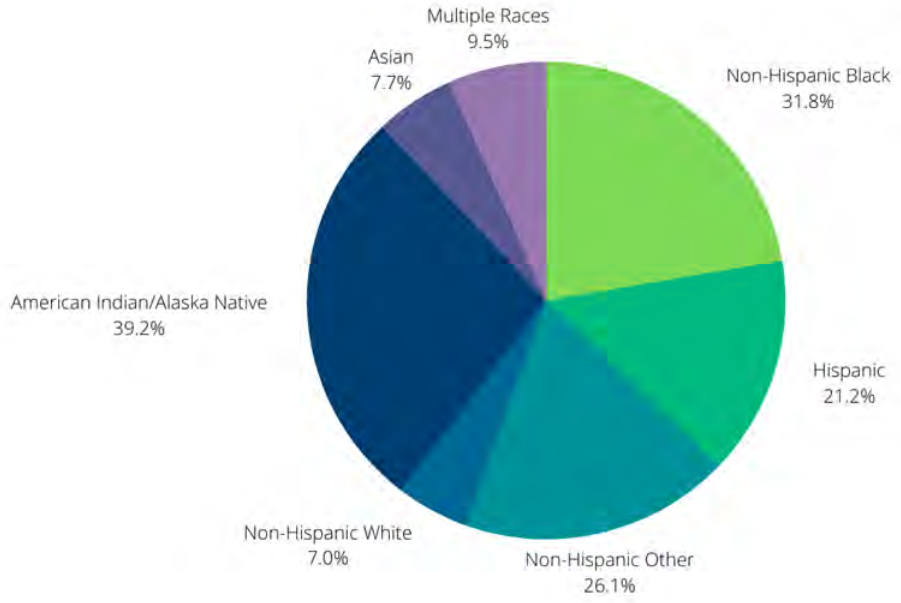


Figure 1.5.3: Percentage of infants and toddlers in California in poverty, by race. Asian 7.7 %, Multiple Races 9.5%, Non-Hispanic Black 31.8%, Hispanic 21.2%, Non Hispanic Other 26.1%, Non-Hispanic White 7.0%, American Indian/Alaska Native 39.2% (Image by Todd LaMarr is licensed under CC by 4.0 [5]

The negative impact SES can have on childrens' development begins to show an effect during the first three years. Significant disparities in vocabulary and language processing efficiency were evident at 18 months between infants from higher and lower SES families. In fact, by 24 months, there is a six month gap between SES groups in the ability to process language (Fernald et al., 2013). Importantly, these early differences do not fade stronger language abilities as toddlers are related to stronger language abilities and higher cognitive abilities later in childhood (Gilkerson et al., 2018; Marchman & Fernald, 2008). Already by 21 months of age, toddlers from higher SES families have greater language and memory skills (Noble et al., 2015). [6]

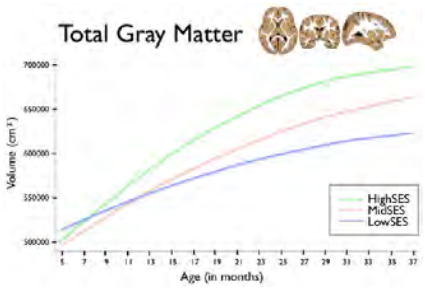


Figure 1.5.4: Trajectory of total gray matter growth from 5 to 37 months of age. Age in months is shown on the horizontal axis, spanning from 5 to 37 months. Total gray matter volume is shown on the vertical axis. The blue line shows children from Low SES households; children from Mid SES households are shown in red. The green line shows children from High SES households. ([9]

The negative impact SES can have on childrens' development is a worldwide concern. Latin America is a region that struggles with wealth inequality. After examining young children from five Latin American countries, differences in language skills between the highest and lowest wealth groups emerged by three years of age (Schady et al., 2014). In Ecuador and Colombia, children from higher SES families score higher on language and cognitive assessments and the relationship between SES and ability only grows wider with time (Paxson & Schady, 2007; Rubio-Codina et al., 2015; Schady, 2011). By two years of age, statistically significant differences in IQ had emerged between British children of high and low SES families (Von Stumm & Plomin, 2015). A cross-country study of children from India, Indonesia, Peru and Senegal found that differences in child-development scores emerged as early as nine months of age for children in the highest and lowest SES groups (Fernald, Kariger, Hidrobo & Gertler, 2012). A study from Bangladesh found cognitive differences between SES groups in infants by seven months of age (Hamadani et al., 2014). [6]

The quality of care and education in group care programs during the first three years can be an important factor to reduce the impact SES can have on children's developmental trajectory (Felfe & Lalive, 2014; Holochwost et al., 2021). Children from low SES families score lower on academic readiness and achievement, unless the children attended a formal childcare program during their first four years of life, including during infancy and toddlerhood (Geoffroy et al., 2010). Infants and toddlers from low SES families exposed to center-based child care demonstrate better reading, writing, and mathematics scores than low-SES children never exposed to center-based programs (Laurin et al., 2015). Children from low SES families who begin center-based care by five months of age have better reading and mathematical skills than infants and toddlers who do not start until eighteen months of age or later. Toddlers who were read to everyday by caregivers had higher reading and math scores as four year olds (Lombardi, Fisk & Cook, 2021). Children who were attending infant child care programs by nine months of age, had greater cognitive abilities later as three year olds (Côté, Doyle, Petitclerc & Timmins, 2013). Although the interaction between SES and child development is complex, research suggests that center-based care is related to greater developmental outcomes due to the quantity and quality of language shared between caregivers and children along with cognitively stimulating experiences (Davis et al., 2021; Lombardi, Fisk & Cook, 2021).

---

[1] "Early learning and development guidelines" from National Center on Child Care Quality Improvement is in the public domain.

[2] "Income and Poverty in the United States: 2020" from the United States Census Bureau is in the public domain.

[3] Brito & Noble (2014). Socioeconomic status and structural brain development. *Frontiers in Neuroscience, 8*, 276. CC by 3.0

[4] "Income and Poverty in the United States: 2020" from the United States Census Bureau is in the public domain.

[5] Image by Todd LaMarr is licensed under CC by 4.0. Data is from Keating, Cole & Schneider, A. (2021). State of babies yearbook: 2021.

Washington, DC: ZERO TO THREE

[6] Reynolds (2021). Center-Based Child Care and Differential Improvements in the Child Development Outcomes of Disadvantaged Children. *Child & Youth Care Forum*. CC by 4.0

[7] Brito & Noble (2014). Socioeconomic status and structural brain development. *Frontiers in Neuroscience, 8*, 276. CC by 3.0

[8] "Anatomy and Physiology" on OpenStax is licensed under CC by 4.0.

[9] Image from Hanson et al., (2013). Family poverty affects the rate of human infant brain growth. *PloS One, 8*(12), e80954. CC by 4.0

1.6: Conclusion

Care and Development: Conclusion

The development that takes place over the first three years is unlike what happens in any other period. The growth of personality, physical abilities and language are rapid and being able to witness the process of how development unfolds is truly remarkable. Nevertheless, the experiences children are exposed to during this time (both positive and negative) can have a direct impact on their developmental trajectories. Infants and toddlers are not a homogenous group various individual differences across children are essential to recognize because they can impact a child's unique developmental trajectory. Investing into the first three years can reap long-term outcomes. To best support optimal development caregivers should engage in quality interactions and create stimulating environments that foster positive relationships and learning experiences.

1.7: References

References

1. Adolph, K. E., Cole, W. G., Komati, M., Garciaguirre, J. S., Badaly, D., Lingeman, J. M., Chan, G. & Sotsky, R. B. (2012). How do you learn to walk? Thousands of steps and dozens of falls per day. *Psychological Science*, *23*(11), 1387-1394.
2. Bai, Y., Ladd, H. F., Muschkin, C. G., & Dodge, K. A. (2020). Long-term effects of early childhood programs through eighth grade: Do the effects fade out or grow? *Children and Youth Services Review*, 104890.
3. Bernier, A., Calkins, S. D., & Bell, M. A. (2016). Longitudinal associations between the quality of mother–infant interactions and brain development across infancy. *Child Development*, *87*(4), 1159-1174.
4. Bornstein, M. H., Putnick, D. L., Bohr, Y., Abdelmaseh, M., Lee, C. Y., & Esposito, G. (2020). Maternal sensitivity and language in infancy each promotes child core language skill in preschool. *Early Childhood Research Quarterly*, *51*, 483-489.
5. Bronfenbrenner, U., & Morris, P. A. (2006). The bioecological model of human development. In W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology, Volume 1: Theoretical models of human development* (6th ed., pp. 793-828). New York, NY: John Wiley.
6. Carina, L. Ü. K. E., Leinweber, J., & Ritterfeld, U. (2019). Walking, pointing, talking–the predictive value of early walking and pointing behavior for later language skills. *Journal of Child Language*, *46*(6), 1228-1237.
7. Center on the Developing Child at Harvard University. (2007). *A science-based framework for early childhood policy: Using evidence to improve outcomes in learning, behavior, and health for vulnerable children*. Cambridge, MA. Retrieved from http://www.developingchild.harvard.edu
8. Copple, C., Bredekamp, S., Koralek, D., & Charner, K. (2013). *Developmentally appropriate practice: Focus on infants and toddlers*. Washington, DC: National Association for the Education of Young Children.
9. Côté, S. M., Doyle, O., Petitclerc, A., & Timmins, L. (2013). Child care in infancy and cognitive performance until middle childhood in the millennium cohort study. *Child Development*, *84*(4), 1191-1208.
10. Davies, C., Hendry, A., Gibson, S. P., Gliga, T., McGillion, M., & Gonzalez-Gomez, N. (2021). Early childhood education and care (ECEC) during COVID-19 boosts growth in language and executive function. *Infant and Child Development*, e2241.
11. Deming, D. (2009). Early childhood intervention and life-cycle skill development: Evidence from Head Start. *American Economic Journal: Applied Economics*, *1*(3), 111-34.
12. Domond, P., Orri, M., Algan, Y., Findlay, L., Kohen, D., Vitaro, F., Tremblay, R. E. & Côté, S. M. (2020). Child care attendance and educational and economic outcomes in adulthood. *Pediatrics*.
13. Early Head Start National Resource Center. (2012). *School readiness goals for infants and toddlers in Head Start and Early Head Start Programs: Examples from the Early Head Start National Resource Center*. Washington, DC: Zero To Three.
14. Felfe, C., & Lalive, R. (2014). Does early child care help or hurt children's development? *Journal of Public Economics*, *59*.
15. Fernald, A., Marchman, V. A., & Weisleder, A. (2013). SES differences in language processing skill and vocabulary are evident at 18 months. *Developmental Science*, *16*(2), 234-248.
16. Fernald, A., Perfors, A., & Marchman, V. A. (2006). Picking up speed in understanding: Speech processing efficiency and vocabulary growth across the 2nd year. *Developmental Psychology*, *42*(1), 98.
17. Fernald, L. C., Kariger, P., Hidrobo, M., & Gertler, P. J. (2012). Socioeconomic gradients in child development in very young children: Evidence from India, Indonesia, Peru, and Senegal. *Proceedings of the National Academy of Sciences*, *109*(2), 17273-17280.
18. Fisher, P. A., Barker, T. V., & Blaisdell, K. N. (2020). A glass half full and half empty: The state of the science in early childhood prevention and intervention research. *Annual Review of Developmental Psychology*, *2*, 269-294.
19. Frank, M. C., Braginsky, M., Yurovsky, D., & Marchman, V. A. (2021). *Variability and consistency in early language learning: The Wordbank project*. MIT Press.
20. García-Sierra, A., Ramírez-Esparza, N., Wig, N., & Robertson, D. (2021). Language learning as a function of infant directed speech (IDS) in Spanish: Testing neural commitment using the positive-MMR. *Brain and Language*, *212*, 104890.
21. Geoffroy, M. C., Côté, S. M., Giguère, C. É., Dionne, G., Zelazo, P. D., Tremblay, R. E., Bolvin, M. & Séguin, J. R. (2010). Closing the gap in academic readiness and achievement: The role of early childcare. *Journal of Child Psychology and Psychiatry*, *51*(12), 1359-1367.
22. Gertler, P., Heckman, J., Pinto, R., Zanolini, A., Vermeersch, C., Walker, S., Chang, S. M. & Grantham-McGregor, S. (2014). Labor market returns to an early childhood stimulation intervention in Jamaica. *Science*, *344*(6187), 998-1001.

23. Gilkerson, J., Richards, J. A., Warren, S. F., Oller, D. K., Russo, R., & Vohr, B. (2018). Language experience in the second year of life and language outcomes in late childhood. *Pediatrics*, *142*(4).
24. Golinkoff, R. M., Hoff, E., Rowe, M. L., Tamis-LeMonda, C. S., & Hirsh-Pasek, K. (2019). Language matters: Denying the existence of the 30-million-word gap has serious consequences. *Child Development*, *90*(3), 985-992.
25. Gomajee, R., El-Khoury, F., Côté, S., van der Waerden, J., Pryor, L., & Melchior, M. (2018). Early childcare type predicts children's emotional and behavioural trajectories into middle childhood. Data from the EDEN mother–child cohort study. *Journal of Epidemiology and Community Health*, *72*(11), 1033-1043.
26. Gopnik, A. (2012). Scientific thinking in young children: Theoretical advances, empirical research, and policy implications. *Science*, *337*(6102), 1623-1627.
27. Gopnik, A., Meltzoff, A. N., & Kuhl, P. K. (1999). *The scientist in the crib: Minds, brains, and how children learn*. William Morrow & Co.
28. Graf Estes, K., & Hurley, K. (2013). Infant-directed prosody helps infants map sounds to meanings. *Infancy*, *18*(5), 797-824.
29. Hamadani, J. D., Tofail, F., Huda, S. N., Alam, D. S., Ridout, D. A., Attanasio, O., & Grantham-McGregor, S. M. (2014). Cognitive deficit and poverty in the first 5 years of childhood in Bangladesh. *Pediatrics*, *134*(4), e1001-e1008.
30. Hansen, K., & Hawkes, D. (2009). Early childcare and child development. *Journal of Social Policy*, *38*(2), 211-239.
31. Hanson, J. L., Chandra, A., Wolfe, B. L., & Pollak, S. D. (2011). Association between income and the hippocampus. *PloS One*, 6(5), e18712.
32. Hanson, J. L., Hair, N., Shen, D. G., Shi, F., Gilmore, J. H., Wolfe, B. L., & Pollak, S. D. (2013). Family poverty affects the rate of human infant brain growth. *PloS One*, *8*(12), e80954.
33. He, M., Walle, E. A., & Campos, J. J. (2015). A cross-national investigation of the relationship between infant walking and language development. *Infancy*, *20*(3), 283-305.
34. Holochwost, S. J., Gomes, L. A., Propper, C. B., Brown, E. D., & Iruka, I. U. (2021). Child care policy as an anti-poverty strategy: The need to address neurophysiological self-regulation. *Policy Insights from the Behavioral and Brain Sciences*, *8*(2), 208-216.
35. Jednoróg, K., Altarelli, I., Monzalvo, K., Fluss, J., Dubois, J., Billard, C., Dehaene-Lambertz, G. & Ramus, F. (2012). The influence of socioeconomic status on children's brain structure. *PLoS One*, *7*, e42486.
36. Joo, Y. S., Magnuson, K., Duncan, G. J., Schindler, H. S., Yoshikawa, H., & Ziol-Guest, K. M. (2020). What works in early childhood education programs?: A meta–analysis of preschool enhancement programs. *Early Education and Development*, *31*(1), 1-26.
37. Karasik, L. B., Adolph, K. E., Tamis-LeMonda, C. S., & Zuckerman, A. L. (2012). Carry on: Spontaneous object carrying in 13-month-old crawling and walking infants. *Developmental Psychology*, *48*(2), 389.
38. Keating, K., Daily, S., Cole, P., Murphey, D., Pina, G., Ryberg, R., Moron, L., & Laurore, J. (2021). State of Babies Yearbook: 2019. Washington, DC: ZERO TO THREE and Bethesda MD: Child Trends.
39. Kidd, E., Donnelly, S., & Christiansen, M. H. (2018). Individual differences in language acquisition and processing. *Trends in Cognitive Sciences*, *22*(2), 154-169.
40. King, L. S., Camacho, M. C., Montez, D. F., Humphreys, K. L., & Gotlib, I. H. (2021). Naturalistic language input is associated with resting-state functional connectivity in infancy. *Journal of Neuroscience*, *41*(3), 424-434.
41. Knudsen, E. I., Heckman, J. J., Cameron, J. L., & Shonkoff, J. P. (2006). Economic, neurobiological, and behavioral perspectives on building America's future workforce. *Proceedings of the National Academy of Sciences*, *103*(27), 10155-10162.
42. Lange, N., Froimowitz, M. P., Bigler, E. D., Lainhart, J. E., & Brain Development Cooperative Group. (2010). Associations between IQ, total and regional brain volumes, and demography in a large normative sample of healthy children and adolescents. *Developmental Neuropsychology*, *35*(3), 296-317.
43. Larose, M. P., Côté, S. M., Ouellet-Morin, I., Maughan, B., & Barker, E. D. (2021). Promoting better functioning among children exposed to high levels of family adversity: The protective role of childcare attendance. *Journal of Child Psychology and Psychiatry*, *62*(6), 762-770.
44. Laurin, J. C., Geoffroy, M. C., Boivin, M., Japel, C., Raynault, M. F., Tremblay, R. E., & Côté, S. M. (2015). Child care services, socioeconomic inequalities, and academic performance. *Pediatrics*, *136*(6), 1112-1124.
45. Li, W., Devine, R. T., Ribner, A., Emmen, R. A., Mi-lan, J. W., Branger, M. C., Wang, L., van Ginkele, J., Alink, L. & Mesman, J. (2022). The role of infant attention and parental sensitivity in infant cognitive development in the Netherlands and China. *Journal of Experimental Child Psychology*, *215*, 105324.
46. Loi, E. C., Vaca, K. E., Ashland, M. D., Marchman, V. A., Fernald, A., & Feldman, H. M. (2017). Quality of caregiver-child play interactions with toddlers born preterm and full term: Antecedents and language outcome. *Early Human Development*, *115*,

110-117.
47. Lombardi, C. M., Fisk, E., & Cook, K. D. (2021). Do child care characteristics during toddlerhood explain income-based gaps in reading and math skills at preschool? *Children and Youth Services Review, 131*, 106285.
48. Lopez, L. D., Walle, E. A., Pretzer, G. M., & Warlaumont, A. S. (2020). Adult responses to infant prelinguistic vocalizations are associated with infant vocabulary: A home observation study. *Plos One*, *15*(11), e0242232.
49. Losier, T., Orri, M., Boivin, M., Larose, S., Japel, C., Tremblay, R. E., & Côté, S. M. (2021). The associations between child-care services during the preschool years and high school graduation: A 20-year longitudinal population-based study. *Journal of Developmental & Behavioral Pediatrics*.
50. Luby, J., Belden, A., Botteron, K., Marrus, N., Harms, M. P., Babb, C., Nishino, T. & Barch, D. (2013). The effects of poverty on childhood brain development: The mediating effect of caregiving and stressful life events. *JAMA Pediatrics*, *167*(12), 1135-1142.
51. Luijk, M. P. C. M., Linting, M., Henrichs, J., Herba, C. M., Verhage, M. L., Schenk, J. J., Arends, L. R., Raat, H., Jaddoe, V., Hofman, A., Verhulst, F. C., Tiemeier, H. & Van IJzendoorn, M. H. (2015). Hours in non-parental child care are related to language development in a longitudinal cohort study. *Child: Care, Health and Development*, *41*(6), 1188-1198.
52. Magnuson, K. A., Kelchen, R., Duncan, G. J., Schindler, H. S., Shager, H., & Yoshikawa, H. (2016). Do the effects of early childhood education programs differ by gender? A meta-analysis. *Early Childhood Research Quarterly, 36*, 521-536.
53. Maguire-Fong, M. J. (2014). *Teaching and learning with infants and toddlers: Where meaning-making begins*. Teachers College Press.
54. Marchman, V. A., & Fernald, A. (2008). Speed of word recognition and vocabulary knowledge in infancy predict cognitive and language outcomes in later childhood. *Developmental Science*, *11*(3), F9-F16.
55. Masek, L. R., Paterson, S. J., Golinkoff, R. M., Bakeman, R., Adamson, L. B., Owen, M. T., ... & Hirsh-Pasek, K. (2020). Beyond talk: Contributions of quantity and quality of communication to language success across socioeconomic strata. *Infancy*, *26*(1), 123-147.
56. McLoyd, V. C. (1998). Socioeconomic disadvantage and child development. *American Psychologist*, *53*(2), 185.
57. Narea, M., Arriagada, V., & Allel, K. (2020). Center-based care in toddlerhood and child cognitive outcomes in Chile: The moderating role of family socio-economic status. *Early Education and Development*, *31*(2), 218-233.
58. Narea, M., Toppelberg, C. O., Irarrázaval, M., & Xu, J. (2020). Maternal and non-maternal care in infancy and later child cognitive, language and motor development in Chile: Does type of care matter? *Early Childhood Research Quarterly, 51*, 204-214.
59. National Center on Child Care Quality Improvement. (2019). *Early learning and development guidelines*. Available at: https://childcareta.acf.hhs.gov/resource/state-early-learning-standards-and-guidelines
60. Nelson, C. A., Zeanah, C. H., & Fox, N. A. (2019). How early experience shapes human development: the case of psychosocial deprivation. *Neural Plasticity*.
61. Noble, K. G., Engelhardt, L. E., Brito, N. H., Mack, L. J., Nail, E. J., Angal, J., Barr, R., Fifer, W. P., Elliott, A. J. & PASS Network. (2015). Socioeconomic disparities in neurocognitive development in the first two years of life. *Developmental Psychobiology*, *57*(5), 535-551.
62. Noble, K. G., Houston, S. M., Kan, E., & Sowell, E. R. (2012). Neural correlates of socioeconomic status in the developing human brain. *Developmental Science*, *15*(4), 516-527.
63. Nores, M., Belfield, C. R., Barnett, W. S., & Schweinhart, L. (2005). Updating the economic impacts of the High/Scope Perry preschool program. *Educational Evaluation and Policy Analysis*, *27*(3), 245-261.
64. Orri, M., Tremblay, R. E., Japel, C., Boivin, M., Vitaro, F., Losier, T., Brendgen, M. R., Falissard, B., Melchior, M., & Côté, S. M. (2019). Early childhood child care and disruptive behavior problems during adolescence: a 17-year population-based propensity score study. *Journal of Child Psychology and Psychiatry*, *60*(11), 1174-1182.
65. Oudgenoeg-Paz, O., Volman, M. C. J., & Leseman, P. P. (2012). Attainment of sitting and walking predicts development of productive vocabulary between ages 16 and 28 months. *Infant Behavior and Development*, *35*(4), 733-736.
66. Paxson, C., & Schady, N. (2007). Cognitive development among young children in Ecuador the roles of wealth, health, and parenting. *Journal of Human Resources*, *42*(1), 49-84.
67. Pérez-Edgar, K., Vallorani, A., Buss, K. A., & LoBue, V. (2020). Individual differences in infancy research: Letting the baby stand out from the crowd. *Infancy*, *25*(4), 438-457.
68. Raby, K. L., Freedman, E., Yarger, H. A., Lind, T., & Dozier, M. (2019). Enhancing the language development of toddlers in foster care by promoting foster parents' sensitivity: Results from a randomized controlled trial. *Developmental Science*, *22*(2), e12753.

69. Raikes, H., Love, J., & Chazan-Cohen, R. (2004). Infant-toddler intervention on the road to school readiness: Lessons from early head start. *Harvard Family Research Project the Evaluation Exchange*, 22-23.
70. Ramírez, N. F., Lytle, S. R., & Kuhl, P. K. (2020). Parent coaching increases conversational turns and advances infant language development. *Proceedings of the National Academy of Sciences*, *117*(7), 3484-3491.
71. Rose, S. A., Feldman, J. F., Jankowski, J. J., & Van Rossem, R. (2008). A cognitive cascade in infancy: Pathways from prematurity to later mental development. *Intelligence*, *36*(4), 367-378.
72. Rowe, M. L., & Weisleder, A. (2020). Language development in context. *Annual Review of Developmental Psychology*, *2*, 201-223.
73. Rubio-Codina, M., Attanasio, O., Meghir, C., Varela, N., & Grantham-McGregor, S. (2015). The socioeconomic gradient of child development: Cross-sectional evidence from children 6–42 months in Bogota. *Journal of Human Resources*, *50*(2), 464-483.
74. Sameroff, A. (2009). *The transactional model of development: How children and contexts shape each other*. Washington, DC: American Psychological Association.
75. Sameroff, A. J., & Mackenzie, M. J. (2003). A quarter-century of the transactional model: How have things changed? *Zero to Three*, *24*(1), 14-22.
76. Schady, N. (2011). Parents' education, mothers' vocabulary, and cognitive development in early childhood: Longitudinal evidence from Ecuador. *American Journal of Public Health*, *101*(12), 2299-2307.
77. Schady, N., Behrman, J., Araujo, M. C., Azuero, R., Bernal, R., Bravo, D., Lopez-Boo, F., Macours, K., Marshall, D., Paxson, C. & Vakis, R. (2014). *Wealth gradients in early childhood cognitive development in five Latin American countries*. The World Bank.
78. Schneider, J. L., & Iverson, J. M. (2021). Cascades in action: How the transition to walking shapes caregiver communication during everyday interactions. *Developmental Psychology*.
79. Shuffrey, L. C., Firestein, M. R., Kyle, M. H., Fields, A., Alcántara, C., Amso, D., Austin, J., Bain, J. M., Barbosa, J., Bence, M., Bianco, C., Fernández, C. R.,Goldman, S., Gyamfi-Bannerman, C., Hott, V., Hu, H.,Hussain, M.,Factor-Litvak, P., Lucchini, M., Mandel, A., Marsh, R.,McBrian, D.,Mourad, M.,Muhle, R.,Noble, K. G.,Penn, A. A.,Rodriguez, C., Sania, A., Silver, W. G.,O'Reilly, K. C.,Stockwell, M.,Tottenham, N., Welch, M. G.,Zork, N.,Fifer, W. P., Monk, C. & Dumitriu, D. (2022). Association of birth during the COVID-19 pandemic with neurodevelopmental status at 6 months in infants with and without in utero exposure to maternal SARS-CoV-2 infection. *JAMA Pediatrics*, e215563-e215563.
80. Tamis-LeMonda, C. S., Bornstein, M. H., & Baumwell, L. (2001). Maternal responsiveness and children's achievement of language milestones. *Child Development*, *72*(3), 748-767.
81. Trude, A. C., Richter, L. M., Behrman, J. R., Stein, A. D., Menezes, A. M., & Black, M. M. (2020). Effects of responsive caregiving and learning opportunities during pre-school ages on the association of early adversities and adolescent human capital: an analysis of birth cohorts in two middle-income countries. *The Lancet Child & Adolescent Health*, *5*(1), 37-46.
82. Veldman, S. L., Santos, R., Jones, R. A., Sousa-Sá, E., & Okely, A. D. (2019). Associations between gross motor skills and cognitive development in toddlers. *Early Human Development*, *132*, 39-44.
83. Von Stumm, S., & Plomin, R. (2015). Socioeconomic status and the growth of intelligence from infancy through adolescence. *Intelligence*, *48*, 30-36.
84. Wade, M., Jenkins, J. M., Venkadasalam, V. P., Binnoon-Erez, N., & Ganea, P. A. (2018). The role of maternal responsiveness and linguistic input in pre-academic skill development: A longitudinal analysis of pathways. *Cognitive Development*, *45*, 125-140.
85. Weisleder, A., & Fernald, A. (2013). Talking to children matters: Early language experience strengthens processing and builds vocabulary. *Psychological Science*, *24*(11), 2143-2152.
86. West, K. L., & Iverson, J. M. (2021). Communication changes when infants begin to walk. *Developmental Science*, e13102.

CHAPTER OVERVIEW

2: Overview of Physical Development

2.1: Introduction

Introduction to Physical Development

Infants and toddlers go through tremendous physical growth during the first three years. From the increases in weight and height that support their motor development to the increases in head circumference that represent their rapid brain growth. Figure 2.1.1 depicts the physical changes within the first three months and Figure 2.1.2 depicts the physical changes from 12 to 36 months. This section will explain the weight, length/height and head circumference growth of infants and toddlers, examining important patterns and differences.

Figure 2.1.1: Children at different ages within the first year. (Images adapted from Unsplash)

Figure 2.1.2: Children at different ages between one to three years of age. (Images adapted from Unsplash)

2.2: Growth in Body Weight

Overview of Growth in Body Weight

The average newborn weighs approximately 7.5 pounds, although a healthy birth weight for a full-term baby is considered to be between 5 pounds, 8 ounces (2,500 grams) and 8 pounds, 13 ounces (4,000 grams). For the first few days of life, infants typically lose about 5 percent of their body weight as they eliminate waste and become accustomed to feeding. This weight loss is temporary, and is followed by a rapid period of growth. By the time infants are 4 months old, their birth weight has usually doubled, and by one year their weight has tripled. By age two, their weight has quadrupled. Figure 2.2.1shows this rapid growth in weight for females from birth through 24 months of age

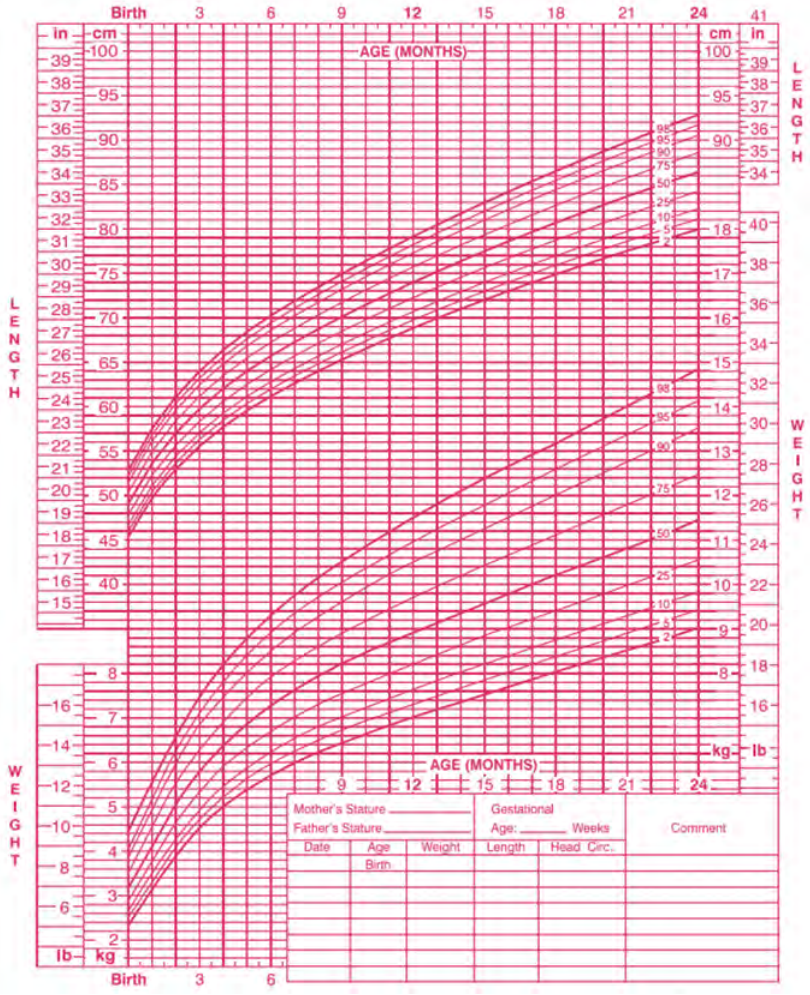


Figure 2.2.1: Length and weight percentiles for girls 0 to 24 months. See Growth Chart Data tables for a breakdown of all numbers represented on graph. (Image from CDC is in the public domain.)

Low Birth Weight

Birth weights vary, but a birth weight too low can negatively impact the development of the child. Low birthweight (LBW) is defined as a birthweight below 2,500 grams or 5 pounds, 8 ounces regardless of gestational age. Very low birth weight (VLBW) is less than 1,500 grams or 3 pounds, 5 ounces and extremely low birth weight (ELBW) is less than 1,000 grams or 2 pounds, 3 ounces (World Health Organization, 2004). LBW is a critical topic as the percentage of children with a LBW varies greatly between countries and between racial/ethnic groups within the same country, and is related to potential long term developmental challenges.

In the U.S. the percentage of infants born with a LBW was 8.31% for 2019, a non-significant increase from 2018 (8.28%) with Black (14.15%) and Hispanic/Latinx (7.55%) women more likely to have children with a LBW compared to white (6.89%) women

(Martin et al., 2021). Globally, it is estimated that 14–20% of all births, or over 20 million newborns annually, are LBW. Figure 2.2.1 shows national and regional estimates of the low birth weight prevalence in 2015. The specific study this data is derived from estimated the global prevalence of LBW at 14.6% (Blencowe et al, 2019). The data from this study also finds important differences between countries. An estimated 5.4% of infants are born LBW in Eastern Asia, 14% in Sub-Saharan Africa, and up to 26% in Southern Asia. Low and middle income countries account for a disproportionate number of LBW newborns, as over 95% of the world's LBW infants are born in low and middle income countries. Figure 2.2.2 shows the percentage of change in LBW from 2000 to 2015. Worldwide and across different regions, the percentage of LBW is trending downward. For example, in Southern Asia, the percentage of LBW infants in 2000 was 32.3%, but it dropped to 26.4% in 2015. [2]

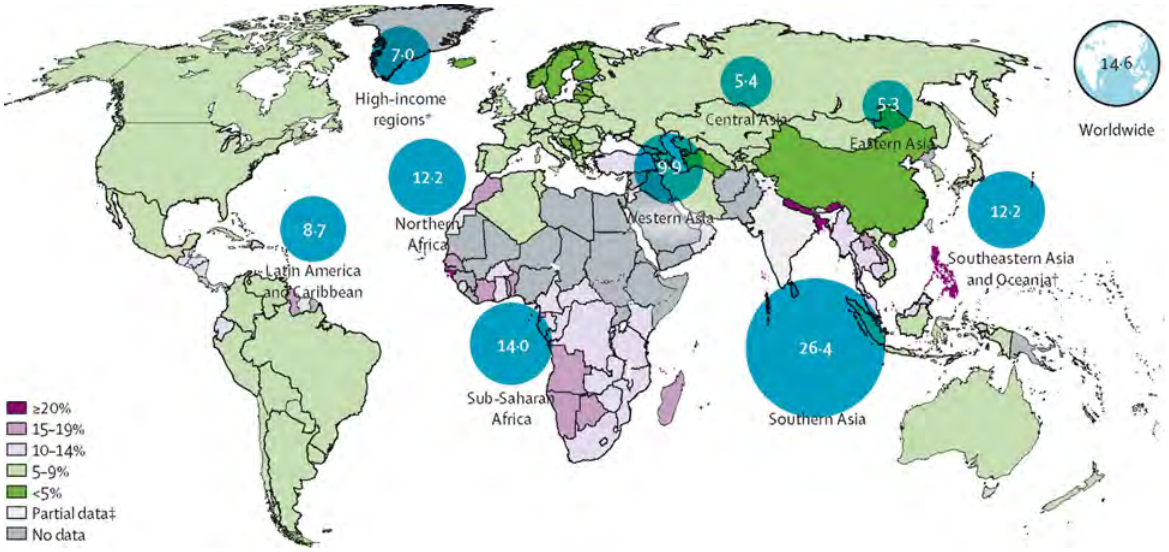


Figure 2.2.2: National and regional estimates of low birthweight prevalence, 2015. Latin America and Caribbean 8.7, High-income regions 7.0, Northern Africa 12.2, Sub-Sahara Africa 14.0, Western Asia 9.9, Central Asia 5.4, Southern Asia 26.4, Easter Asia 5.3, Southeastern Asia Oceania 12.2, Worldwide 14.6 ([3])

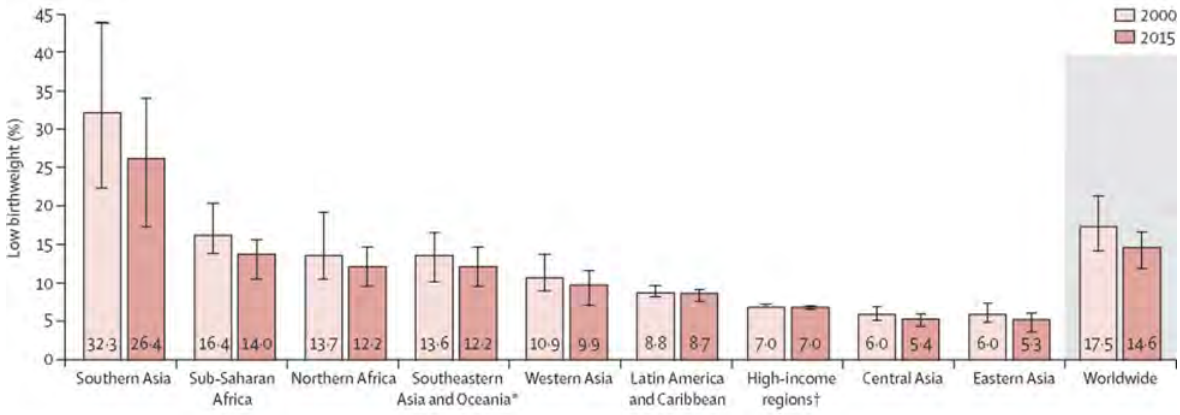
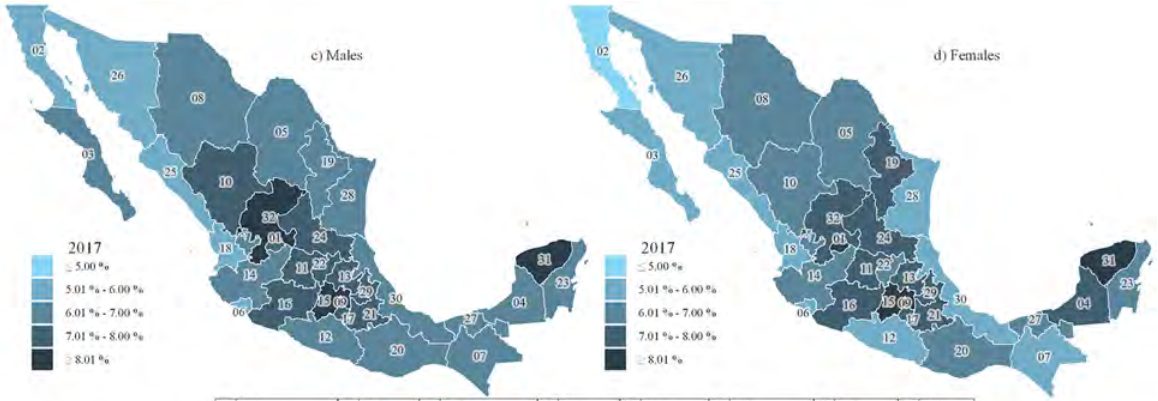


Figure 2.2.3:

Percentage of change in LBW from 2000 to 2015, worldwide and across different regions. Southern Asia: 2000 32.3%, 2015 26.4, Sub-Saharan Africa: 2000 16.4% 2015 14.0%, Northern Africa: 2000 13.7% 2015 12.2%, Southeastern Asia and Oceania: 2000 13.6% 2015 12.2%, Western Asia: 2000 10.9% 2015 9.9%, Latin America: 2000 8.8% 2015 8.7%, High-income regions: 2000 7.0% 2015 7.0%, Central Asia: 2000 6.0% 2015 5.4%, Eastern Asia: 2000 6.0% 2015 5.3%, Worldwide: 2000 17.5% 2015 14.6% [4]

While there is a global downward trend for infants born with a LBW, some countries have experienced an increase. Mexico is a country in the southern part of North America that is made up of 32 states. The incidence of LBW in Mexico, at the national level, increased from 6.2% in 2008 to 7.1% in 2017. As Figure 2.2.4 shows, at the state level, Mexico City reported the highest incidence followed by Southeastern and Central states (Mexico State, Aguascalientes and Yucatan); however, the states with the highest increase are located in the north of the country (Baja California Sur, Nuevo León, and Zacatecas). [5]



ID	State	ID	State	ID	State	ID	State	ID	State	ID	State	ID	State	ID	State
01	Aguascalientes	05	Coahuila	09	Ciudad de México	13	Hidalgo	17	Morelos	21	Puebla	25	Sinaloa	29	Tlaxcala
02	Baja California	06	Colima	10	Durango	14	Jalisco	18	Nayarit	22	Querétaro	26	Sonora	30	Veracruz
03	Baja California Sur	07	Chiapas	11	Guanajuato	15	México	19	Nuevo León	23	Quintana Roo	27	Tabasco	31	Yucatán
04	Campeche	08	Chihuahua	12	Guerrero	16	Michoacán	20	Oaxaca	24	San Luis Potosí	28	Tamaulipas	32	Zacatecas

Figure 2.2.4: Percentage of infants with a LBW in 2017 across 32 states in Mexico for both males and females. Count of states and their percentage of Low Birthwate infants by gender: Under 5% - 0 Males 1 Females, 5.01%-6.00% -5 Males 10 Females, 6.01%-7.00% - 13 Males 6 Females, 7.01% - 8.00% - 8 Males 9 Females, Over 8.01% - 3 Males 3 Females ([6])

LBW is a substantial public health challenge in every country, associated with a range of potential developmental challenges (Evensen et al., 2020; Longo et al., 2021; Van de Pol & Allegaert, 2020). More than 80% of neonatal deaths are in LBW newborns (Blencowe et al., 2012; Katz et al., 2013; Lee et al., 2013). LBW newborns also have a higher risk of stunting in childhood, and long-term developmental and physical health challenges (Blencowe et al., 2013; Christian et al., 2013). Approximately 5–10% of all VLBW infants show major motor challenges, while 25–50% have cognitive, behavioral and/or attention challenges. Additionally, LBW, especially ELBW, is associated with long-term cognitive, language, executive function and learning difficulties (Aarnoudse-Moens et al., 2009; Barre et al., 2011; Blasco et al., 2020; Grunau, Whitfield & Davis, 2002; Marchman et al., 2019; Squarza et al., 2016; Zerbeto, Cortelo & Filho, 2015). [7] [8]

LBW is a critical topic for infant and toddler caregivers to be aware of because the experiences LBW children have during the first three years can potentially reduce the severity of developmental challenges. For example, when LBW infants experience high levels of sensitive caregiving, they improve their executive function abilities faster and catch up to non-LBW peers in executive function abilities by five years of age (Camerota et al., 2015). In contrast, when LBW infants experience lower than average sensitive caregiving, they continue to show lower executive function skills throughout the first five years. Caregiver sensitivity refers to the timing of a caregiver's response to a child and the ability to respond appropriately to the child's needs. In addition to sensitivity, responsiveness is also an important characteristic. Responsive caregiving, or interactions in which caregivers give appropriate responses to a child's signals, leads to stronger language abilities in LBW toddlers (Madigan et al., 2015). Language development in LBW infants is enhanced when caregivers are responsive and sensitive in their caregiving and elaborate in their communication (Loi et al., 2017; Spencer-Smith et al., 2019). [9]

Figure 2.2.5. [1]

[1] "Physical Growth and Development in Newborns and Toddlers" by: Tera Jones from Lumen Learning.

[2] Cutland et al., (2017). Low birth weight: Case definition & guidelines for data collection, analysis, and presentation of maternal immunization safety data. *Vaccine*, *35*(48Part A), 6492.

[3] Image from Blencowe et al., (2019). National, regional, and worldwide estimates of low birthweight in 2015, with trends from 2000: A systematic analysis. *The Lancet Global Health*, *7*(7), e849-e860. CC by 4.0

[4] Image from Blencowe et al., (2019). National, regional, and worldwide estimates of low birthweight in 2015, with trends from 2000: A systematic analysis. *The Lancet Global Health*, *7*(7), e849-e860. CC by 4.0

[5] Ancira-Moreno et al., (2021). Incidence of low birth weight in Mexico: A descriptive retrospective study from 2008–2017. *Plos one*, *16*(9), e0256518. CC by 4.0

[6] Image from Ancira-Moreno et al., (2021). Incidence of low birth weight in Mexico: A descriptive retrospective study from 2008–2017. *Plos one*, *16*(9), e0256518. CC by 4.0

[7] Blencowe et al., (2019). National, regional, and worldwide estimates of low birthweight in 2015, with trends from 2000: A systematic analysis. *The Lancet Global Health*, *7*(7), e849-e860. CC by 4.0

[8] Longo, et al., (2021). Neurodevelopmental outcome of preterm very low birth weight infants admitted to an Italian tertiary center over an 11-year period. *Scientific Reports*, *11*(1), 1-10.

[9] Scherer et al., (2019). The relationship between responsive caregiving and child outcomes: evidence from direct observations of mother-child dyads in Pakistan. *BMC Public Health*, *19*(1), 1-10. CC by 4.0

[10] Image by __ drz __ on Unsplash.

2.3: Growth in Body Length/Height

Growth in Body, Length, and Height

The average length of a newborn is 19.5 inches, increasing to 29.5 inches by 12 months and 34.4 inches by 2 years old (WHO Multicentre Growth Reference Study Group, 2006). The average length at 12 months (one-year-old) typically ranges from 28.5 to 30.5 inches. The average length at 24 months (two years old) is around 33.2 to 35.4 inches (CDC, 2010). Figure 2.3.1 shows this rapid growth in length/height for males from birth through 24 months of age.

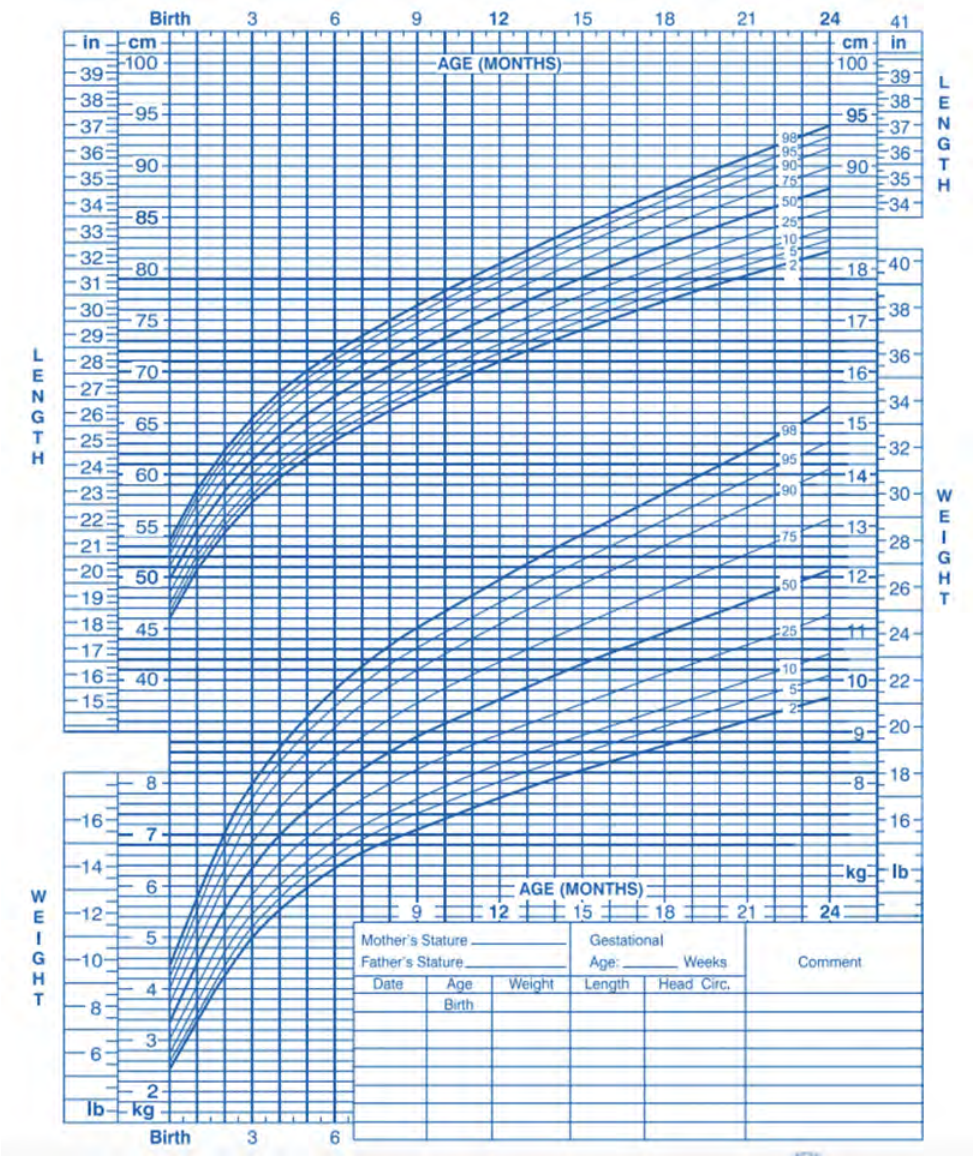


Figure 2.3.1: Length and weight percentiles for boys 0 to 24 months. See Data Table of Infant Length-for-age Charts for a full breakdown of chart numbers [1]

Stunted Growth

Infant and toddler length/height can vary, but a length/height too low can be a worrisome sign of stunted growth. Stunted growth is characterized by a height of more than two standard deviations below the World Health Organization (WHO) age-specific growth reference standard (WHO Multicentre Growth Reference Study Group, 2007). In simpler terms, stunted growth is when children are significantly shorter in length/height than what would be expected for their age. Children with stunted growth have a mortality rate that is three times higher than their peers (McDonald et al., 2013; Victora et al., 2021) and are at a higher risk of displaying cognitive challenges later in life (Prendergast & Humphrey, 2014; Sanou et al., 2018; Walker et al., 2021).

In the U.S. the prevalence of stunting is estimated to be about 3.2% (World Health Organization, 2021). While the global prevalence has declined over the years, childhood stunting continues to be a great concern worldwide. Figure 2.3.2 shows the global and regional change in the number of children showing stunted growth from 1990 to 2019. In 1990, 252.8 million children under five years of age exhibited stunted growth; by 2019, this number dropped to 144 million children. The prevalence of stunting differs greatly by country. Figure 2.3.3 shows the longitudinal trajectory of the prevalence of stunting in thirteen countries from 1985 to 2019. While all thirteen countries show a decline, there are still significant differences between countries. Even after 2015, Malawi, Ethiopia, Nepal and Bangladesh each had a prevalence between 30% to 40%, while Morocco, Peru and Kyrgyzstan each had a prevalence between 10% to 20%.

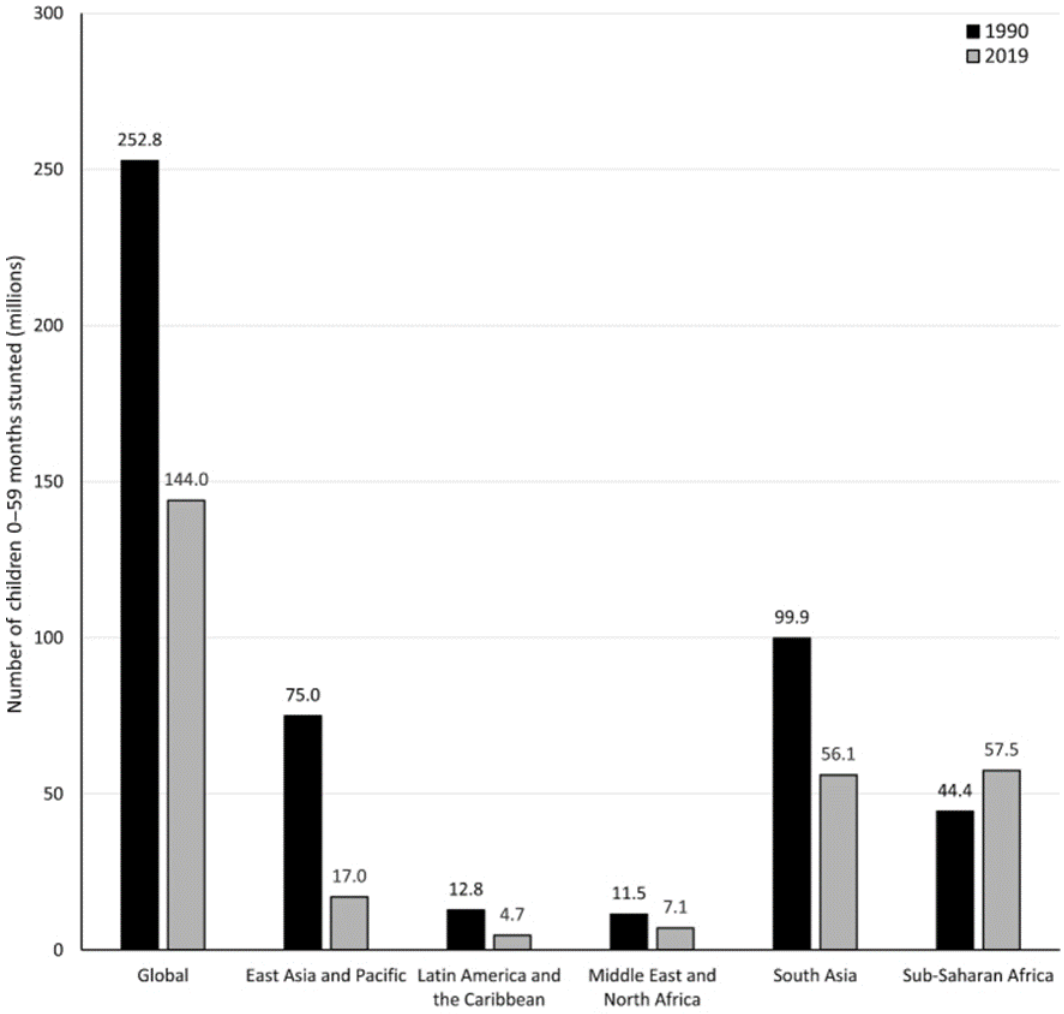


Figure 2.3.2: Global and regional change of stunted growth from 1990 to 2019. Global: 1990 252.8 2019 144, East Asia and Pacific: 1990 12.8 2019 4.7, Middle East and North Africa: 1990 11.5 2019 7.1, South Asia: 1990 99.9 2019 56.1, Sub-Saharan Africa: 1990 44.4 2019 57.5. [2]

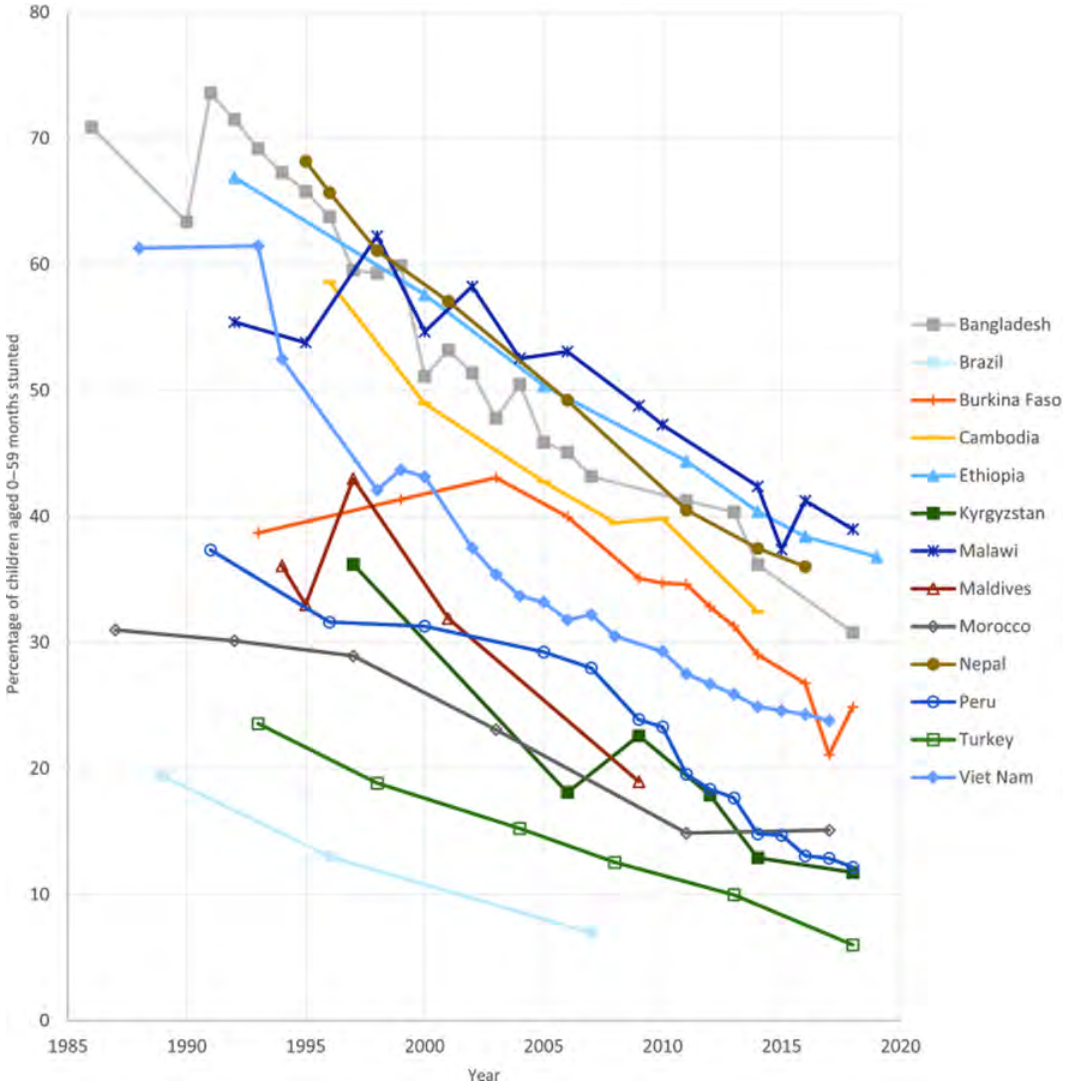


Figure 2.3.3: Prevalence of childhood stunting by country.Bangladesh 71% 1995 down to 31% in 2019, Brazil had a downward trend 19% in 1988 down to 7% in 2008, Burkina Faso 38% in 1993 down to 25% in 2016 after some up and down fluctuations between those two dates, Cambodia was a downward trend from 58% in 1999 to 33% in 2014. Ethiopia was a downward trend from 66% down to 38% in 2019. Kyrgyzstan had an overall downward trend with some upward fluctuations, from 36% in 1997 to 12% in 2019. Malawi begin at 55% in 1992 with a sharp upward tick to 63% in 1999 and then a downward trend to 38% in 2018. Maldives 35% in 1993 with a sharp upward tick to 43% in 1993 and then downward to 19% in 2009. Morocco had significant up and down numbers between 1986 and 2020, however an overall downward trend from 72% in 1986 to 31% in 2018%. Nepal was a downward trend from 68% in 1995 to 38% in 2016. Peru an overall downward trend from 37% in 1992 down to 12% in 2017. Turkey overall downward trend from 23% in 1993 to 7% in 2017. Viet Nam downward trend from 68% in 1992 down to 38% in 2018. All dates and percentages are approximate. [3]

[1] Image from CDC is in the public domain.

[2] Image from Vaivada et al., 2020). Stunting in childhood: An overview of global burden, trends, determinants, and drivers of decline. *The American Journal of Clinical Nutrition*, *112*, 777S-791S. CC by 4.0

[3] Image from Vaivada et al., (2020). Stunting in childhood: An overview of global burden, trends, determinants, and drivers of decline. *The American Journal of Clinical Nutrition*, *112*, 777S-791S. CC by 4.0

2.4: Growth in Head Circumference

Head Circumference

Head circumference trajectories are important as they are commonly used as a measure of neurological development in infancy and early childhood. As seen in Figure 2.4.1 and Figure 2.4.2, On average, head circumference increases by 2 centimeters per month during the first three months and 1 centimeter per month from 3 to 6 months of age. From six to twelve months, head circumference increases by 0.5 centimeters per month. During the first year of life, there is a 12 centimeter average increase in head circumference. After one year of age, only 1 centimeter gain occurs per 6 months in head circumference until three years of age and only 1 centimeter every year between 3 to 5 years of age. An average of five centimeters total is gained in head circumference between 1 to 5 years of age. The rate of head circumference growth during the first three years of life can vary and is influenced by numerous factors, including, but not limited to, an Autism Spectrum Disorder diagnosis (Regev et al., 2021; Webb et al., 2007), family socioeconomic status (Bouthoorn et al., 2012) and premature birth and/or low birth weight (Jaekel et al., 2018). For example, infants of mothers with higher educational levels have infants with larger head circumferences, but this difference was only found during the first six months of life (Bouthoorn et al., 2012). [1] [2]

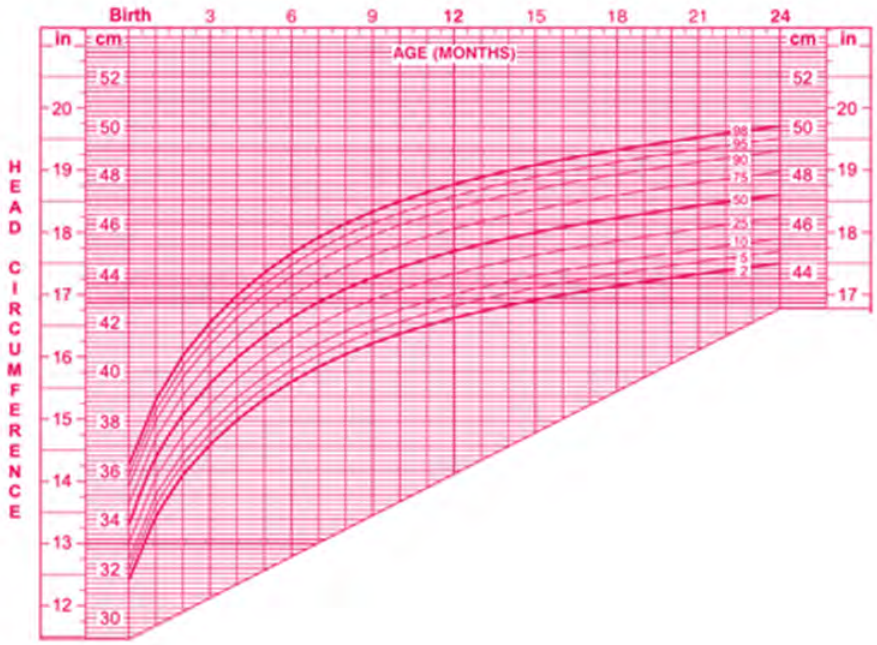


Figure 2.4.1: See Data Table of Infant Head Circumference-for-age Charts for all numbers represented in the chart. [3]

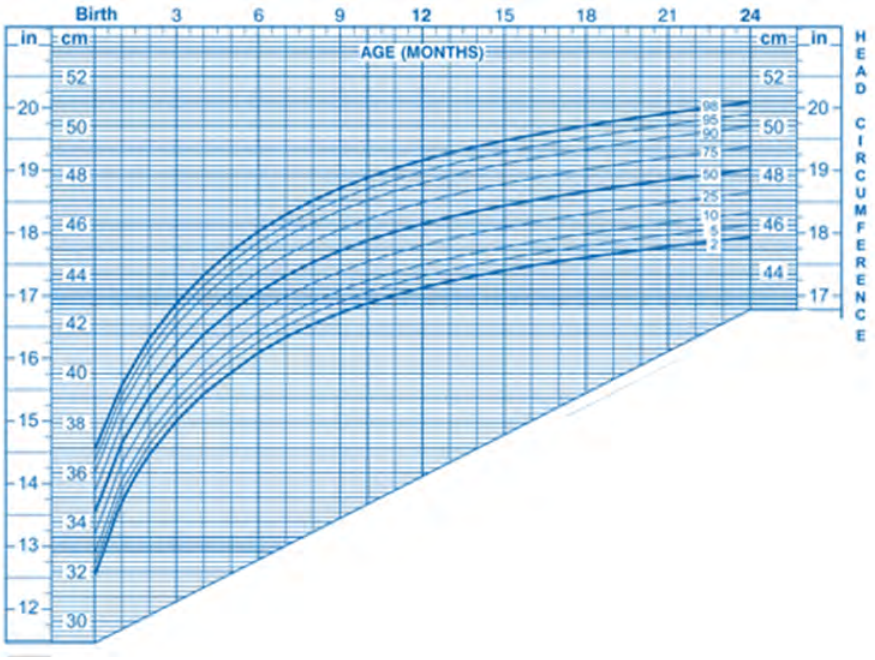


Figure 2.4.2: See Data Table of Infant Head Circumference-for-age Charts for all numbers represented in the chart. [4]

Head circumference is an important reflection of growth and development of the brain, especially in early childhood (Bartholomeusz, Courchesne & Karns, 2002). Some studies have found smaller head circumference to be associated with a lower overall intelligence and lower cognitive abilities (Bach et al., 2020; Jaekel et al., 2019; Kirkegaard et al., 2020; Koshy et al., 2021). Large deviations from the norm in head circumference can indicate microcephaly (a baby's head is smaller than expected when compared to babies of the same sex and age) or macrocephaly (a baby's head is larger than expected when compared to babies of the same sex and age).[5]

Microcephaly was in world news headlines in 2015 with the outbreak of the Zika Virus. Congenital Zika syndrome is a unique pattern of birth defects and disabilities found among fetuses and babies infected with Zika virus during pregnancy. Zika primarily spreads through infected mosquito bites and can be passed from an infected pregnant mother to her fetus. A common symptom of prenatal infection is an infant with decreased brain tissue and microcephaly (Satterfield-Nash et al., 2017).[5]

Figure 2.4.3: Typical head size, compared to babies with microcephaly. bay with microcephaly has significant decrease in size, baby with severe microcephaly has an even greater decrease in overall head size.[6]

[1] Jones & Samanta (2020). *Macrocephaly*. StatPearls. CC by 4.0

[2] Treit et al., (2016). Relationships between head circumference, brain volume and cognition in children with prenatal alcohol exposure. *PloS One*, *11*(2), e0150370. CC by 4.0

[3] Image from CDC is in the public domain.

[4] Image from CDC is in the public domain.

[5] "Facts about Microcephaly" by the CDC is in the public domain.

[6] Image adapted from "Facts about Microcephaly" by the CDC.

2.5: Worldwide Variation in Human Growth

Human Growth Variations

The growth charts from the World Health Organization (WHO) and the Center for Disease Control and Prevention (CDC) are widely used in the U.S. to describe the physical growth of children. For children in the U.S. the CDC recommends that the WHO growth charts be used to monitor growth for all children from birth up to 2 years of age and then to use the CDC charts for children two years of age and older. [1]

Despite widespread use of the WHO charts, there are many important limitations. First of all, data participants came from single cities in only six countries (Brazil, Ghana, India, Norway, Oman and the USA). Second, the WHO growth charts use the growth of breastfed infants as the norm for growth, which may not represent the feeding experiences of all infants. Third, the WHO notes that any deviations from its standards should be considered as evidence of 'abnormal growth' (World Health Organization, 2006). [2]

One study compared the data from the WHO's Multicentre Growth Reference Study (MGRS) to data from 55 different countries to see if the growth charts from the WHO can accurately be used with children outside of the six countries the WHO studied (Natale & Rajagopalan, 2014). Results showed that many countries had physical growth outside of what the WHO considers standard, especially for head circumference. Figure 2.5.1 shows the mean weight of two year old males across thirty countries compared to the MGRS mean score and within 0.5 standard deviations. While most of the countries fell within 0.5 standard deviations of the MGRS mean, many countries did not, suggesting that WHO's growth chart for weight may not be the best reference chart for all children.

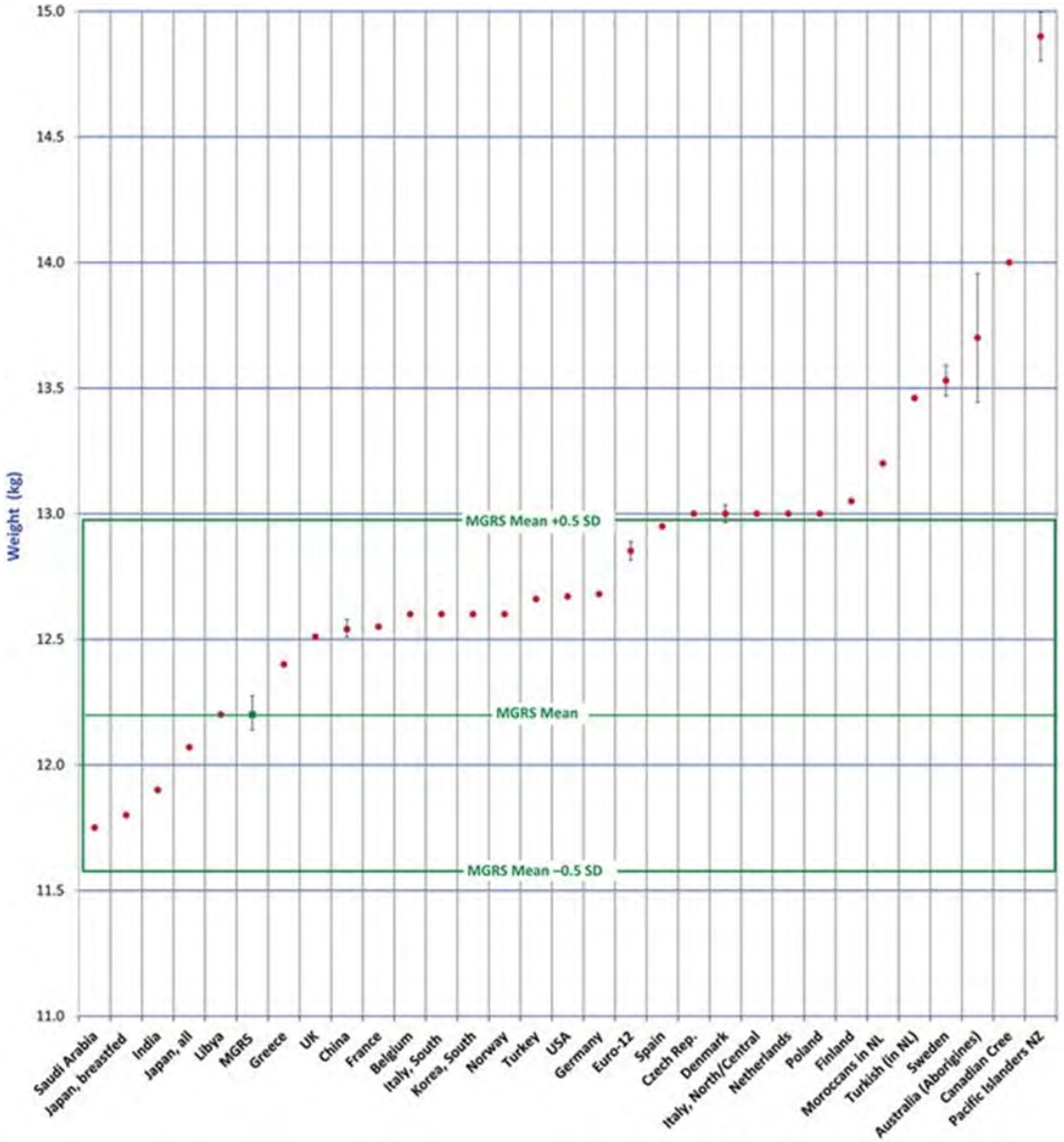


Figure 2.5.1: **Weight at 2 years: 30 countries versus Multicentre Growth Reference Study (MGRS). The green box delimits the area within 0.5 SD of the MGRS mean. The green line within the box shows the MGRS mean. (A) Boys; MGRS mean: 12.2 kg; SD up: 1.55 kg, down: 1.25 kg. (B) Girls; MGRS mean: 11.5 kg; SD up: 1.65 kg, down: 1.25 kg. Error bars show 1 SE.**. [3])

Figure 2.5.2 shows the mean head circumference of two year old females across twenty-six countries compared to the MGRS mean score and within 0.5 of the standard deviations. Interestingly, head circumference was the growth measurement that varied the most. The majority of the countries fell outside of 0.5 standard deviations of the MGRS mean, suggesting that the WHO's growth chart for head circumference may only be an accurate reference chart for a select few countries.

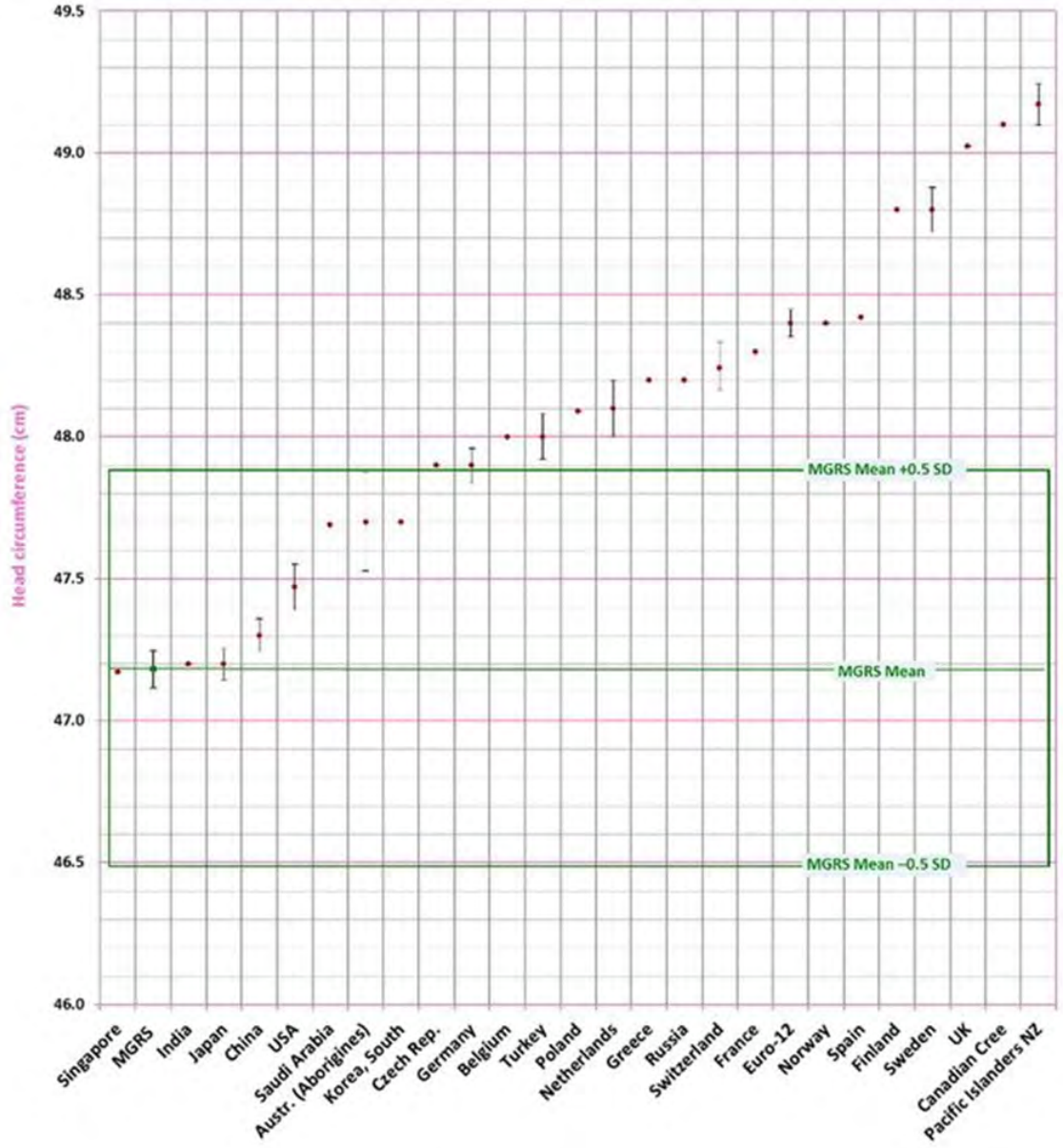


Figure 2.5.2: Head circumference at 2 years for females: 26 countries versus Multicentre Growth Reference Study (MGRS). ([4])

The data from this study suggest that the WHO growth charts may not be appropriate for all children around the world, especially for monitoring the growth of head circumference. The study acknowledges important differences in the physical development of infants and toddlers exist across countries. Growth patterns and reference charts for children from specific countries are becoming more available (Bonthuis et al., 2012; Cole, & Mori, 2018; Zhang et al., 2019). If caregivers monitor the physical growth of children, they should search for charts that best represent the demographics of the children they serve and not assume commonly used reference charts are accurate for all infants and toddlers.

What is the take away message for infant and toddler caregivers?

- Physical development is important because when children measure below average growth, they are at risk of long term developmental challenges.
- Physical growth is commonly measured with birth weight, height/length and head circumference.
- The percentage of infants and toddlers who are at risk due to lower than average physical growth varies by country, state and racial/ethinic group, among other factors.
- Knowledge of the regional percentage of infants and toddlers measuring lower than average for birth weight, height/length and head circumference could be important information for caregivers as they prepare to meet the needs of the individual children

they serve.

- Quality caregiving is essential for all children, but is especially important for children who are at a developmental risk, such as children with a LBW, children who have experienced stunting and children with a lower than average head circumference.
- Caregiving characteristics such as providing sensitive and responsive care as well as practices that increase the quantity and quality of language exposure support the optimal development of all children, especially children who are at long term developmental risk due to lower than average scores on physical development.
- If caregivers monitor the physical growth of infants and toddlers, they should search for charts that best represent the demographics of the children they serve as commonly used charts from the WHO and the CDC do not accurately represent the physical growth of all children.

[1] "Growth Charts" from the CDC is in the public domain.

[2] Natale & Rajagopalan (2014). Worldwide variation in human growth and the World Health Organization growth standards: A systematic review. *BMJ Open*, *4*(1), e003735. CC by NC 3.0

[3] Image adapted from Natale & Rajagopalan (2014). Worldwide variation in human growth and the World Health Organization growth standards: A systematic review. *BMJ Open*, *4*(1), e003735. CC by NC 3.0

[4] Image adapted from Natale & Rajagopalan (2014). Worldwide variation in human growth and the World Health Organization growth standards: A systematic review. *BMJ Open*, *4*(1), e003735. CC by NC 3.0

2.6: Conclusion

Conclusion of Physical Development Overview

The physical development of infants and toddlers is rapid and consistent. Physical growth is often measured with charts tracking weight, height/length and head circumference, showing increases in all three measurements every month during the first three years! It is important to know that while growth charts provide standards to monitor growth, there are many limitations to these charts. Research has found significant differences in the growth of children's weight, height and head circumference across countries; therefore, caregivers should be cautious when applying growth charts to all children. Some children may fall significantly low on growth charts and are at risk of various development challenges, such as children born with a low birth weight. For these infants and toddlers, quality caregiving practices are especially important to improve developmental abilities.

2.7: References

CHAPTER OVERVIEW

3: Health and Nutrition

3.1: Introduction

Introduction to Health and Nutrition

The first three years of life are a critically important period for growth and development. To best support this growth and development, infants and toddlers need nutrient-dense food that is developmentally appropriate, high quantity and quality of sleep, and physical activity. This section will explain the recommended intake of food and nutrition during the first three years and provide strategies for caregivers to support safe sleep and physical activity.

3.2: Breast Milk- Composition, Benefits and Rates

Overview of Breast Milk and Breastfeeding

Feeding an infant breast milk is one of the best ways to start them off on the path of lifelong health. Breast milk consists of 87% water, 1% protein, 4% lipids, and 7% carbohydrate, displayed in Figure 3.2.1 (Boquien, 2018; Martin, Ling & Blackburn, 2016). It also contains many vitamins and minerals. Another unique aspect of human milk is the high proportion of fatty acids, including the two essential fatty acids linoleic acid and alpha-linolenic acid. These fatty acids are important for infant brain development. In addition to nutrients, human milk includes bioactive substances and immunologic properties that support infant health and development (Le Doare, Holder, Bassett & Pannaraj, 2018). [1] [2]

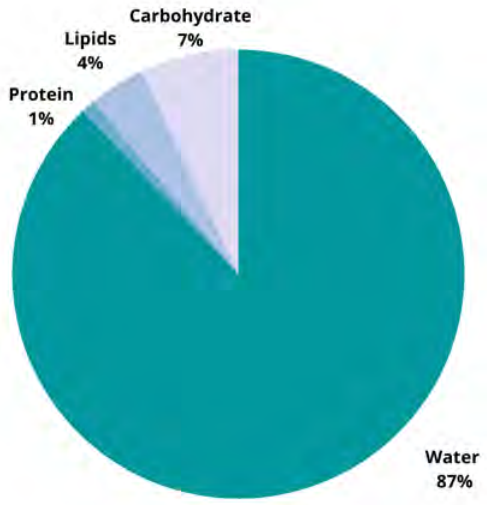


Figure 3.2.1: Breast milk composition ([3])

In the initial week after pregnancy, the mother secretes colostrum, a thick yellow liquid. From days 7 to 14, the mother secretes transitional milk, a combination of colostrum and mature milk. After two weeks, the mature milk is formed and produced (Ballard & Morrow, 2013). The breast milk can be divided into the bluish-gray foremilk, present at the beginning of a feed which contains less fat, and the creamy white hindmilk secreted towards the end of a feed that is rich in fat. The composition of breast milk can differ depending on maternal health and diet, environmental exposure, and gestational age, amongst other factors (Martin, Ling & Blackburn, 2016). [4]

Breast milk can support an infant's nutrient needs for about the first 6 months of life, with the exception of vitamin D and potentially iron. The World Health Organization (WHO) recommends infants be exclusively breastfed for the first 6 months of life and encourages the continuation of breast milk in combination with complementary feeding of solid foods for 2 years and beyond (World Health Organization, 2003). Exclusive breast milk feeding refers to an infant consuming only human milk, and not in combination with infant formula and/or complementary foods or beverages (including water), except for medications or vitamin and mineral supplementation. [5] [6]

Figure 3.2.2: Benefits of breastfeeding. ([1])

A newborn may require breastfeeding every 1 to 3 hours for 10 to 20 minutes on average; however, the frequency and duration of breastfeeding sessions decrease as the child gets older and they can receive more milk in less time. On the third day after birth, the amount of breastmilk taken by the infant is about 300 to 400 milliliters each 24 hours, and on the fifth day 500 to 800 milliliters. Infant milk consumption averages about 800 milliliters each day during the first 6 months. [8]

While breast milk is encouraged, not all families are able to provide it for their infants for various reasons. For example, a family may choose not to breastfeed, a child may be adopted, or the mother may be unable to produce a full milk supply or may be unable to pump and store milk safely due to family or workplace conditions. If human milk is unavailable, infants should be fed an iron-fortified commercial infant formula (i.e., labeled “with iron”) regulated by the U.S. Food and Drug Administration (FDA), which is based on standards that ensure nutrient content and safety. Infant formulas are designed to meet the nutritional needs of infants and are not needed beyond 12 months. It is important to take precautions to ensure that expressed human milk and prepared infant formula are handled and stored safely. [9]

Despite the benefits of breast milk, breastfeeding rates remain low in many countries. Globally, only 37% of infants between 0 to 6 months of age are exclusively breastfed, with the highest percentage (47%) among infants in South-East Asia (World Health Organization, 2014). In Malaysia, while 94.7% of infants were breastfed at least once, only 14.5% practiced exclusive breastfeeding for the first six months (Fatimah et al., 2010). In Lebanon only 38% of infants are exclusively breastfed during the first month of life and around 2% are breastfeeding at 6 months of age (Hamade et al., 2013). Breastfeeding, both initiation and duration, has been increasing steadily among high-income countries since the late 1970’s (Lubold, 2019; Wolf, 2003); however, in some countries, breastfeeding rates have increased at a much faster rate than in others. For example, Figure 3.2.3 shows the proportion of women who initiated breastfeeding in Ireland, Sweden, and the US from 1984 to 2015. While Sweden has consistently had higher rates, both Ireland and the U.S. have seen a positive increase in breastfeeding initiation rates over time. [10] [11] [12]

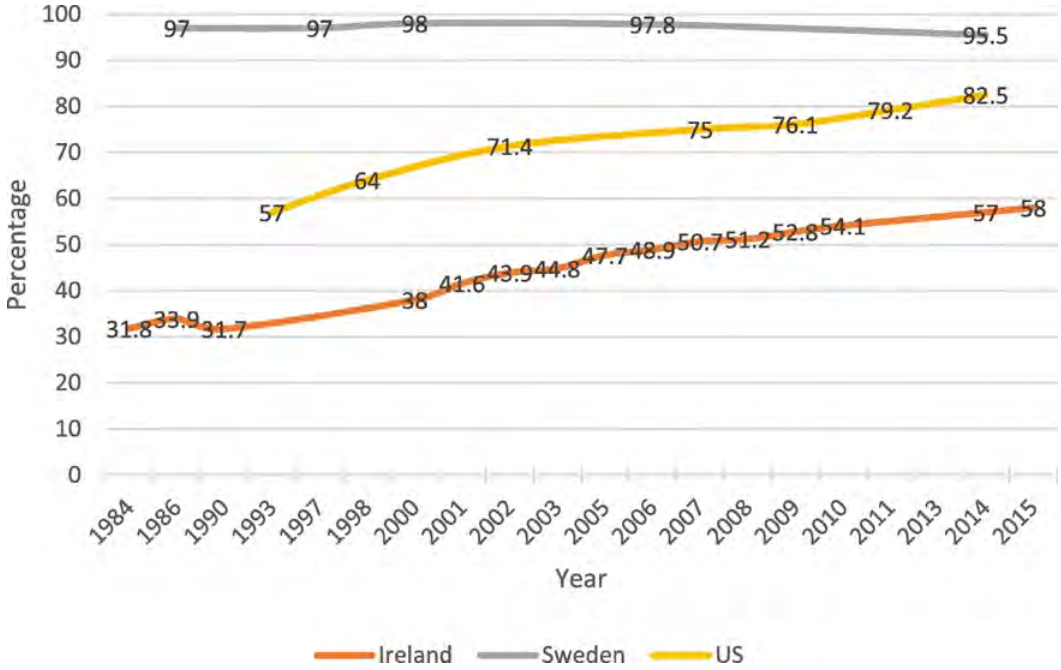


Figure 3.2.3: Proportion of women who initiated breastfeeding in Ireland, Sweden, and the U.S. from 1984 to 2015. Sweden ranged from 97% in 1993 to 95.5% in 2014. US ranged from 57% in 1993 to 82.5%in 2014. Ireland ranged from 31.8% in 1984 to 58% in 2015. ([13])

Figure 3.2.4 shows the rate of any amount of breastfeeding during the first twelve months for children born in 2018 in the U.S. Younger infants are more likely to be breastfed as approximately 80% of one month old infants receive some amount of breastfeeding compared to under 60% at six months and under 40% at twelve months. Figure 3.2.4 also shows the rate of exclusive breastfeeding for the first six months in 2018. While nearly 60% of infants are exclusively breastfed at one month of age, less than 30% are at six months of age. Rates of breastfeeding initiation and duration differ by state. In California in 2017, 90.3% of newborns were breastfed at least once, 67.1% were still breastfeeding at six months and 43.3% were still breastfeeding at twelve months; however, only 50.1% were exclusively breastfed for the first three months and only 28.2% were exclusively breastfed for the first six months. Louisiana had the lowest percentage of infants who ever breastfed (66.2%) while Minnesota had the highest at 95.3%. At six months, the national average for infants still breastfeeding was 58.3%, which dropped to 35.3% at twelve months. Furthermore, there is a racial disparity in both the initiation and duration of breastfeeding in the U.S. (Beauregard et al., 2019). Black infants had a significantly lower rate of having ever been breastfed at 3 months (58.0%) than did white infants (72.7%); at 6 months, the rates were 44.7% among Black infants and 62.0% among white infants. [14] [15] [16] [17]

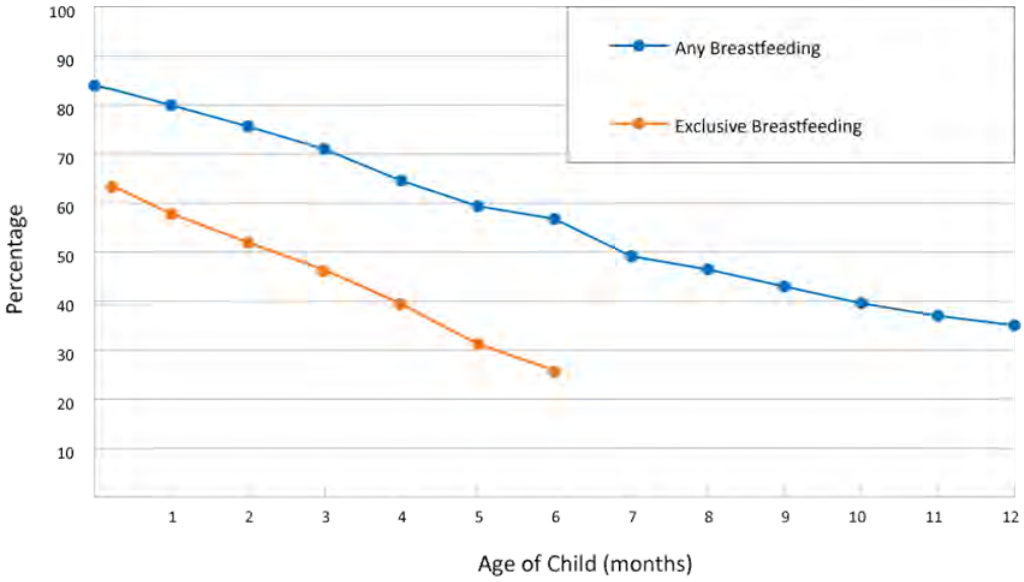


Figure 3.2.4: Rates of any and exclusive breastfeeding by age among infants born in 2018. Any breastfeeding went from 84% at birth to 35% at 12 months of age. Exclusive breastfeeding went from 62% at birth to a little over 6 months. ([18])

The rate of exclusive breastfeeding is lower among working mothers (Chen, Wu & Chie, 2006; Kimbro, 2006; Tan, 2011). In a survey comprising 228,000 new mothers of varying employment status in the United States, the breastfeeding rate at six months was statistically lower among mothers employed full time (26.1%), as compared with part-time (36.6%) and non-working mothers (35.0%) (Ryan, Zhou & Arensberg, 2006). Returning to work, time costs, and unconducive workplaces are common reasons for early breastfeeding cessation among working mothers (Brown et al., 2014; Ong, Yap, Li & Choo, 2005; Smith & Forrester, 2013). [19]

Child care centers can play a crucial role in supporting breastfeeding mothers (Lundquist, McBride, Donovan & Kieffer, 2019; Marhefka et al., 2019). Lundquist et al. (2019) highlighted the importance of educating child care center staff about breastfeeding as well as creating supportive policies and practices in childcare centers. Furthermore, Marhefka et al. (2019) concluded that breastfeeding-friendly child care centers could contribute to creating a cultural shift towards breastfeeding continuation. [20]

While child care centers can play an important role, they still have much progress to make in supporting breastfeeding mothers and their children. For example, Mattar et al. (2019) showed very low rates of breastfeeding among children in Lebanese daycare centers. Studies from the U.S. have found lower rates of breastfeeding in center-based programs, compared to home-based programs and an overall lack of supportive policies and practices in center-based care programs (Dieterich, Caplan, Yang & Demirci, 2020; Machado, 2015). [21]

Figure 3.2.5:Breastfeeding mother ([22])

Studies on breastfeeding worldwide indicate the importance of policy recommendations and support at the national and local levels (Gomez-Pomar & Blubaugh, 2018; Horton & Victoria, 2013; World Health Organization, 1998). Research in the United States and Australia showed that encouragement, written policies, resource/materials distribution, and training for breastfeeding were significantly higher in Australia, despite similar rates of availability of facilities such as places to breastfeed and refrigerators for storage in childcare facilities (Cameron et al., 2012). In Japan, there is a lack of understanding of breastfeeding in the workplace and there are perceived challenges such as the burden of breastfeeding management in childcare facilities (Yabe et al., 2021) [23]

To support breastfeeding, child care centers can create spaces where mothers can comfortably breastfeed their children and/or pump breastmilk. Additionally, centers can have a devoted space and organized system for storing pumped breastmilk and a specific space for cleaning the pumping parts. All child care programs can lower a breastfeeding mother's anxiety by allowing her to feed her infant on-site, having a posted breastfeeding policy that is routinely communicated, making sure procedures for storing and handling breast milk and feeding breastfed infants are in place, and making sure staff members are well-trained in these procedures. Data from the Infant Feeding Practices Study II, a longitudinal study that followed mothers from the third trimester until children were age 1 year, found that breastfeeding at 6 months was significantly associated with support from child care providers to feed expressed breast milk to infants and allow mothers to breastfeed on-site before or after work (Fein, Grummer-Strawn & Raju, 2008; Fein, Mandal & Roe, 2008). [24]

Many mothers need to leave their babies at a child care facility to work. The longer the mother is at work, the longer the baby will spend time with the childcare worker. Hence, childcare workers and settings can be primary sources of support for working mothers who want to breastfeed by helping to store, handle and feed the baby with breastmilk while the mother is at work (Cameron et al., 2012). In studies examining child care providers' support of breastfeeding, Javanparast et al. (2012) and Batan & Scanlon (2013) found that by helping to feed expressed breastmilk and allowing mothers to breastfeed before or after work, childcare providers helped mothers maintain breastfeeding at six months postpartum. Nevertheless, Lucas et al. (2013) found some knowledge deficit among childcare providers in the area of health benefits and proper handling of breastmilk, indicating the need for adequate support and training for them to help working mothers. [25]

Childcare administrators are well aware of the benefits of breastmilk, but express perceived risk with the handling and feeding of breast milk (Schafer et al., 2021). This is reinforced by the fact that previous studies have also reported that the lack of literacy regarding breastfeeding and the perceived risk of handling breast milk among childcare facility administrators were barriers (Lucas et al., 2013; Marhefka et al., 2019; Schafer et al., 2021). [26]

Figure 3.2.6:Bottle feeding ([27])

To support the use of breast milk in childcare centers, caregivers and staff must be knowledgeable of proper handling and storage of both breastmilk and infant formula: [28]

- Before handling breast milk wash your hands well with soap and water.
- Refrigerate freshly expressed breast milk within 4 hours for up to 4 days. Previously frozen and thawed breast milk should be used within 24 hours. Thawed breast milk should never be refrozen. Refrigerate prepared infant formula for up to 24 hours.
- If preparing powdered infant formula, use a safe water source and follow instructions on the label.
- Do not store breast milk in the door of the refrigerator or freezer. This will help protect the breast milk from temperature changes from the door opening and closing.

- Do not use a microwave to warm breast milk or infant formula. Microwaving can destroy nutrients in breast milk and create hot spots, which can burn a baby's mouth. Warm safely by placing the sealed container of breast milk or infant formula in a bowl of warm water or under warm, running tap water.
- Once it has been offered to the infant, use or discard leftovers quickly (within 2 hours for breast milk or 1 hour for infant formula).
- Thoroughly wash all infant feeding items, such as bottles and nipples.
- Consider sanitizing feeding items for infants younger than 3 months of age, infants born prematurely, or infants with a compromised immune system.
- Freshly expressed or pumped milk can be stored:
  - At room temperature (77°F or colder) for up to 4 hours.
  - In the refrigerator for up to 4 days.
  - In the freezer for about 6 months is best; up to 12 months is acceptable. Although freezing keeps food safe almost indefinitely, recommended storage times are important to follow for the best quality.

[1] "Dietary Guidelines for Americans, 2020-2025" by U.S. Department of Agriculture and U.S. Department of Health and Human Services is in the public domain.

[2] Boquien (2018). Human milk: An ideal food for nutrition of preterm newborn. *Frontiers in Pediatrics*, *6*, 295. CC by 4.0

[3] Image by Todd LaMarr is licensed under CC by 4.0

[4] Shah et al., (2019). Physiology, Breast Milk. CC by 4.0

[5] Abou Jaoude et al., (2021). Factors related to breastfeeding support in Lebanese daycare centers: A qualitative study among daycare directors and employees. *International Journal of Environmental Research and Public Health*, *18*(12), 6205.

[6] "Dietary Guidelines for Americans, 2020-2025" by U.S. Department of Agriculture and U.S. Department of Health and Human Services is in the public domain.

[1] Image from Luiza Braun on Unsplash.

[8] Shah et al., (2019). Physiology, Breast Milk. CC by 4.0

[9] "Dietary Guidelines for Americans, 2020-2025" by U.S. Department of Agriculture and U.S. Department of Health and Human Services is in the public domain.

[10] Suan et al., (2016). Childcare workers' experiences of supporting exclusive breastfeeding in Kuala Muda District, Malaysia: A qualitative study. International Breastfeeding Journal, 12(1), 1-8. CC by 4.0

[11] Abou Jaoude et al., (2021). Factors related to breastfeeding support in Lebanese daycare centers: A qualitative study among daycare directors and employees. *International Journal of Environmental Research and Public Health*, *18*(12), 6205.

[12] Lubold (2019). Historical-qualitative analysis of breastfeeding trends in three OECD countries. *International Breastfeeding Journal*, *14*(1), 1-12. CC by 4.0

[13] Image from Lubold (2019). Historical-qualitative analysis of breastfeeding trends in three OECD countries. *International Breastfeeding Journal*, *14*(1), 1-12. CC by 4.0

[14] Abou Jaoude et al., (2021). Factors related to breastfeeding support in Lebanese daycare centers: A qualitative study among daycare directors and employees. *International Journal of Environmental Research and Public Health*, *18*(12), 6205.

[15] Suan et al., (2016). Childcare workers' experiences of supporting exclusive breastfeeding in Kuala Muda District, Malaysia: a qualitative study. *International Breastfeeding Journal*, *12*(1), 1-8. CC by 4.0

[16] "Breastfeeding Report Card" from the CDC is in the public domain.

[17] Beauregard et al., (2019). Racial disparities in breastfeeding initiation and duration among US infants born in 2015. *Morbidity and Mortality Weekly Report*, *68*(34), 745. Public domain.

[18] Image from the CDC is in the public domain.

[19] Suan et al., (2016). Childcare workers' experiences of supporting exclusive breastfeeding in Kuala Muda District, Malaysia: a qualitative study. *International Breastfeeding Journal*, *12*(1), 1-8. CC by 4.0

[20] Abou Jaoude et al., (2021). Factors related to breastfeeding support in Lebanese daycare centers: A qualitative study among daycare directors and employees. *International Journal of Environmental Research and Public Health*, *18*(12), 6205.

[21] Abou Jaoude et al., (2021). Factors related to breastfeeding support in Lebanese daycare centers: A qualitative study among daycare directors and employees. *International Journal of Environmental Research and Public Health*, *18*(12), 6205.

[22] Image from Luiza Braun on Unsplash.

[23] Yabe et al., (2021). Perception and handling of breastmilk by childcare staff: A qualitative study of childcare facilities in Japan. *Journal of General and Family Medicine*. CC by NC 4.0

[24] "Support for Breastfeeding in Early Care and Education" from the CDC is in the public domain.

[25] Suan et al., (2016). Childcare workers' experiences of supporting exclusive breastfeeding in Kuala Muda District, Malaysia: a qualitative study. *International Breastfeeding Journal, 12*(1), 1-8. CC by 4.0

[26] Yabe et al., (2021). Perception and handling of breastmilk by childcare staff: A qualitative study of childcare facilities in Japan. *Journal of General and Family Medicine*. CC by NC 4.0

[27] Image from Nathan Dumlao on Unsplash.

[28] "Proper Storage and Preparation of Breast Milk" from the CDC is in the public domain.

3.3: Complementary Foods

Foods to Supplement Breast milk and Formula

At about six months of age, infants should be introduced to nutrient-dense, developmentally appropriate foods to complement breast milk or infant formula. Some infants may show developmental signs of readiness before the age of six months, but introducing complementary foods before age four months is not recommended. Waiting until after six months to introduce foods is also not recommended because starting around six months, complementary foods are necessary to ensure adequate nutrition and exposure to flavors, textures, and different types of foods. Infants should be given developmentally appropriate foods to help prevent choking. It is also important to introduce potentially allergenic foods along with other complementary foods. [1]

For infants fed breast milk, it is particularly important to include complementary foods that are rich in iron as breast milk is not a good source of these nutrients.About one-third (32%) of infants in the United States are introduced to complementary foods and beverages before four months of age, highlighting the importance of providing guidance and support to caregivers on the timing of complementary foods. Early introduction of complementary foods and beverages is higher among infants receiving infant formula (42%) or a combination of infant formula and breast milk (32%) than among infants exclusively fed breast milk (19%). [2]

Food Allergies

Food allergies are a growing food safety and public health concern that affect an estimated 8% of children in the United States (Gupta et al., 2018). That's 1 in 13 children, or about 2 students per classroom. A food allergy occurs when the body has a specific and reproducible immune response to certain foods (Boyce et al., 2011). The body's immune response can be severe and life-threatening, such as anaphylaxis. Eight foods or food groups account for most serious allergic reactions in the United States: milk, eggs, fish, crustacean shellfish, wheat, soy, peanuts, and tree nuts (Boyce et al., 2011). [3]

There is no cure for food allergies. Strict avoidance of the food allergen is the only way to prevent a reaction. However, because it is not always easy or possible to avoid certain foods, staff in early care and education programs should develop plans for preventing an allergic reaction and responding to a food allergy emergency, including anaphylaxis. Early and quick recognition and treatment can prevent serious health problems or death. The symptoms and severity of allergic reactions to food can be different between individuals and can also be different for one person over time. Anaphylaxis is a sudden and severe allergic reaction that may cause death, but not all allergic reactions will develop into anaphylaxis (Sampson et al., 2006). [4]

Developmental Readiness for Beginning To Eat Solid Foods

The age at which infants reach different developmental stages will vary. Typically between 4 to 6 months of age, infants develop the gross motor, oral, and fine motor skills necessary to begin to eat complementary foods. As an infant's oral skills develop, the thickness and texture of foods can gradually be varied. Signs that an infant is ready for complementary foods include: [5]

- Being able to control their head and neck.
- Sitting up alone or with support.
- Bringing objects to the mouth.
- Trying to grasp small objects, such as toys or food.
- Swallowing food rather than pushing it back out onto the chin.

Figure 3.3.1: Enjoying food. ([6])

Infants and young children should be given developmentally appropriate foods to help prevent choking. Foods such as hot dogs, candy, nuts and seeds, raw carrots, grapes, popcorn, and chunks of peanut butter are some of the foods that can be a choking risk for young children. Caregivers can take steps to decrease choking risks, including [7]

- Offering foods in the appropriate size, consistency, and shape will allow an infant or toddler child to eat and swallow easily.
- Making sure the infant or young child is sitting up in a chair or other safe, supervised place.
- Ensuring an adult is supervising feeding during mealtimes.
- Not putting infant cereal or other solid foods in an infant's bottle. This could increase the risk of choking and will not make the infant sleep longer.

[1] "Dietary Guidelines for Americans, 2020-2025" by U.S. Department of Agriculture and U.S. Department of Health and Human Services is in the public domain.

[2] "Dietary Guidelines for Americans, 2020-2025" by U.S. Department of Agriculture and U.S. Department of Health and Human Services is in the public domain.

[1] "Food Allergies" from the CDC is in the public domain.

[4] "Food Allergies" from the CDC is in the public domain.

[5] "Dietary Guidelines for Americans, 2020-2025" by U.S. Department of Agriculture and U.S. Department of Health and Human Services is in the public domain.

[6] Image by Derek Owens on Unsplash

[7] "Dietary Guidelines for Americans, 2020-2025" by U.S. Department of Agriculture and U.S. Department of Health and Human Services is in the public domain.

3.4: Concerns for Underconsumption and Overconsumption

Over and Under Consumption

In the United States, some dietary components are of public health concern for infants and toddlers. Iron is a dietary component of concern among older infants ages 6 through 11 months who are fed primarily breast milk and consume inadequate iron from complementary foods. Older infants who are fed primarily breast milk also under-consume zinc and protein from complementary foods, and vitamin D, choline, and potassium are notably under-consumed by all older infants. During the second year of life, the dietary components of public health concern for underconsumption are vitamin D, fiber, and potassium and concern for overconsumption include added sugars and sodium.[1]

Introduce Iron-rich Foods Starting at about Six Months

Iron-rich foods are important components of the infant's diet from age 6 through 11 months to maintain adequate iron status, which supports brain development and immune function. Infants are typically born with body stores of iron adequate for about the first 6 months of life, depending on gestational age, maternal iron status, and timing of umbilical cord clamping. By age 6 months, however, infants require an external source of iron apart from breast milk.[1]

A complementary food source of iron beginning at about 6 months is particularly important for infants fed breast milk because the iron content of breast milk is low and maternal iron intake during lactation does not increase its iron content. In the United States, an estimated 77% of infants fed breast milk have inadequate iron intake during the second half of infancy, highlighting the importance of introducing iron-rich foods starting at age 6 months.[1]

Infants receiving most of their milk feeds as iron fortified infant formula are likely to need less iron from complementary foods beginning at 6 months of age. After age 12 months, children have a lower iron requirement, but good food sources of iron are still needed to maintain adequate iron status and prevent deficiency.[1]

Iron found in foods comes in two forms: heme and non-heme iron. Heme iron is commonly found in animal products and is more easily absorbed by the body. Sources of heme iron include:[2]

- Red meat (for example, beef, pork, lamb, goat, or venison)
- Seafood (for example, fatty fish)
- Poultry (for example, chicken or turkey)
- Eggs

Non-heme iron can be found in plants and iron-fortified products. This type of iron is less easily absorbed by the body and will require careful planning to get enough iron for your baby. Sources of non-heme iron include:[2]

- Iron-fortified infant cereals
- Tofu
- Beans and lentils
- Dark green leafy vegetables

Pairing non-heme iron sources with foods high in vitamin C can help with iron absorption. Vitamin C-rich fruits and vegetables include:[2]

- Citrus fruits like oranges
- Berries
- Papaya
- Tomatoes
- Sweet potatoes
- Broccoli
- Cabbage
- Dark green leafy vegetables

Figure 3.4.1: Infant enjoying a delicious strawberry. ([3])

Introduce Zinc-rich Foods Starting at about Six Months

Zinc-rich complementary foods are important from age 6 months onwards for adequate zinc status, which supports growth and immune function. Although the zinc content of breast milk is initially high and efficiently absorbed, the concentration declines over the first 6 months of lactation and is not affected by maternal zinc intake. During the second half of infancy, approximately half (54%) of U.S. infants fed breast milk have inadequate zinc intake. Prioritizing zinc-rich foods starting at 6 months of age to complement breast milk feedings can help infants meet their requirement for zinc. [1]

Encourage a Variety of Food

To support nutrient adequacy, foster acceptance of healthy foods, and set intakes on a path toward a healthy pattern, it is important to encourage foods from all food groups. Because very young children are being exposed to new textures and flavors for the first time, it may take

up to 8 to 10 exposures for an infant to accept a new type of food. Repeated offering of foods such as fruits and vegetables increases the likelihood of an infant accepting them (Nicklaus, 2016). Several studies have shown that a food is consumed more and is judged as more liked by the infant after several offerings. For example, an increase in acceptance of a new green vegetable was observed after 10 exposures (Sullivan & Birch, 1994), and an increase in intake of a new fruit or vegetable was shown after eight exposures (Birch, Gunder, Grimm-Thomas & Laing, 1998). The effect of repeated exposure is great enough to increase the acceptance of foods which had been previously identified by the mother as being refused by her infant, which were most often green vegetables and pumpkin (Maier et al., 2007). However, despite the documented success after multiple offerings, foods are most often only presented a limited number of times (often less than five times) before the parent(s) decide that the infant dislikes this food (Carruth, Ziegler, Gordon & Barr, 2004). [1] [3]

A nutrient-dense, diverse diet from 6 months through toddlerhood includes a variety of food sources from each food group. Protein foods, including meats, poultry, eggs, seafood, nuts, seeds, and soy products, are important sources of iron, zinc, protein, choline, and long chain polyunsaturated fatty acids. The long-chain polyunsaturated fatty acids, specifically the essential omega-3 and omega-6 fatty acids supplied through seafood, nuts, seeds, and oils, influence the infant's fatty acid status and are among the key nutrients needed for the rapid brain development that occurs through the infant's first 2 years of life. Some types of fish such as salmon and trout are also natural sources of vitamin D. [4]

Figure 3.4.2:A variety of colorful vegetables to enjoy. ([5])

Vegetables and fruits, especially those rich in potassium, vitamin A, and vitamin C, should be offered to infants and toddlers starting at age 6 through toddlerhood. The vegetable subgroup of beans, peas, and lentils also provides a good source of protein and dietary fiber. [1]

For dairy, families can introduce yogurt and cheese, including soy-based yogurt, before 12 months. However, infants should not consume cow milk, as a beverage, or fortified soy beverage, before 12 months as a replacement for breast milk or infant formula. In the second year of life, when calcium requirements increase, dairy products, including milk, yogurt, cheese, and fortified soy beverages and soy yogurt provide a good source of calcium. Vitamin D-fortified milk and soy beverages also provide a good source of vitamin D. For those younger than the age of 2, offer dairy products without added sugar. [1]

Grains, including iron-fortified infant cereal, play an important role in meeting nutrient needs during this life stage. Infant cereals fortified with iron include oat, barley, multigrain, and rice cereals. Rice cereal fortified with iron is a good source of nutrients for infants, but rice cereal shouldn't be the only type of cereal given to infants. Offering young children whole grains more frequently than refined grains will increase dietary fiber as well as potassium intake during the second year of life and help young children establish healthy dietary practices. [1]

Dietary Components to Limit

While encouraging intake from each food group, some dietary components should be limited. Infants and young children have virtually no room in their diet for added sugars. This is because the nutrient requirements for infants and young children are quite high relative to their size, but the amount of complementary foods they consume is small. Complementary foods need to be nutrient-dense and not contain additional calories from added sugars. In addition, low- and no-calorie sweeteners are not recommended for children younger than age two. Taste preferences are being formed during this time period, and infants and young children may develop preferences for overly sweet foods if introduced to very sweet foods during this timeframe. [1]

Figure 3.4.3:The delights of a cake all to yourself. ([6])

Sodium is found in a number of foods, including some salty snacks, commercial toddler foods, and processed meats. In addition to keeping sodium intake within limits for toddlers, another reason to avoid high-sodium foods is that taste preferences for salty food

may be established early in life. Choose fresh or low-sodium frozen foods, when available, and low-sodium canned foods to minimize sodium content. [1]

Infants should not be given any foods containing raw or cooked honey. Honey can contain the Clostridium botulinum organism that could cause serious illness or death among infants. Infants and young children also should not be given any unpasteurized foods or beverages, such as unpasteurized juices, milk, yogurt, or cheeses, as they could contain harmful bacteria. [1]

Due to the relatively high nutrient needs of toddlers, a healthy dietary pattern has virtually no room for added sugars. Toddlers consume an average of more than 100 calories from added sugars each day, ranging from 40 to 250 calories a day (about 2.5 to 16 teaspoons). Sugar-sweetened beverages, particularly fruit drinks, contribute more than 25 percent of total added sugars intakes and sweet bakery products contribute about 15 percent. Other food category sources contribute a smaller proportion of total added sugars on their own, but the wide variety of sources, which include yogurts, ready-to-eat cereals, candy, fruits, flavored milk, milk substitutes, baby food products, and breads, points to the need to make careful choices across all foods. [1]

---

[1] "Dietary Guidelines for Americans, 2020-2025" by U.S. Department of Agriculture and U.S. Department of Health and Human Services is in the public domain.

[2] "Iron" from the CDC is in the public domain

[3] Image by Stewardesign on Pixabay.

[4] Nicklaus (2016). Complementary feeding strategies to facilitate acceptance of fruits and vegetables: A narrative review of the literature. *International Journal of Environmental Research and Public Health*, *13*(11), 1160. CC by 4.0

[5] Image by Marisol Benitez on Unsplash.

[6] Image by Henley Design Studio on Unsplash.

3.5: Beverages

Infants and Beverages

For healthy infants with adequate intake of breast milk or infant formula, supplemental water is typically not needed in the first 6 months. Small amounts (up to 4 to 8 ounces per day) of plain, fluoridated drinking water can be given to infants with the introduction of complementary foods. Plain, fluoridated drinking water intake can slowly be increased after age 1 to meet hydration and fluoride needs.[1]

Infants should not consume cow milk or fortified soy beverages before age 12 months to replace breast milk or infant formula. Cow milk does not have the correct amount of nutrients for infants, and its higher protein and mineral content are hard for an infant's kidneys and digestive system to process. Plain cow milk (whole milk) or fortified unsweetened soy beverage can be offered beginning around 12 months of age to help meet calcium, potassium, vitamin D, and protein needs. Flavored milks for children aged 12 through 23 months should be avoided because they contain added sugars.[1]

Plant-based milk alternatives include beverages made from plants, such as soy, oat, rice, coconut, and almond. These beverages should not be used in the first year of life to replace breast milk or infant formula. They may come in different flavors and some forms have added sugars. Unsweetened versions of these beverages may be accommodated in small amounts in the diet during the second year of life, but most have significantly less protein than cow milk and are not always fortified with calcium and vitamin D. Among plant-based milk alternatives, only fortified soy beverage is currently considered a dairy equivalent. Thus, consuming other plant-based beverages does not contribute to meeting dairy recommendations.[1]

Before twelve months, 100% fruit or vegetable juices should not be given to infants. In the second year of life, fruit juice is not necessary, and most fruit intake should come from eating whole fruit. If 100% fruit juice is provided, up to 4 ounces per day can fit in a healthy dietary pattern. Juices that contain added sugars should be avoided.[1]

Sugar-sweetened beverages (e.g., regular soda, juice drinks (not 100% fruit juice), sports drinks, and flavored water with sugar) should not be given to children younger than age 2. Drinks labeled as fruit drinks or fruit-flavored drinks are not the same as 100% fruit juice and contain added sugars. These beverages displace nutrient-dense beverages and foods in the diet of young children. Infants and toddlers do not have room in their diets for the additional calories from added sugars found in these beverages. In addition, sugar-sweetened beverage intake in infancy and early childhood may predispose children to consume more of these beverages later in life.[1]

Concerns exist about potential negative health effects of caffeine for young children, and no safe limits of caffeine have been established for this age group. Caffeine is a stimulant that can occur naturally in foods and beverages or as an additive. Major sources of caffeine for Americans include beverages such as soft drinks, tea, coffee, and sports drinks. Beverages containing caffeine should be avoided for infants and toddlers.[1]

[1] "Dietary Guidelines for Americans, 2020-2025" by U.S. Department of Agriculture and U.S. Department of Health and Human Services is in the public domain.

3.6: Healthy Dietary Patterns During a Toddler's Second Year of Life

Dietary Patterns

In the second year of life, toddlers consume less breast milk, and infant formula is not recommended. Calories and nutrients should predominantly be met from a healthy dietary pattern of age-appropriate foods and beverages.[1]

The table below displays a healthy dietary pattern for toddlers ages 12 through 23 months who are no longer receiving breast milk or infant formula. The pattern is provided at calorie levels ranging from 700 to 1,000 calories per day, which are appropriate for most toddlers ages 12 through 23 months. A healthy dietary pattern includes a variety of nutrient-dense fruits, vegetables, grains, protein foods (including lean meats, poultry, eggs, seafood, nuts, and seeds), dairy (including milk, yogurt, and cheese), and oils.

Vegetable Subgroups in Weekly Amounts

CALORIE LEVEL OF PATTERN a	700	800	900	1,000
Vegetables: Total (cup eq/day)	⅔	¾	1	1
Dark-Green Vegetables (cup eq/wk)	1	⅓	½	½
Red and Orange Vegetables (cup eq/wk)	1	1 ¾	2 ½	2 ½
Beans, Peas, Lentils (cup eq/wk)	¾	⅓	½	½
Starchy Vegetables (cup eq/wk)	1	1 ½	2	2
Other Vegetables (cup eq/wk)	¾	1 ¼	1 ½	1 ½
Fruits (cup eq/day)	½	¾	1	1
Grains (ounce eq/day)	1 ¾	2 ¼	2 ½	3
Whole Grains (ounce eq/day)	1 ½	2	2	2
Refined Grains (ounce eq/day)	¼	¼	½	1
Dairy (cup eq/day)	1 ⅔	1 ¾	2	2
Protein Foods (ounce eq/day)	2	2	2	2

Protein Foods Subgroups in Weekly Amounts

CALORIE LEVEL OF PATTERN a	700	800	900	1,000
Meats, Poultry (ounce eq/wk)	8 ¾	7	7	7 ¾
Eggs (ounce eq/wk)	2	2 ¾	2 ¼	2 ¼
Seafood (ounce eq/wk)e	2-3	2-3	2-3	2-3
Nuts, Seeds, Soy Products (ounce eq/wk)	1	1	1 ¼	1 ¼
Oils (grams/day)	**9**	**9**	**8**	**13**

After food group and subgroup recommendations are met, a small number of calories are allocated to oils. The recommendation to limit saturated fat to less than 10 percent of calories per day does not apply to those younger than age 2, and the inclusion of higher fat versions of dairy is a notable difference in the pattern for toddlers ages 12 through 23 months compared to patterns for ages 2 and older. However, no calories remain in the pattern for additional saturated fat or for added sugars. This dietary pattern requires careful choices of foods and beverages but does not require inclusion of fortified products specifically formulated for infants or toddlers to meet nutrient recommendations.[1]

Based on the FDA's and EPA's joint "Advice About Eating Fish," young children should eat seafood lowest in methylmercury, and certain species of seafood should be avoided. If consuming up to 2 ounces of seafood per week, children should only be fed cooked varieties from the "Best Choices" listed in Figure 3.6.1. If consuming up to 3 ounces of seafood per week, children should only be fed cooked varieties from the "Best Choices" list that contain even lower methylmercury: flatfish (e.g., flounder), salmon, tilapia, shrimp, catfish, crab, trout, haddock, oysters, sardines, squid, pollock, anchovies, crawfish, mullet, scallops, whiting, clams, shad, and Atlantic mackerel. If consuming up to 3 ounces of seafood per week, many commonly consumed varieties of seafood should be avoided because they cannot be consumed at 3 ounces per week by children without the potential of exceeding safe methylmercury limits; examples that should not be consumed include: canned light tuna or white (albacore) tuna, cod, perch, black sea bass. [1]

Figure 3.6.1: Fish sorted by level of mercury risk. ([3]) View Text Version

Figure 3.6.2 displays the dietary intakes of toddlers during the second year of life, in other words, what toddlers are actually eating. Average intakes of the food groups are compared to the range of recommended intakes. Average intakes of dairy foods, most of which is consumed as milk, generally exceeds recommended amounts in toddlers. In fact, the difference between the diary recommendation and the actual intake is the greatest of all the food groups. Intakes of yogurt and cheese account for about 10% of dairy intakes. Plant-based beverages and flavored milks each make up about 2% of dairy intakes among toddlers. Approximately 60% of toddlers meet or exceed recommended intakes for fruit. A majority of fruit is consumed as whole fruit (fresh, canned, puréed, frozen) or as 100% fruit juice. Average intake of total vegetables is below the range of recommended amounts, with nearly 90% of toddlers falling short of recommendations. About one-half of vegetables are consumed on their own, one-quarter are consumed as part of a mixed dish, and nearly 5 percent are consumed as savory snacks (e.g., potato chips). [1]

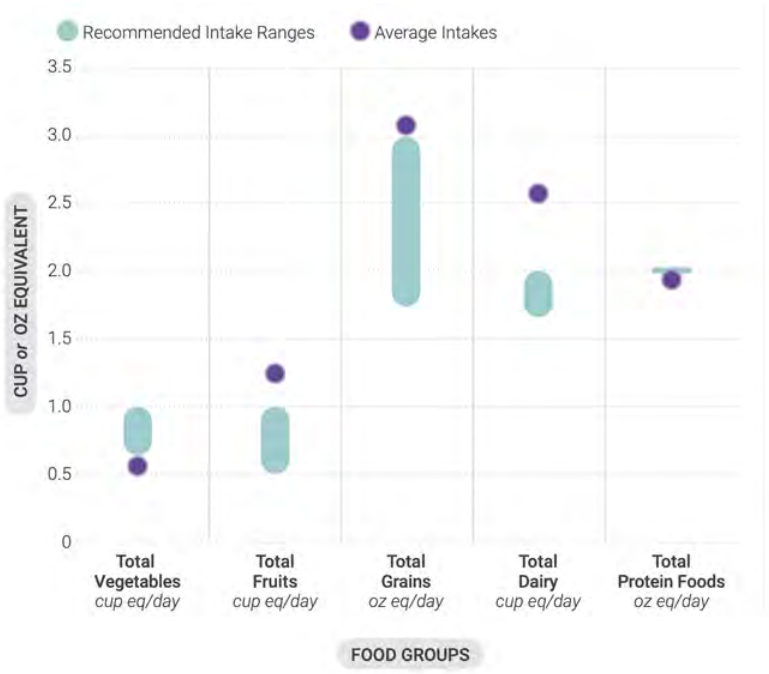


Figure 3.6.2: Average daily food group intakes compared to recommended intake ranges. Recommended intake for: Total vegetables=.5-1cup, Total Fruits=.5-1, Total Grains=1.75-3, Total Dairy=1.75-2, Total Protein Foods=2. Average intakes for: Total vegetables=.75, Total Fruits=1.25, Total grains=3, Total Dairy=2.5, Total Protein Foods=2 ([4])

While the average overall intake of total vegetables is below the range of recommended amounts, consumption of specific types of vegetables is lower than others. Figure 3.6.3 shows the average intake of different types of vegetables (dark green, red and orange, beans, peas and lentils, starchy and other) compared to the recommended range. Of all the types of vegetables, the difference between the recommended range for dark green vegetables and the actual intake is the greatest of all the food groups. Toddlers should be eating more dark green vegetables. For all of the other types of vegetables, average intake falls toward the lower end of what is recommended. For example, while the average intake of red and orange vegetables is between 1 to 1.5 cups each week, the recommended intake range is between 1 to 2.5 cups each week.

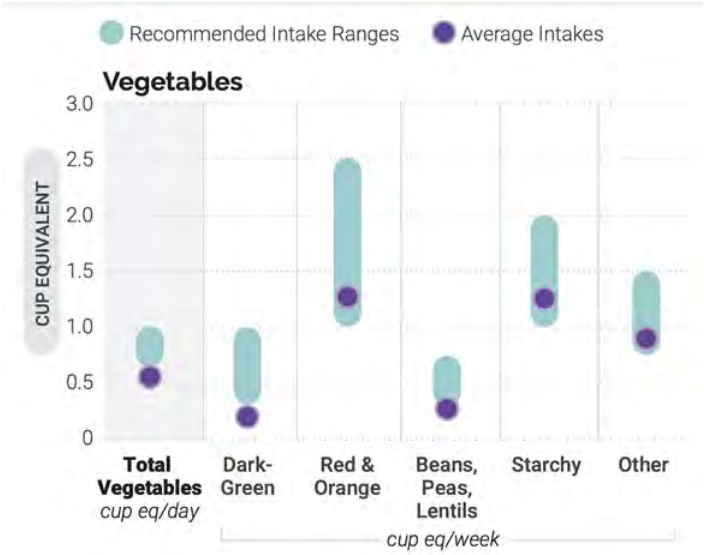


Figure 3.6.3: Average intake of vegetables compared to recommended intake ranges: ages 12 through 23 months. Recommended Intake Ranges Vegetables Dark-Green=.25-1, Red and Orange=1-2.5, Beans, Peas, and Lentils=.25-.75, Starchy=1-2,Other=.75-1.5. Average Intake Vegetables Dark Green=.25, Red & Orange=1.25, Beans,Peas,Lentils=.25,Starchy= 1.25,Other=.75([4])

Figure 3.6.4 shows the average intake of grains compared to recommended intake ranges: ages 12 through 23 months. Total grains, particularly refined grains, are consumed in amounts that exceed recommendations. Conversely, intakes of whole grains fall short

of recommended amounts for more than 95% of toddlers. A majority of grains are consumed through breads, rolls, tortillas, or other bread products or as part of a mixed dish. Ten percent of grains come from sweet bakery products and approximately 15 percent come from crackers and savory snacks. Many of these categories are top sources of sodium or added sugars in this age group. [1]

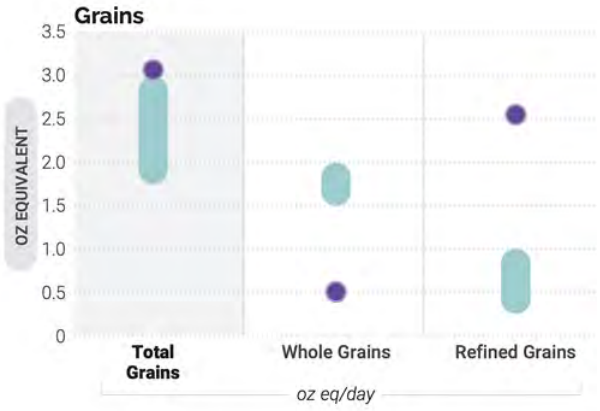


Figure 3.6.4: Average intake of grains compared to recommended intake ranges: ages 12 through 23 months. Recommended:Total Grains Reccommended= 1.75-3, Whole Grains=1.5-2, Refined Grains=.75-1. Average Intakes: Total Grains=3, Whole Grains=.5, Refined Grains=2.5 ([1])

Figure 3.6.5 shows the average intake of protein compared to recommended intake ranges for toddlers between 12 through 23 months. Protein food intake falls within the recommended range, on average. Intakes of meats, poultry, and eggs make up the majority of protein food intake, however seafood intake in toddlers is low. Children in this age group can reduce sodium intake by eating less cured or processed meats including hot dogs, deli meats, and sausages. [1]

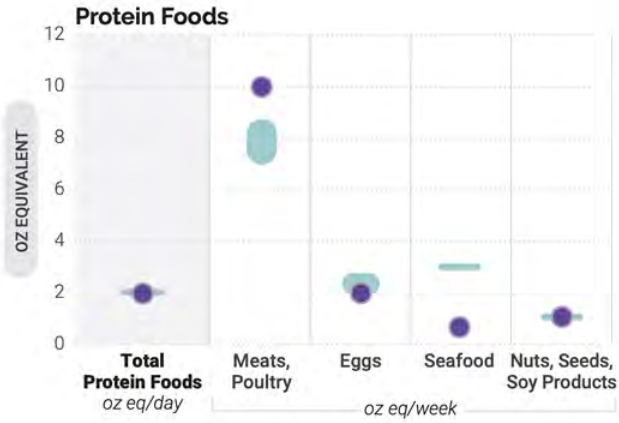


Figure 3.6.5: Average intake of protein compared to recommended intake ranges: ages 12 through 23 months. Protein Foods Recommended Intake Ranges in ounces: Total Protein Foods = 2, Meats, Poultry=7-9, Eggs=3, Seafood=3, Nuts, Seeds, Soy Products=3. Average Intakes: Total Protein Foods: 2, Meats, Poultry=10, Eggs=2, Seafood=1,Nuts,Seeds,Soy Products=.5. ([1])

[1] "Dietary Guidelines for Americans, 2020-2025" by U.S. Department of Agriculture and U.S. Department of Health and Human Services is in the public domain.

[2] Image from "Dietary Guidelines for Americans, 2020-2025" by U.S. Department of Agriculture and U.S. Department of Health and Human Services is in the public domain.

[3] "Advice about eating fish" from the FDA is in the public domain.

[4] Image from "Dietary Guidelines for Americans, 2020-2025" by U.S. Department of Agriculture and U.S. Department of Health and Human Services is in the public domain.

3.7: Supporting Healthy Eating

Healthy Eating

In addition to “what” to feed children, “how” to feed young children also is critical. Repeated exposure to foods can increase acceptance of new foods. Another important concept is responsive feeding, a feeding style that emphasizes recognizing and responding to the hunger or fullness cues of an infant or young child.

Even before a child can talk, they will show signs of hunger or fullness by using sounds and body movements. Crying is often a late sign of hunger. Understanding a child’s signs is important to help you know when and how often to feed a child. Responsive feeding is a term used to describe a feeding style that emphasizes recognizing and responding to the hunger or fullness cues of an infant or young child. Furthermore, responsive feeding helps young children learn how to self-regulate their intake. [1]

Between birth through 5 months a child may be hungry if they: [1]

- Put their hands to their mouth.
- Turn their head toward the breast or bottle.
- Pucker, smack, or lick their lips.

Figure 3.7.1: Displaying signs of hunger. ([2])

Between birth through 5 months a child may be full if they: [1]

- Close their mouth.
- Turn their head away from the breast or bottle.
- Relax their hands.

Between 6 to 23 months a child may be hungry if they: [1]

- Reach for or point to food.
- Open their mouth when offered a spoon or food.
- Get excited when they see food.
- Use hand motions or make sounds to let you know they are still hungry.

Figure 3.7.2: Toddler enjoying food. ([3])

Between 6 to 23 months a child may be full if they: [1]

- Push food away.

- Close their mouth when food is offered.
- Turn their head away from food.
- Use hand motions or make sounds to let you know they are full.

Figure 3.7.3: Toddler giving signs of being full ([1])

Accessing a Healthy Dietary Pattern

Many resources exist to support healthy growth and development during infancy and toddlerhood. These include the following government programs that aim to support a healthy dietary pattern for infants and toddlers living in households with limited incomes: [1]

- **The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)** supports infant and early childhood nutrition through supplementing the diets of women who are pregnant or lactating and by providing breastfeeding support and iron-fortified infant formula when breast milk is unavailable or fed only partially. WIC accommodates the transition to solid foods by providing nutrient-dense foods in the supplemental food packages offered to older infants and toddlers. Nutrition education and counseling and referrals to healthcare and social services are other important resources offered to income-eligible WIC participants.
- **The Child and Adult Care Food Program (CACFP)** provides reimbursement for nutrient-dense meals and snacks served to infants and toddlers in participating child care centers, including at Head Start programs, and day care homes where infants and toddlers also have access to health screenings and families can be connected to health services to support their overall well-being.
- **The Supplemental Nutrition Assistance Program (SNAP)** is the largest food assistance program in the United States. SNAP helps meet the nutritional needs of infants and toddlers living in low-income households by providing temporary monthly benefits that can be used to access a healthy dietary pattern. These government nutrition programs are especially important for the 14% of families with children who experience food insecurity and may struggle to access the foods needed to support a healthy dietary pattern. Professionals can use these, and additional Government and non-Government resources that exist within communities, to support healthy eating during infancy and toddlerhood.

[1] "Signs Your Child is Hungry or Full" from the CDC is in the public domain.

[2] Image from the CDC

[3] Image from the CDC is in the public domain.

[1] Image from the CDC is in the public domain.

[1] "Dietary Guidelines for Americans, 2020-2025" by U.S. Department of Agriculture and U.S. Department of Health and Human Services is in the public domain.

3.8: Sleep

Importance of Sleep

Along with food and nutrition, sleep is critical during the first three years to promote healthy development. Sleep develops rapidly during the first few years of life and is a highly dynamic process with many changes during the first three years. At birth, infants do not have an established circadian rhythm to regulate their sleep–wake cycle and therefore sleep across multiple intervals throughout the day and night in short bouts, which may also be due to infants' feeding needs (Davis, Parker & Montgomery, 2004). At about 10 to 12 weeks of age, the first signs of a circadian rhythm begin to develop, marked by an increase in sleeping through the night (Mirmiran, Baldwin & Ariagno, 2003). The change in total sleep duration over 24 hours decreases from 16 to 17 hours in newborns, to 14 to 15 hours at 16 weeks of age, and then decreases further to 13 to 14 hours by 6 months of age (Adams, Jones, Esmail & Mitchell, 2004; Galland, Taylor, Elder & Herbison, 2012). While the need for day sleep decreases, night sleep duration increases through the first year of life, resulting in a shift towards a more nocturnal pattern of sleep (Bruni et al., 2014; Iglowstein, Jenni, Molinari & Largo, 2003; Sadeh, Mindell, Luedtke & Wiegand, 2009). [1]

Figure 3.8.1: Sleeping comfortable with a trusted caregiver. ([2])

Concerns that children are not getting enough sleep have been around for over one hundred years, with recommendations of ideal sleep duration for children being provided as early as 1897 (Matricciani et al., 2012). The National Sleep Foundation (NSF) recommends a daily sleep duration of 14 to 17 hours each day from birth to 3 months, 12 to 15 hours each day from 4 to 11 months, 11 to 14 hours each day for infants aged 1 to 2 years, and 10 to 13 hours each day for preschoolers aged 3 to 5 years (Hirshkowitz et al., 2015). However, many infants and toddlers sleep less than the recommended amount (Matricciani et al., 2012). Figure 3.8.2 shows sleep duration data across ages. As can be seen in the figure, the total amount of hours varies the most during infancy, followed by slightly less variability during toddlerhood. From the preschool years to later childhood, there is little variability as children's sleep duration stabilizes and the total amount of hours they sleep becomes consistent. Short sleep duration is particularly prevalent in predominantly Asian countries. A study conducted on caregivers of 29,287 children between the ages of 0 and 36 months from seventeen countries reported that total sleep duration in children from predominantly Asian countries is significantly lower than children from predominantly Caucasian countries (Mindell et al., 2010). Moreover, regardless of age group, children from predominantly Asian countries consistently sleep less. [1]

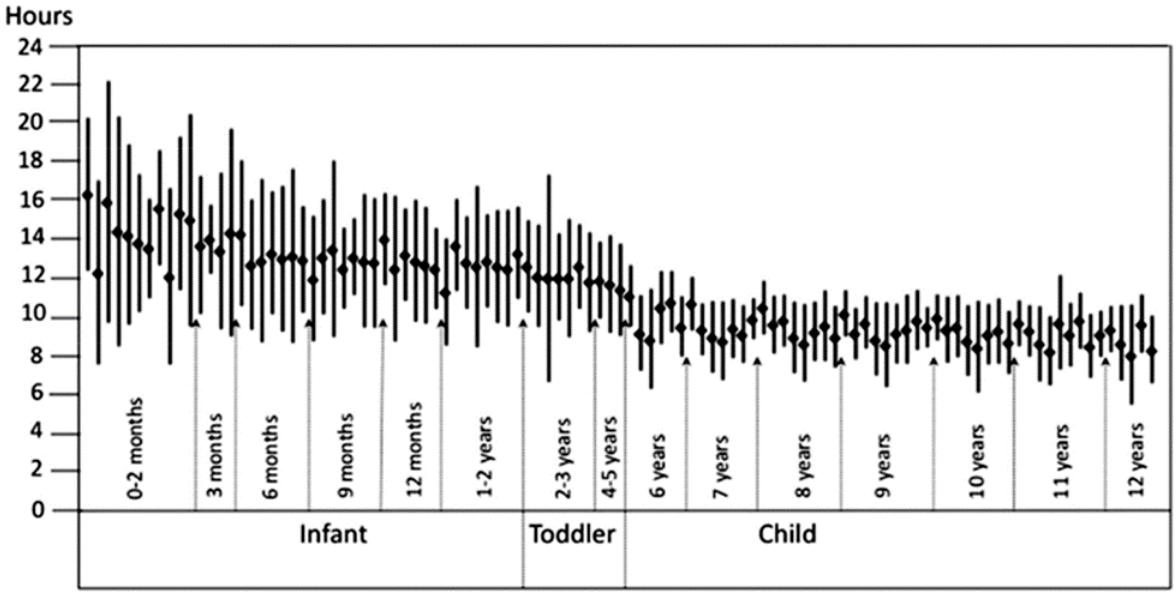


Figure 3.8.2: Sleep duration data across ages. Mean number of hours in for infants 0-2 yrs with significant ranging between 22-8 hrs for infants 0-2, typically the numbers of hours is 16-14 hrs, toddler 2-5 dips down 13-14 average hours, a child 6-12 has significant variation between 6-12 hrs but the average is still around 10 hrs. ([3])

Sleep is important for infants and toddlers because sleep plays a significant role in memory consolidation, language acquisition and cognitive development (Tham, Schneider & Broekman, 2017). Memory consolidation is a process whereby a memory becomes more stable and resistant to being forgotten (Rasch & Born, 2013; Stickgold & Walker, 2007). For example, six and twelve month old infants who napped for at least 30 minutes after learning a set of object–action pairings from a puppet toy recalled significantly more target actions when tested after a 24-hour delay compared to infants in the no-nap group (Seehagen, Konrad, Herbert & Schneider, 2015). This study suggests that napping during infancy can help in the consolidation of memories, like learning new actions. [4]

After learning an artificial language, 15 month old infants who napped for at least 30 minutes, compared to those who did not nap at all, were able to abstract grammatical relations among words at a later test session that occurred 4 hours after learning (Gómez, Bootzin & Nadel, 2006). In a follow-up study, the benefits of napping for language learning persisted even after 24 hours (Hupbach, Gomez, Bootzin & Nadel, 2009). Sixteen month old infants who napped after learning sets of new object–word associations spent more time looking at the correct associative pairing at the 2-hour delayed test session, whereas infants who remained awake did not display any differences in looking between the learning and delayed test sessions (Horváth, Myers, Foster & Plunkett, 2015). These studies suggest that napping can enhance aspects of language learning. [4]

Figure 3.8.3: Infant sleeping. ([5])

While taking naps and greater overall sleep can benefit cognitive and language development, less quality sleep and less overall sleep is negatively related to developmental outcomes. Greater movements or activity during sleep and greater number of awakenings after sleep onset were negatively correlated with scores on the Bayley Scales of Infant and Toddler Development Mental Development Index (BSID-MDI) amongst 10 month old infants (Scher, 2005). In contrast, greater sleep efficiency (i.e.

spending a larger percentage of time asleep between sleep onset and wakefulness) was positively correlated with BSID-MDI scores in the same group of infants. Besides sleep efficiency, longer proportions of sleep at night were also associated with better cognitive problem-solving skills (Gibson, Elder & Gander, 2012). Higher percentages of parent-reported night sleep (out of total sleep duration) at 12 and 18 months of age were significantly associated with better executive functioning performance at 26 months of age, especially performance related to impulse-control tasks (Bernier, Carlson, Bordeleau & Carrier, 2010). The benefits of higher percentages of sleep duration at night extend beyond toddlerhood. Findings from a follow-up study report that 12 month old infants with higher proportions of night sleep displayed better executive functioning performance at 4 years (Bernier et al., 2013). [4]

[1] Tham et al., (2017). Infant sleep and its relation with cognition and growth: A narrative review. *Nature and Science of Sleep*, *9*, 135.

[2] Image by AMIT RANJAN is on Unsplash.

[1] Rudzik, A. E., & Ball, H. L. (2021). Biologically normal sleep in the mother-infant dyad. American journal of human biology, e23589. CC by 4.0

[4] Tham et al., (2017). Infant sleep and its relation with cognition and growth: A narrative review. *Nature and Science of Sleep*, *9*, 135.

[1] Image by adiretoriaeventos on Pixabay.

3.9: Sudden Unexpected Infant Death (SUID)

SUID

To support optimal sleep for infants and toddlers, caregivers must be knowledgeable of safe sleep practices. Sudden unexpected infant death (SUID) is a term used to describe the sudden and unexpected death of an infant less than 1 year old in which the cause was not obvious before investigation. These deaths often happen during sleep or in the infant's sleep area. In the United States about 3,400 infants die suddenly and unexpectedly each year. Sudden unexpected infant deaths include sudden infant death syndrome (SIDS), accidental suffocation in a sleeping environment, and other deaths from unknown causes. Figure 3.9.1 shows the trends in sudden unexpected infant death (SUID) rates in the United States from 1990 through 2019. The SUID rate declined considerably beginning in 1990 following the release of The American Academy of Pediatrics safe sleep recommendations in 1992 and the initiation of the Back to Sleep (now known as Safe to Sleep) campaign that began in 1994. Since 1999, declines have slowed and plateaued. In 2019, the SUID rate was 90.1 deaths per 100,000 live births.

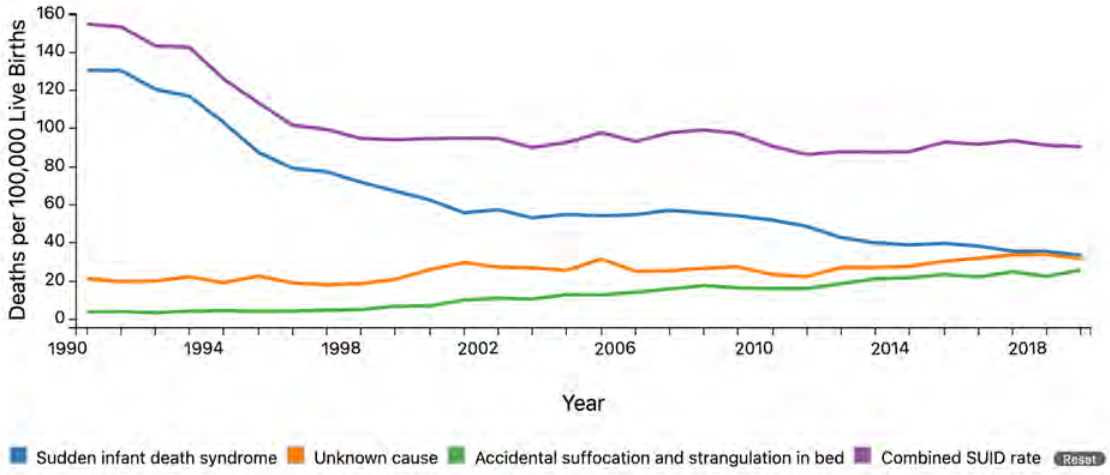


Figure 3.9.1: Trends in Sudden Unexpected Infant Death by Cause, 1990–2019. Causes of deaths per 100,000 live births. The highest trend line was combined SUID rate. Begins at 160 in 1990 and trends downward to 100 in 2018. 2nd highest Sudden infant death syndrome downward trend starting at 160 in 1990 and ending at 100 after 2018. Unknown causes 3rd highest has a gradual upward trend from 22 in 1990 to 30 after 2018, upward trend for accidental death at 5 in 1990 to 20 in 2018. ([1])

In 2019, there were about 1,250 deaths due to SIDS, about 1,180 deaths due to unknown causes, and about 960 deaths due to accidental suffocation and strangulation in bed.

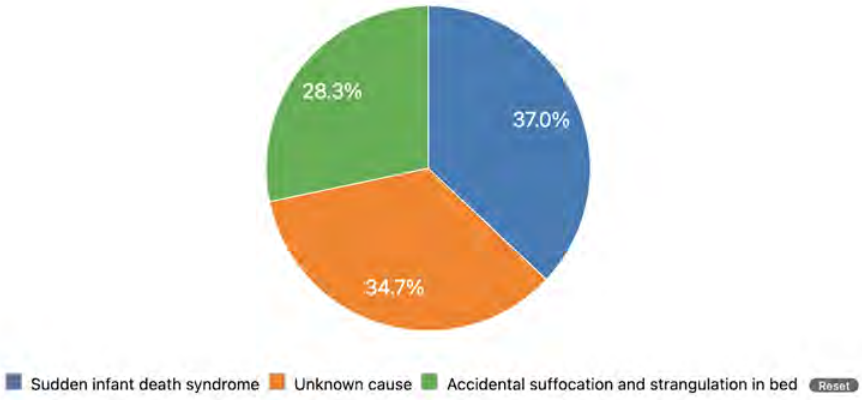


Figure 3.9.2: Breakdown of Sudden Unexpected Infant Deaths by Cause in 2019. SUID = 37%, Unknown cause = 34.7%, Accidental suffocation and strangulation in bed = 28.3%. ([2]

Figure 3.9.3 is a map showing how sudden unexpected infant death (SUID) rates varied by state from 2015 through 2019 among the 50 U.S. states and the District of Columbia. Vermont, Massachusetts, California, New Hampshire, and New York had the lowest SUID rates.

Mississippi, Alabama, Arkansas, Louisiana, and South Dakota, had the highest SUID rates.

The SUID rate in Mississippi (184.7 per 100,000 live births) was almost 4 times the SUID rate in Vermont (46.3 per 100,000 live births).

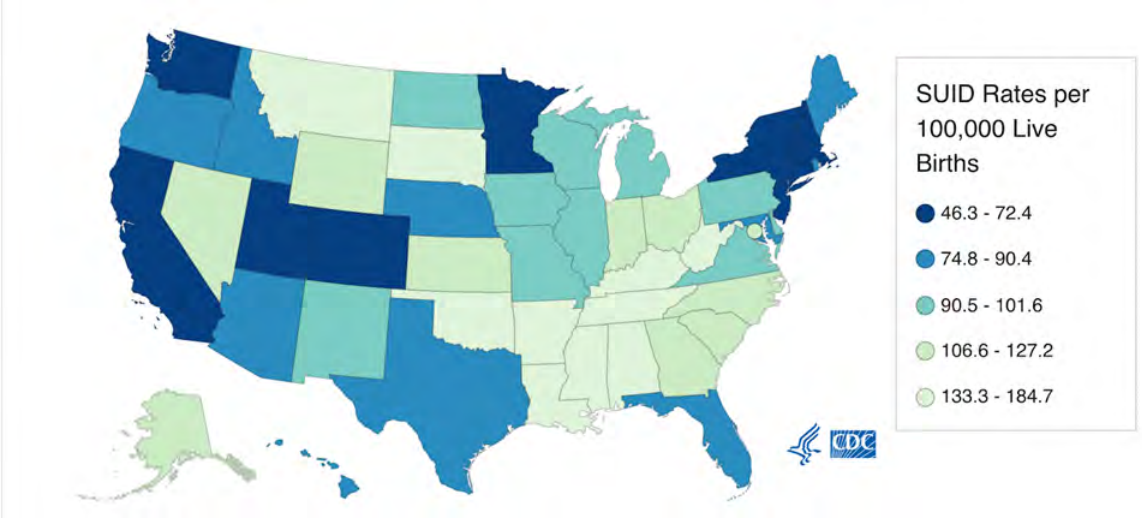


Figure 3.9.3: SUID Rates by State, 2015–2019. Alabama 175.8, Alaska 126.8, Arizona 83.3, Arkansas 172.6, California 51.2 Colorado 60, Connecticut 61.4, Delaware 94.1, District of Columbia 122.7, Florida 88.7, Georgia 127.2, Hawaii 79.8, Idaho 74.8, Illinois 90.5, Indiana 106.6, Iowa 96, Kansas 111.1, Kentucky 133.3, Louisiana 157.4, Maine 85.9, Maryland 89.8, Massachusetts 48.9, Michigan 99.8, Minnesota 58.3, Mississippi 184.7, Missouri 101.6, Montana 140.1, Nebraska 88.1,Nevada 116.7, New Hampshire 56.1, New Jersey 61.6, New Mexico 97.3, New York 57.2, North Carolina 113.6, North Dakota 97.2, Ohio 110.3, Oklahoma 151.4, Oregon 88.2, Pennsylvania 92.4, Rhonde Island 88.5, South Carolina 116, South Dakota 154.8, Tennessee 148.7, Texas 90.4, Utah 57.8, Vermont 46.3, Virginia 100.7, Washington 72.4, West Virginia 149, Wisconsin 91.4, Wyoming 108 ([3])

Although the SUID rate has declined since the 1990s, significant racial and ethnic differences continue. Figure# is a stacked bar chart showing sudden unexpected infant death (SUID) rates by cause and by race/ethnicity in the United States from 2014 through 2018. SUID rates per 100,000 live births for American Indian/Alaska Native (212.1) and non-Hispanic Black infants (186.9) were more than twice those of non-Hispanic White infants (84.9). SUID rates per 100,000 live births were lowest among Hispanic (54.1) and Asian/Pacific Islander infants (34.4). Deaths due to SIDS accounted for the largest proportion of SUID for non-Hispanic Black infants (39%), Asian/Pacific Islander infants (40%), American Indian/Alaska Native infants (42%), and non-Hispanic White infants (43%). Deaths due to unknown causes accounted for the largest proportion of SUID for Hispanic infants (41%). ASSB accounted for the smallest proportion of SUID for all racial groups, ranging from 21% of SUID among Hispanic infants to 26% of SUID among non-Hispanic Black and non-Hispanic White infants.

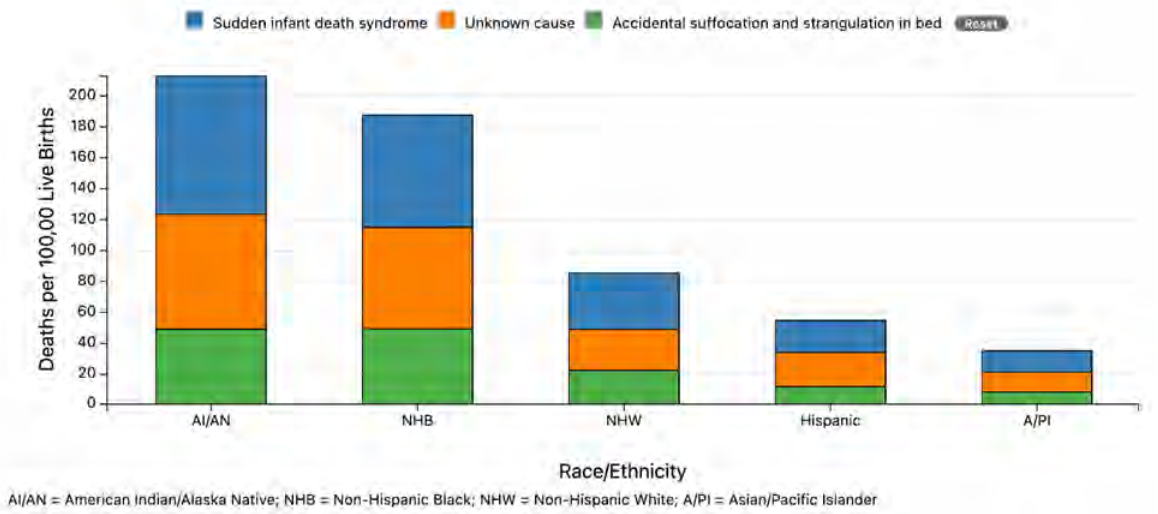


Figure 3.9.4: Sudden Unexpected Infant Death by Race/Ethnicity, 2014–2018. Sudden infant death syndrome Sudden infant death syndrome AI/AN=89.5, NHB=72.7, NHW=36.7, Hispanic=20.7 A/PI=13.8, Unknown cause AI/AN=74.3,NHB=65.7, NHW=26.4, Hispanic=22.3,A/PI=13,Accidental suffocation and strangulation in bed AI/AN=48.4,NHB=48.5, NHW=21.8, Hispanic=11.1,A/PI=7.7([4])

Despite campaigns and the spreading awareness to reduce SIDS by creating safer sleeping environments, caregivers continue to not fully follow the guidelines. For example, Figure 3.9.5 shows the positions caregivers in Sweden place infants to sleep in. While most infants were placed to sleep in a supine position, as recommended, the data revealed that there were still some infants placed to sleep in the prone position (face down) (Wennergren, Strömberg-Celind, Goksör & Alm, 2021). Furthermore, the number of infants placed to sleep in the prone position increased from 2.3% at three months to 3.5% at six months of age.

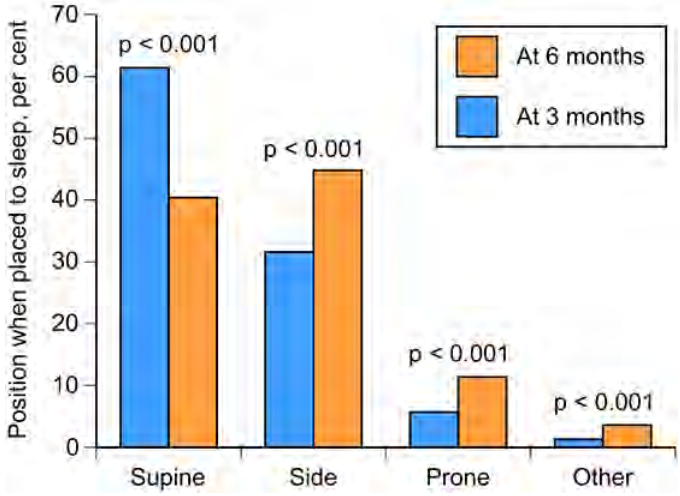


Figure 3.9.5: Sleeping position of infants when placed to sleep. The position the infants were usually placed in when they were put down to sleep at three and six months of age. Side relates to the combination of side only and alternative use of the side or supine position, while prone relates to the combination of prone only and alternative use of the side or prone, or supine or prone, position. The figure is based on 3,566 (99.3%) responses for three months and 3,579 (99.7%) responses for six months. ([5])

In the U.S, 22% of mothers reported not placing their baby on their back to sleep, as recommended (see Figure 3.9.6). The percentage was highest in Black mothers (38%) and young mothers under twenty years of age (30%).

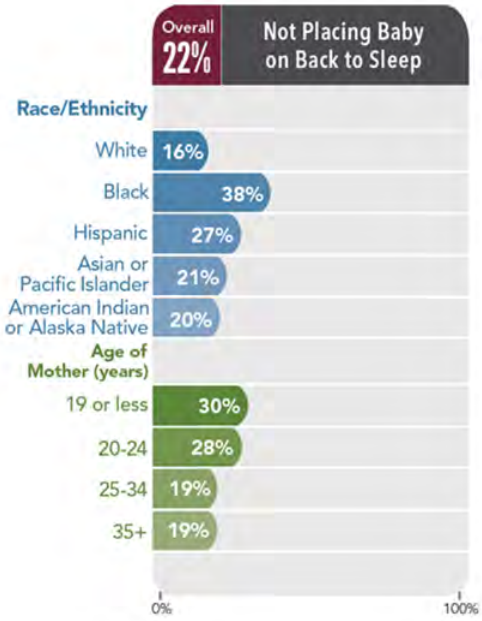


Figure 3.9.6: Percentage of mothers placing infants to sleep on their back. Not Placing Baby on Back to Sleep: Overall 22%, White 16%, Black 38%, Hispanic 27%, Asian or Pacific Islander 21%, American Indian or Alaska Native 20%, Age of Mother (years) 19 or less 30, 20-24 28, 25-34 19, 35+ 19 ([6])

Health care providers and researchers don't know the exact causes of sudden infant death syndrome (SIDS). However, research shows that caregivers can help reduce the risk of SIDS and other sleep-related infant deaths by doing the following:

- Place infants on their back for all sleep times—naps and at night.
- Use a firm, flat sleep surface, such as a mattress in a safety-approved crib, covered by a fitted sheet.
- Keep soft bedding such as blankets, pillows, bumper pads, and soft toys out of the sleep area.
- Do not cover an infant's head or allow them to get too hot. Signs an infant may be getting too hot include sweating or if their chest feels hot.

[1] Image from the CDC is in the public domain.

[2] Image from the CDC is in the public domain.

[3] Image from the CDC is in the public domain.

[4] Image from the CDC is in the public domain.

[5] Wennergren, G., Strömberg Celind, F., Goksör, E., & Alm, B. (2021). Swedish survey of infant sleep practices showed increased bed-sharing and positive associations with breastfeeding. Acta Paediatrica, 110(6), 1835-1841. CC by NC 4.0

[6] Image from "Safe Sleep for Babies" from the CDC is in the public domain.

3.10: Physical Activity

Guidance on Physical Activity

The World Health Organization's (WHO) guidelines on physical activity, sedentary behavior and sleep for children under 5 years of age provides recommendations on the amount of time in a 24-hour day that young children should spend being physically active or sleeping for their health and wellbeing. The guidelines from the WHO are similar to those from various countries, including Australia, Canada and South Africa (Draper et al., 2020; Okely et al., 2017; Tremblay et al., 2017). For infants and toddlers, the WHO guidelines recommend the following: [1]

Infants (less than 1 year) should:

- Be physically active several times a day in a variety of ways, particularly through interactive floor-based play; more is better. For those not yet mobile, this includes at least 30 minutes in prone position (tummy time) spread throughout the day while awake.
- Not be restrained for more than 1 hour at a time (e.g. prams/strollers, high chairs, or strapped on a caregiver's back). Screen time is not recommended. When sedentary, engaging in reading and storytelling with a caregiver is encouraged.
- Have 14–17 hours (0–3 months of age) or 12–16 hours (4–11 months of age) of good quality sleep, including naps.

Children 1–2 years of age should:

- Spend at least 180 minutes in a variety of types of physical activities at any intensity, including moderate-to vigorous-intensity physical activity, spread throughout the day; more is better.
- Not be restrained for more than 1 hour at a time (e.g. prams/strollers, high chairs, or strapped on a caregiver's back) or sit for extended periods of time.
- When sedentary, engaging in reading and storytelling with a caregiver is encouraged.
- Have 11–14 hours of good quality sleep, including naps, with regular sleep and wake-up times.

Figure 3.10.1: Typical Outdoor play yard for toddlers. ([2])

Unfortunately, many young children attending childcare centers do not meet the recommended amount of minutes for physical activity (Tandon, Saelens & Christakis, 2015). Although indoor and outdoor space and budgets can be restrictive for group care programs, there are strategies caregivers can implement to support the physical activity level of infants and toddlers. Previous studies have found that the size of the play area (Gubbels et al. 2012; Olesen, Kristensen, Korsholm & Froberg, 2013), having an indoor recreation room (Barbosa et al. 2016; Sando, 2019) and using indoor space for motor activities (Sugiyama, Okely, Masters & Moore, 2010) are positively associated with physical activity. Caregivers can create safe, open and age-appropriate spaces for mobile infants who are crawling and walking. Structures should allow infants the ability to safely practice developing motor

abilities without the frequent intervention of adult caregivers. Low structures can help infants to stand up and offer support while standing and walking. [3]

Indoors, children are more active when more space is available for playing. Tables, especially adult-sized tables, are related to a reduced level of physical activity (Nordtømme 2016; Sando, 2019). The arrangement of tables and the other furniture signal to children that they are expected to be seated at the tables and that physical and active play is not encouraged. Toddlers are significantly more active when jumping equipment is present, as well as when a fixed track was marked on the playground (Gubbels, Van Kann & Jansen, 2012). Just as indoor environments have marked areas for different activities, multicolor playground markings can increase children's activity levels (Ridgers, Stratton, Fairclough & Twisk, 2007) by encouraging different physical activities. [4] [5]

Figure 3.10.2: A paved bike path helps create different opportunities for movement. ([6])

[1] "The WHO guidelines on physical activity, sedentary behaviour and sleep for children under 5 years" from the World Health Organization is licensed under CC by NC SA 3.0.

[2] Image by Todd LaMarr is licensed under CC by 4.0

[3] Sando (2019). The physical indoor environment in ECEC settings: Children's well-being and physical activity. *European Early Childhood Education Research Journal*, *27*(4), 506-519. CC by 4.0

[4] Sando (2019). The physical indoor environment in ECEC settings: Children's well-being and physical activity. *European Early Childhood Education Research Journal*, *27*(4), 506-519. CC by 4.0

[5] Gubbels et al., (2012). Play equipment, physical activity opportunities, and children's activity levels at childcare. *Journal of Environmental and Public Health*. CC by 3.0

[6] Image by Todd LaMarr is licensed under CC by 4.0

3.11: Conclusion

Conclusion of Health and Nutrition

To support the optimal health of infants and toddlers, it is critical for caregivers to be aware of current guidelines and best practices concerning food, nutrition, sleep and physical activity. Children grow rapidly during the first three years of life and optimal health can best support these critical years in growth and development. Caregivers play an essential role in providing nutritious food that is developmentally appropriate and ensuring infants and toddlers are engaging in enough sleep and physical activity in safe and supportive environments.

3.12: References

Adams, S. M., Jones, D. R., Esmail, A., & Mitchell, E. A. (2004). What affects the age of first sleeping through the night? J*ournal of Pediatrics and Child Health*, *40*(3), 96-101.

Ballard, O., & Morrow, A. L. (2013). Human milk composition: Nutrients and bioactive factors. *Pediatric Clinics*, *60*(1), 49-74.

Barbosa, S. C., Coledam, D. H. C., Stabelini, A., Elias, R. G. M., & Oliveira, A. R. D. (2016). School environment, sedentary behavior and physical activity in preschool children. *Revista Paulista de Pediatria*, *34*, 301-308.

Batan, M., Li, R., & Scanlon, K. (2013). Association of child care providers breastfeeding support with breastfeeding duration at 6 months. *Maternal and Child Health Journal*, *17*(4), 708-713.

Beauregard, J. L., Hamner, H. C., Chen, J., Avila-Rodriguez, W., Elam-Evans, L. D., & Perrine, C. G. (2019). Racial disparities in breastfeeding initiation and duration among US infants born in 2015. *Morbidity and Mortality Weekly Report*, *68*(34), 745.

Bernier, A., Beauchamp, M. H., Bouvette-Turcot, A. A., Carlson, S. M., & Carrier, J. (2013). Sleep and cognition in preschool years: Specific links to executive functioning. *Child Development*, *84*(5), 1542-1553.

Bernier, A., Carlson, S. M., Bordeleau, S., & Carrier, J. (2010). Relations between physiological and cognitive regulatory systems: Infant sleep regulation and subsequent executive functioning. *Child Development*, *81*(6), 1739-1752.

Birch, L. L., Gunder, L., Grimm-Thomas, K., & Laing, D. G. (1998). Infants' consumption of a new food enhances acceptance of similar foods. *Appetite*, *30*(3), 283-295.

Boquien, C. Y. (2018). Human milk: An ideal food for nutrition of preterm newborns. *Frontiers in Pediatrics*, *6*, 295.

Boyce, J. A., Assa'ad, A., Burks, A. W., Jones, S. M., Sampson, H. A., Wood, R. A., Plaut, M., Cooper, S. F., Fenton, M. J., Arshad, S. H., Bahna, S. L., Beck, L. A., Byrd-Bredbenner, C., Camargo, C. A., Eichenfield, L., Furuta, G. T., Hanifin, J. M., Jones, C., Kraft, M., Levy, B. D.,

Lieberman, P., Luccioli, S., McCall, K. M., Schneider, L. C., Simon, R. A., Simons, F. E. R.,

Teach, S. J., Yawn, B. P. & Schwaninger, J. M. (2011). Guidelines for the diagnosis and management of food allergy in the United States: summary of the NIAID-sponsored expert panel report. *Journal of the American Academy of Dermatology*, *64*(1), 175-192.

Brown, C. R., Dodds, L., Legge, A., Bryanton, J., & Semenic, S. (2014). Factors influencing the reasons why mothers stop breastfeeding. *Canadian Journal of Public Health*, *105*(3), e179-e185.

Bruni, O., Baumgartner, E., Sette, S., Ancona, M., Caso, G., Di Cosimo, M. E., Mannini, A., Ometto, M., Pasquini, A., Ulliana, A., & Ferri, R. (2014). Longitudinal study of sleep behavior in normal infants during the first year of life. *Journal of Clinical Sleep Medicine*, *10*(10), 1119-1127.

Carruth, B. R., Ziegler, P. J., Gordon, A., & Barr, S. I. (2004). Prevalence of picky eaters among infants and toddlers and their caregivers' decisions about offering a new food. *Journal of the American Dietetic Association*, *104*, 57-64.

Chen, Y. C., Wu, Y. C., & Chie, W. C. (2006). Effects of work-related factors on the breastfeeding behavior of working mothers in a Taiwanese semiconductor manufacturer: A cross-sectional survey. *BMC Public Health*, *6*(1), 1-8.

Cameron, B., Javanparast, S., Labbok, M., Scheckter, R., & McIntyre, E. (2012). Breastfeeding support in child care: An international comparison of findings from Australia and the United States. *Breastfeeding Medicine*, *7*(3), 163-166.

Davis, K. F., Parker, K. P., & Montgomery, G. L. (2004). Sleep in infants and young children: Part one: Normal sleep. *Journal of Pediatric Health Care*, *18*(2), 65-71.

Dieterich, R., Caplan, E., Yang, J., & Demirci, J. (2020). Integrative review of breastfeeding support and related practices in child care centers. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, *49*(1), 5-15.

Draper, C. E., Tomaz, S. A., Biersteker, L., Cook, C. J., Couper, J., De Milander, M., Flynn, K., Giese, S., Krog, S., Lambert, E. V., Liebenberg, T., Mendoza, C., Nunes, T., Pienaar, A., Priorieschi, A., Rae, D. E., Rahbeeni, N., Reilly, J. J., Reynolds, L., Samuels, M., Siljeur, R., Urion, J., van Wyk, M. & Okely, A. D. (2020). The South African 24-hour movement guidelines for birth to 5 years: an integration of physical activity, sitting behavior, screen time, and sleep. *Journal of Physical Activity and Health*, *17*(1), 109-119.

Fein, S. B., Grummer-Strawn, L. M., & Raju, T. N. (2008). Infant feeding and care practices in the United States: Results from the Infant Feeding Practices Study II. *Pediatrics, 122*, S25-S27.

Fein, S. B., Mandal, B., & Roe, B. E. (2008). Success of strategies for combining employment and breastfeeding. *Pediatrics, 122*, S56-S62.

Galland, B. C., Taylor, B. J., Elder, D. E., & Herbison, P. (2012). Normal sleep patterns in infants and children: A systematic review of observational studies. *Sleep Medicine Reviews, 16*(3), 213-222.

Gibson, R., Elder, D., & Gander, P. (2012). Actigraphic sleep and developmental progress of one-year-old infants. *Sleep and Biological Rhythms, 10*(2), 77-83.

Gómez, R. L., Bootzin, R. R., & Nadel, L. (2006). Naps promote abstraction in language-learning infants. *Psychological Science, 17*(8), 670-674.

Gomez-Pomar, E., & Blubaugh, R. (2018). The baby friendly hospital initiative and the ten steps for successful breastfeeding: A critical review of the literature. *Journal of Perinatology, 38*(6), 623-632.

Gubbels, J. S., Van Kann, D. H., & Jansen, M. W. (2012). Play equipment, physical activity opportunities, and children's activity levels at childcare. *Journal of Environmental and Public Health*.

Gupta, R. S., Warren, C. M., Smith, B. M., Blumenstock, J. A., Jiang, J., Davis, M. M., & Nadeau, K. C. (2018). The public health impact of parent-reported childhood food allergies in the United States. *Pediatrics, 142*(6).

Fatimah, S., Saadiah, H. N., Tahir, A., Imam, M. I., & Faudzi, Y. A. (2010). Breastfeeding in Malaysia: Results of the third national health and morbidity S]survey (NHMS III) 2006. *Malaysian Journal of Nutrition, 16*(2).

Hamade, H., Chaaya, M., Saliba, M., Chaaban, R., & Osman, H. (2013). Determinants of exclusive breastfeeding in an urban population of primiparas in Lebanon: A cross-sectional study. *BMC Public Health, 13*(1), 1-10.

Hirshkowitz, M., Whiton, K., Albert, S. M., Alessi, C., Bruni, O., DonCarlos, L., Hazen, N., Herman, J., Katz, E. S., Kheirandish-Gozal, L., Neubauer, D. N., O'Donnell, A. E., Ohayon, M., Peever, J., Rawding, R., Sachdeva, R. C., Setters, B., Vitiello, M. V., & Hillard, P. J. A. (2015). National Sleep Foundation's sleep time duration recommendations: Methodology and results summary. *Sleep Health, 1*(1), 40-43.

Horta, B. L. & Victoria, C. G. (2013). *Long-term effects of breastfeeding: A systematic review*. World Health Organization.

Horváth, K., Myers, K., Foster, R., & Plunkett, K. (2015). Napping facilitates word learning in early lexical development. *Journal of Sleep Research, 24*(5), 503-509.

Hupbach, A., Gomez, R. L., Bootzin, R. R., & Nadel, L. (2009). Nap-dependent learning in infants. *Developmental Science, 12*(6), 1007-1012.

Iglowstein, I., Jenni, O. G., Molinari, L., & Largo, R. H. (2003). Sleep duration from infancy to adolescence: Reference values and generational trends. *Pediatrics, 111*(2), 302-307.

Javanparast, S., Newman, L., Sweet, L., & McIntyre, E. (2012). Analysis of breastfeeding policies and practices in childcare centres in Adelaide, South Australia. *Maternal and Child Health Journal, 16*(6), 1276-1283.

Kimbro, R. T. (2006). On-the-job moms: Work and breastfeeding initiation and duration for a sample of low-income women. *Maternal and Child Health Journal, 10*(1), 19-26.

Le Doare, K., Holder, B., Bassett, A., & Pannaraj, P. S. (2018). Mother's milk: A purposeful contribution to the development of the infant microbiota and immunity. *Frontiers in Immunology, 9*, 361.

Lubold, A. M. (2019). Historical-qualitative analysis of breastfeeding trends in three OECD countries. *International Breastfeeding Journal, 14*(1), 1-12.

Lucas, A., McMahon, P. M., Asling, M. B., Knobloch, A., Kosh, E., & Sims, K. (2013). Assessing child care providers' knowledge and attitudes regarding support of breastfeeding in a region with low breastfeeding prevalence. *Journal of Human Lactation, 29*(4), 556-563.

Lundquist, A., McBride, B. A., Donovan, S. M., & Kieffer, A. (2019). An exploratory look at the role of childcare providers as a support and resource for breastfeeding mothers. *Breastfeeding Medicine, 14*(5), 313-319.

Machado, A. M. (2015). Assessment of breastfeeding policies in a sample of inner city child-care centers in north-central Kentucky. [Doctoral dissertation, University of Kentucky]. UKnowledge. https://uknowledge.uky.edu/cph_etds/55/

Maier, A., Chabanet, C., Schaal, B., Issanchou, S., & Leathwood, P. (2007). Effects of repeated exposure on acceptance of initially disliked vegetables in 7-month old infants. *Food Quality and Preference*, *18*(8), 1023-1032.

Marhefka, S. L., Sharma, V., Schafer, E. J., Turner, D., Falope, O., Louis-Jacques, A., Wachira, W. M., Livingston, T. & Roig-Romero, R. M. (2019). 'Why do we need a policy?' Administrators' perceptions on breast-feeding-friendly child care. *Public Health Nutrition*, *22*(3), 553-563.

Martin, C. R., Ling, P. R., & Blackburn, G. L. (2016). Review of infant feeding: Key features of breast milk and infant formula. *Nutrients*, *8*(5), 279.

Matricciani, L. A., Olds, T. S., Blunden, S., Rigney, G., & Williams, M. T. (2012). Never enough sleep: A brief history of sleep recommendations for children. *Pediatrics*, *129*(3), 548-556.

Mattar, L., Hobeika, M., Zeidan, R. K., Salameh, P., & Issa, C. (2019). Determinants of exclusive and mixed breastfeeding durations and risk of recurrent illnesses in toddlers attending day care programs across Lebanon. *Journal of Pediatric Nursing*, *45*, e24-e34.

McKelvey, L. M., Whiteside-Mansell, L., Zhang, D., & Selig, J. P. (2020). Adverse childhood experiences in infancy: A latent class approach exploring interrelatedness of risks. *Adversity and Resilience Science*, 1-13.

Mindell, J. A., Sadeh, A., Wiegand, B., How, T. H., & Goh, D. Y. (2010). Cross-cultural differences in infant and toddler sleep. *Sleep Medicine*, *11*(3), 274-280.

Mirmiran, M., Baldwin, R. B., & Ariagno, R. L. (2003). Circadian and sleep development in preterm infants occurs independently from the influences of environmental lighting. *Pediatric Research*, *53*(6), 933-938.

Nicklaus, S. (2016). Complementary feeding strategies to facilitate acceptance of fruits and vegetables: A narrative review of the literature. *International Journal of Environmental Research and Public Health*, *13*(11), 1160.

Nordtømme, S. 2016. "På vei mot en rom (s) lig pedagogikk: En fortolkende studie av barns

lekeerfaringer med rom og materialitet [Towards a spacious pedagogy. An interpretive study

of children's play experiences with space and materiality]." PhD diss., Høgskolen i Sørøst-Norge.

Okely, A. D., Ghersi, D., Hesketh, K. D., Santos, R., Loughran, S. P., Cliff, D. P., Shilton, T., Grant, D., Jones, R. A., Stanley, R. M., Sherring, J., Hinkley, T., Trost, S. G., McHugh, C., Eckermann, S., Thorpe, K., Waters, K., Olds, T. S., Mackey, T., Livingstone, R., Christian, H., Carr, H., Verrender, A., Pereira, J. R., Zhang, Z., Downing, K. L. & Tremblay, M. S. (2017). A collaborative approach to adopting/adapting guidelines-The Australian 24-Hour Movement Guidelines for the early years (Birth to 5 years): an integration of physical activity, sedentary behavior, and sleep. *BMC Public Health*, *17*(5), 167-190.

Olesen, L. G., Kristensen, P. L., Korsholm, L., & Froberg, K. (2013). Physical activity in children attending preschools. *Pediatrics*, *132*(5), e1310-e1318.

Ong, G., Yap, M., Li, F. L., & Choo, T. B. (2005). Impact of working status on breastfeeding in Singapore: Evidence from the National Breastfeeding Survey 2001. *The European Journal of Public Health*, *15*(4), 424-430.

Rasch, B., & Born, J. (2013). About sleep's role in memory. *Physiological Reviews*, *93*(2), 681–766.

Ridgers, N. D., Stratton, G., Fairclough, S. J., & Twisk, J. W. (2007). Long-term effects of a playground markings and physical structures on children's recess physical activity levels. *Preventive Medicine*, *44*(5), 393-397.

Ryan, A. S., Zhou, W., & Arensberg, M. B. (2006). The effect of employment status on breastfeeding in the United States. *Women's Health Issues*, *16*(5), 243-251.

Sadeh, A. V. I., Mindell, J. A., Luedtke, K., & Wiegand, B. (2009). Sleep and sleep ecology in the first 3 years: A web-based study. *Journal of Sleep Research*, *18*(1), 60-73.

Sampson, H. A., Muñoz-Furlong, A., Campbell, R. L., Adkinson Jr, N. F., Bock, S. A., Branum, A., Brown, S., Camargo, C., Cydulka, R., Galli, S. J., Gidudu, J., Gruchalla, R. S., Harlor, A. D., Hepner, D. L., Lewis, L. M., Lieberman, P. L., Metcalfe, D., O'Connor, R., Muraro, A., Rudman, A., Schmitt, C., Scherrer, D., Simons, E. R., Thomas, S., Wood, J. P. & Decker, W. W. (2006). Second symposium on the definition and management of anaphylaxis: Summary report—Second National Institute of Allergy and

Infectious Disease/Food Allergy and Anaphylaxis Network symposium. *Journal of Allergy and Clinical Immunology, 117*(2), 391-397.

Sando, O. J. (2019). The physical indoor environment in ECEC settings: children's well-being and physical activity. *European Early Childhood Education Research Journal*, *27*(4), 506-519.

Schafer, E. J., Livingston, T. A., Roig-Romero, R. M., Wachira, M., Louis-Jacques, A. F., & Marhefka, S. L. (2021). "Breast is best, but…" according to child care administrators, not best for the childcare environment. *Breastfeeding Medicine, 16*(1), 21-28.

Scher, A. (2005). Infant sleep at 10 months of age as a window to cognitive development. *Early Human Development*, *81*(3), 289-292.

Seehagen, S., Konrad, C., Herbert, J. S., & Schneider, S. (2015). Timely sleep facilitates declarative memory consolidation in infants. *Proceedings of the National Academy of Sciences*, *112*(5), 1625-1629.

Smith, J. P., & Forrester, R. (2013). Who pays for the health benefits of exclusive breastfeeding? An analysis of maternal time costs. *Journal of Human Lactation*, *29*(4), 547-555.

Stickgold, R., & Walker, M. P. (2007). Sleep-dependent memory consolidation and reconsolidation. *Sleep Medicine*, *8*(4), 331-343.

Sugiyama, T., Okely, A. D., Masters, J. M., & Moore, G. T. (2012). Attributes of child care centers and outdoor play areas associated with preschoolers' physical activity and sedentary behavior. *Environment and Behavior, 44*(3), 334-349.

Sullivan, S. A., & Birch, L. L. (1994). Infant dietary experience and acceptance of solid foods. *Pediatrics*, *93*(2), 271-277.

Tan, K. L. (2011). Factors associated with exclusive breastfeeding among infants under six months of age in peninsular Malaysia. *International Breastfeeding Journal*, *6*(1), 1-7.

Tandon, P. S., Saelens, B. E., & Christakis, D. A. (2015). Active play opportunities at child care. *Pediatrics*, *135*(6), e1425-e1431.

Tham, E. K., Schneider, N., & Broekman, B. F. (2017). Infant sleep and its relation with cognition and growth: A narrative review. *Nature and Science of Sleep*, *9*, 135.

Tremblay, M. S., Chaput, J. P., Adamo, K. B., Aubert, S., Barnes, J. D., Choquette, L., Duggan, M., Faulkner, G., Goldfield, G. S., Gray, C. E., Gruber, R., Janson, K., Janssen, I., Janssen, X., Garcia, A. J., Kuzik, N.,, LeBlanc, C., MacLean, J. Okely, A. D., Poitras, V. J., Rayner, M., Reilly, J. J., Sampson, M., Spence, J. C., Timmons, B. W. & Carson, V. (2017). Canadian 24-hour movement guidelines for the early years (0–4 years): an integration of physical activity, sedentary behaviour, and sleep. *BMC Public Health*, *17*(5), 1-32.

U.S. Department of Agriculture and U.S. Department of Health and Human Services (2020). *Dietary Guidelines for Americans, 2020-2025*. 9th Edition.

Wennergren, G., Strömberg Celind, F., Goksör, E., & Alm, B. (2021). Swedish survey of infant sleep practices showed increased bed-sharing and positive associations with breastfeeding. *Acta Paediatrica*, *110*(6), 1835-1841.

Wolf, J. H. (2003). Low breastfeeding rates and public health in the United States. *American Journal of Public Health*, *93*(12), 2000-2010.

World Health Organization. (1998). *Evidence for the ten steps to successful breastfeeding*. World Health Organization.

World Health Organization. (2003). Global strategy for infant and young child feeding. World Health Organization

World Health Organization (2014). *World health statistics*. World Health Organization.

Yabe, C., Yasugi, S., Musha, Y., Takemura, Y. C., & Son, D. (2021). Perception and handling of breastmilk by childcare staff: A qualitative study of childcare facilities in Japan. *Journal of General and Family Medicine*.

CHAPTER OVERVIEW

4: Overview of Brain Development

4.1: Introduction

Introduction to Brain Development

As a caregiver of infants and toddlers, close observation allows you to experience, first hand, the developmental growth of language, cognition and social-emotional abilities. We know that the brain is also experiencing a rapid period of growth during these first three years of life, but brain development is not as easy to directly observe. The goal of this section is to provide an overview of some of the major brain structures and processes and importantly, explain how these structures and processes develop during infancy and toddlerhood.

4.2: Brain Development- Volume Growth

Volume Growth

The brain begins developing a few weeks after conception and continues developing throughout the time in the womb. Once a baby is born, the major structures of the brain are formed and ready for the many new experiences of infancy. The explosive growth and function of the brain in infancy is unparalleled by any other postnatal developmental period. After birth, the brain continues to grow at a remarkable pace with its total volume doubled in the first year, followed by another 15% increase during the second year (Knickmeyer et al., 2008). The brain quadruples in size during the preschool period, reaching approximately 90% of adult volume by age 6 (Courchesne et al. 2000; Iwasaki et al. 1997; Kennedy et al. 2002; Lenroot & Giedd 2006; Paus et al. 2001; Reiss et al. 1996). Figure 4.2.1 shows the growth trajectory for brain volume from 0 to 18 years of age. The blue lines represent the growth for males and the red lines represent the growth for females. The yellow segment highlights the significant difference of growth between the two sexes. Notice how steep the trajectory rises in the first three years--representing this explosive brain growth! [1] [2]

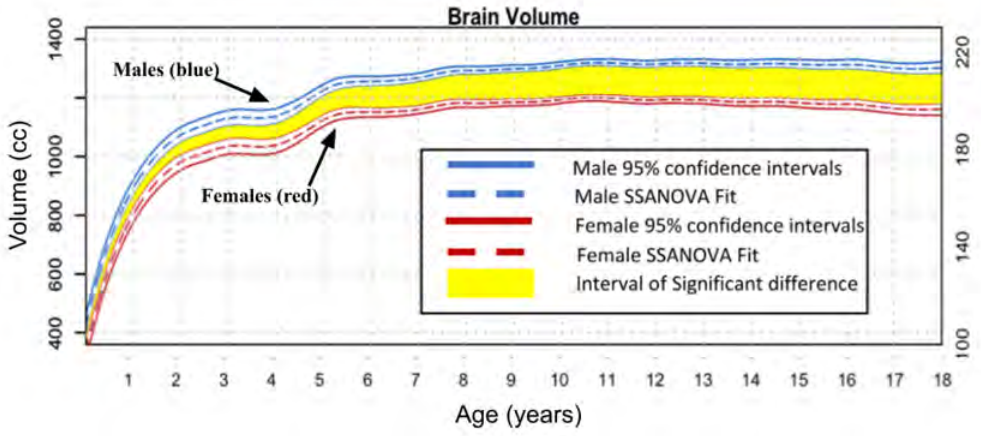


Figure 4.2.1: Brain volume growth 0 to 18 years. Male volume increases significantly and sharply from 0-3 years plateauing at 1200 CC's around 3 years of age and then increasing again from 3-6 before plateauing again at around 1500 CC. Female volume increases significantly and sharply from 0-3 years plateauing at 1000 CC's around 3 years of age and then increasing again from 3-6 before plateauing again at around 1200 CC. . ([3])

Let's now zoom in and focus on the month-by-month brain growth during just the first two years. Figure 4.2.2 and Figure 4.2.3 chart the normative growth in brain volume for female and male children, respectively, between 0 to 24 months of age. Just as there are normative growth charts for infant and toddler height, weight and head circumference, Peterson et al., (2021) have published the first ever normative percentile curves for brain volume growth during childhood, with special attention towards infancy and toddlerhood. Each chart displays the 3rd, 15th, 50th, 85th, and 97th percentiles of normal brain volume growth during the first two years. Percentile curves allow a child to be compared to other children of the same sex and age, determining whether a child measures below or above the average. In these charts for example, if a child measures at the 50th percentile, this suggests that, at any specific age, 50% of the children will have larger brain volumes and 50% will have smaller brain volumes. If a child's brain volume is in the 15th percentile, this means 15% of children have smaller brain volumes and 85% have larger brain volumes than this child.

Compare and contrast Figure 4.2.2 and Figure 4.2.3. What stands out to you? What do you notice is similar or different between the two charts? Notice the steady increase in brain volume each month, with the largest increases in the earlier months, primarily during the first twelve months. Comparing the two charts, males have a larger brain volume than females, a difference that appears early in infancy. Also, the percentile curves highlight the fact that there are early appearing individual differences in brain volume between children of the same sex, already by the first few months of life. In other words, by two months of age, some infants are at, below or above the 50th percentile. Brain volume during infancy and toddlerhood does not predict cognitive ability during these ages; however, sex and age-normalized brain volume for children between 6-18 years of age is related to cognitive performance (Peterson et al., 2021).

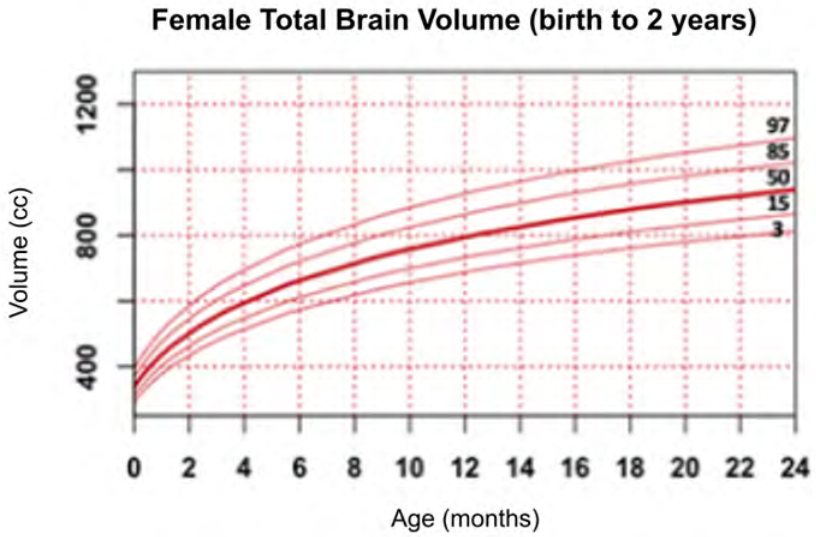


Figure 4.2.2: Copy and Female Total Brain Volume (birth to 2 years) showing percentiles from 0-24 yrs. 3rd maxes at 800, 15th maxes at 850 cc, 50th maxes at 900, 85th maxes at 1000, and 97th maxes 1100 at percentiles of normal brain volume growth in females. ([4]

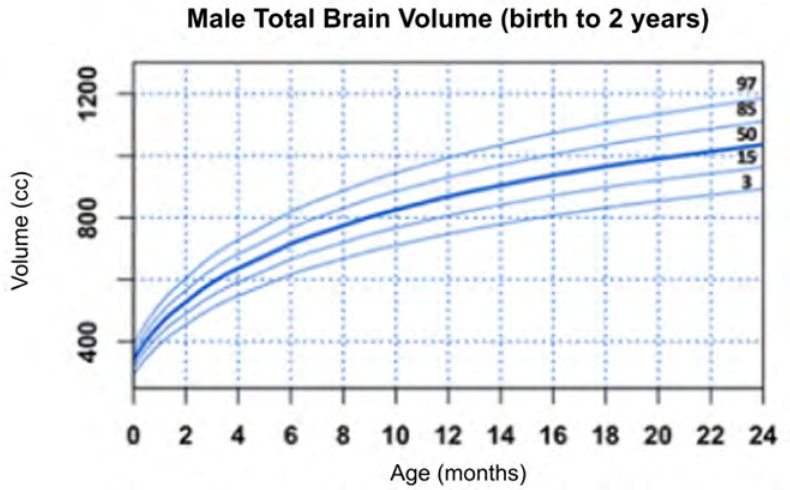


Figure 4.2.3: Male Total Brain Volume (birth to 2 years) showing the percentiles of normal brain volume growth in males. 3rd maxed 850, 15th at 1000, 50th maxed at 1100, 85th maxed at 1150, and 97th maxed at 1200 ([5])

[1] Gao et al., (2017). Functional connectivity of the infant human brain: Plastic and modifiable. *The Neuroscientist, 23*(2), 169-184. CC by NC 3.0

[2] Stiles & Jernigan (2010). The basics of brain development. *Neuropsychology Review, 20*(4), 327-348. CC by 2.0

[3] Image adapted from Peterson et al., (2021). Normal childhood brain growth and a universal sex and anthropomorphic relationship to cerebrospinal fluid. *Journal of Neurosurgery: Pediatrics*. Used with permission.

[4] Image adapted from Peterson et al., (2021). Normal childhood brain growth and a universal sex and anthropomorphic relationship to cerebrospinal fluid. *Journal of Neurosurgery: Pediatrics*. Used with permission.

[5] Image adapted from Peterson et al., (2021). Normal childhood brain growth and a universal sex and anthropomorphic relationship to cerebrospinal fluid. *Journal of Neurosurgery: Pediatrics*. Used with permission.

4.3: Structures of the brain

Brain Structures

The surface of the brain, known as the **cerebral cortex**, is very uneven, characterized by a distinctive pattern of folds or bumps, known as gyri (singular: gyrus), and grooves, known as sulci (singular: sulcus), shown in Figure 4.3.1. These gyri and sulci form important landmarks that allow us to separate the brain into functional centers. The most prominent sulcus, known as the **longitudinal fissure**, is the deep groove that separates the brain into two halves or hemispheres: the left hemisphere and the right hemisphere.[1]

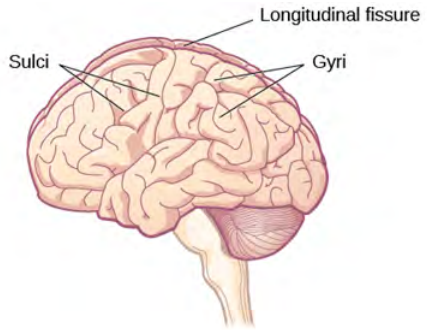


Figure 4.3.1: The surface of the brain. ([1])

The two hemispheres are connected by a thick band of neural fibers known as the **corpus callosum**, consisting of about 200 million axons. The corpus callosum allows the two hemispheres to communicate with each other and allows for information being processed on one side of the brain to be shared with the other side.[1]

The two hemispheres of the cerebral cortex are part of the forebrain (see Figure 4.3.2), which is the largest part of the brain. The forebrain contains the cerebral cortex and a number of other structures that lie beneath the cortex (subcortical structures): the thalamus, the hypothalamus, the pituitary gland, and the limbic system. The cerebral cortex, which is the outer surface of the brain, is associated with higher-level processes such as consciousness, thought, emotion, reasoning, language, and memory. Each cerebral hemisphere can be subdivided into four lobes, each associated with different functions.[1]

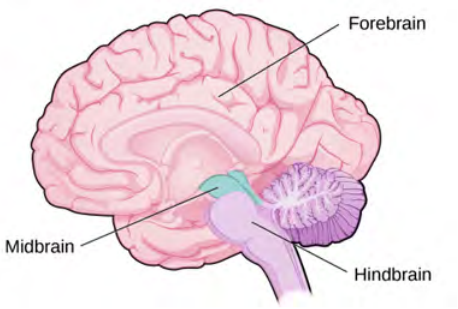


Figure 4.3.2: The brain and its parts can be divided into three main categories. ([3])

[1] "The Brain and Spinal Cord" on OpenStax is licensed under CC by 4.0

[2] "The Brain and Spinal Cord" on OpenStax is licensed under CC by 4.0

[3] Image from "The Forebrain Structures" on OpenStax is licensed under CC by 4.0

4.4: Lobes of the Brain

The Four Lobes

The four lobes of the brain are the frontal, parietal, temporal, and occipital lobes (see Figure 4.4.1). The **frontal lobe** is located in the forward part of the brain, located behind your forehead. The frontal lobe is involved in reasoning, motor control, emotion, and language. It contains the motor cortex, which is involved in planning and coordinating movement; the prefrontal cortex, which is responsible for higher-level cognitive functioning; and Broca's area, which is essential for language production. [1]

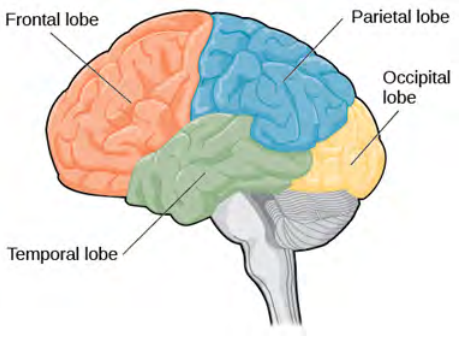


Figure 4.4.1: The four lobes of the brain. ([2])

The brain's **parietal lobe** is located immediately behind the frontal lobe, and is involved in processing information from the body's senses. It contains the somatosensory cortex, which is essential for processing sensory information from across the body, such as touch, temperature, and pain. [3]

The **temporal lobe** is located on the side of the head (temporal means "near the temples"), and is associated with hearing, memory, emotion, and some aspects of language. The auditory cortex, the main area responsible for processing auditory information, is located within the temporal lobe. Wernicke's area, important for speech comprehension, is also located here. Whereas individuals with damage to Broca's area have difficulty producing language, those with damage to Wernicke's area can produce sensible language, but they are unable to understand it (see Figure 4.4.2). [1]

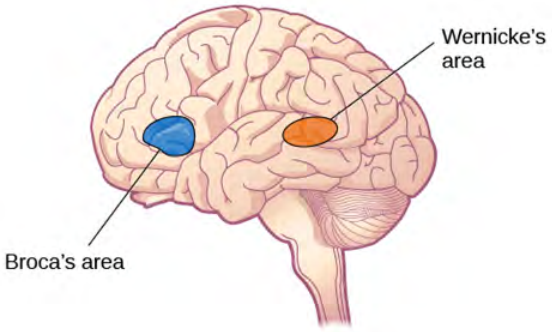


Figure 4.4.2:Location of Broca's area and Wernicke's area in the brain. Broca's area is located in the frontal lobe and Wernicke's located in the parietal lobe
. ([4])

The **occipital lobe** is located at the very back of the brain, and contains the primary visual cortex, which is responsible for interpreting incoming visual information.

[1] "The Brain and Spinal Cord" on OpenStax is licensed under CC by 4.0

[2] "The Lobes of the Brain" on OpenStax is licensed under CC by 4.0

[3] "The Brain and Spinal Cord" on OpenStax is licensed under CC by 4.0

[4] "Broca's and Wernicke's area" on OpenStax is licensed under CC by 4.0

4.5: Other Areas of the Forebrain

Additional Forebrain Areas

Other areas of the forebrain, located beneath the cerebral cortex, include the thalamus and the limbic system. The thalamus is a sensory relay for the brain. All of our senses, with the exception of smell, are routed through the thalamus before being directed to other areas of the brain for processing (Figure 4.5.1).

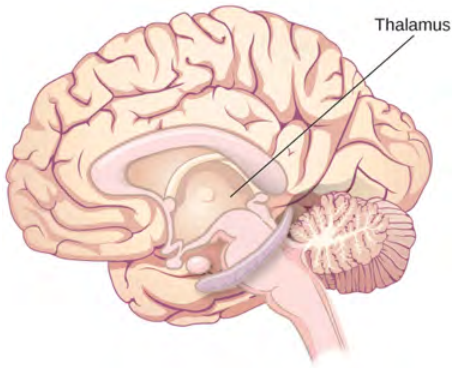


Figure 4.5.1:Thalamus. The thalamus serves as the relay center of the brain where most senses are routed for processing. (Copyright; [1])

The **limbic system** is involved in processing both emotion and memory. Interestingly, the sense of smell projects directly to the limbic system; therefore, not surprisingly, smell can evoke emotional responses in ways that other sensory modalities cannot. The limbic system is made up of a number of different structures, but three of the most important are the hippocampus, the amygdala, and the hypothalamus (see Figure 4.5.2). The hippocampus is an essential structure for learning and memory. The amygdala is involved in our experience of emotion and in tying emotional meaning to our memories. The hypothalamus regulates a number of homeostatic processes, including the regulation of body temperature, appetite, and blood pressure. The hypothalamus also serves as an interface between the nervous system and the endocrine system and in the regulation of sexual motivation and behavior. [2]

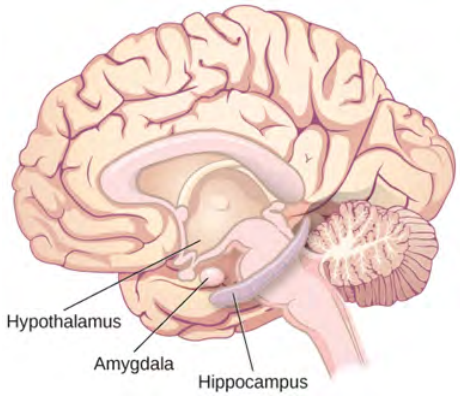


Figure 4.5.2: The limbic system.. ([3])

[1] Image from "The Brain and Spinal Cord" on OpenStax is licensed under CC by 4.0

[2] "The Brain and Spinal Cord" on OpenStax is licensed under CC by 4.0

[3] The Limbic System from "The Brain and Spinal Cord" on OpenStax is licensed under CC by 4.0

4.6: Cerebral Lateralization

The second year of life marks a period of dramatic advances in childrens' expressive and receptive language abilities. How does the developing brain support this explosive language growth? Cerebral lateralization refers to the functional specialization of the two cerebral hemispheres. In other words, each hemisphere becomes dominant in primarily processing specific types of information. A common example of cerebral lateralization is language processing. Most adults predominantly process language in the left hemisphere (Lust et al., 2011; Whitehouse & Bishop, 2009); however, lateralization of language to the left hemisphere is not present at birth, but rather develops over the first three years. [1]

Across the first three years of life, neuroscience has discovered changes in brain activity, especially shifts in cerebral specialization, related to children's language experience. As Figure 4.6.1 shows, between 13 to 17 months of age, brain activity is bilateral (activated across both hemispheres). However, just a few months later, by 20 months of age, brain activity is predominantly lateralized to the left hemisphere (Mills, Coffey-Corina & Neville, 1997: Mills et al., 2004). This pattern of results has been supported by studies of word processing in 19 to 22-month-old simultaneous bilingual children (Conboy and Mills, 2006), in late talkers up to age 30 months (Mills et al., 2005a), and in 18 to 30-month-old children with autism spectrum disorder and typically developing controls (Kuhl et al., 2013). These data indicate that left lateralization of brain activity is not present at birth and the timing from bilateral to left lateralization is strongly related to experience with language, specifically word familiarity, rather than chronological age (Mills et al., 2005). [2]

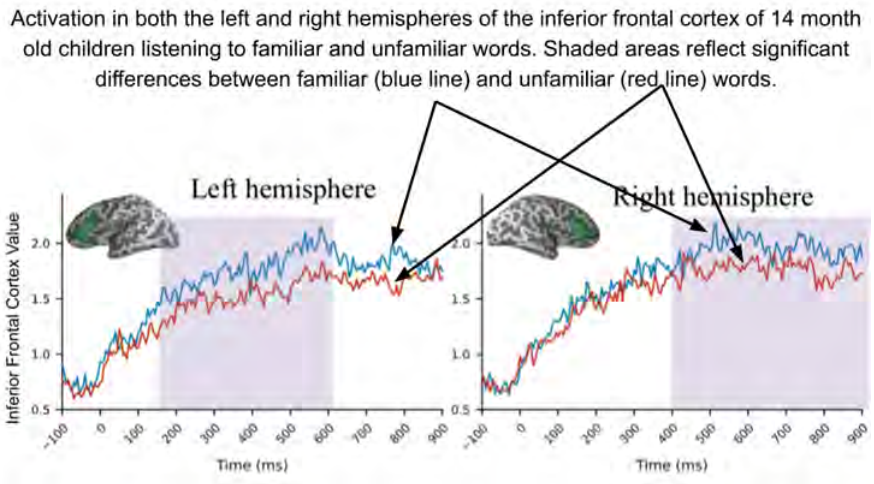


Figure 4.6.1: Activation in both the left and right hemispheres of the inferior frontal cortex of 14-month-old children listening to familiar and unfamiliar words. Shaded areas reflect significant differences between familiar (blue line) and unfamiliar (red line) words. ([3])

[1] Groen et al., (2012). Does cerebral lateralization develop? A study using functional transcranial Doppler ultrasound assessing lateralization for language production and visuospatial memory. *Brain and Behavior, 2*(3), 256-269. CC by NC 3.0

[2] Bosseler et al., (2021). Using magnetoencephalography to examine word recognition, lateralization, and future language skills in 14-month-old infants. *Developmental Cognitive Neuroscience, 47*, 100901. CC by 4.0

[3] Image from Bosseler et al., (2021). Using magnetoencephalography to examine word recognition, lateralization, and future language skills in 14-month-old infants. *Developmental Cognitive Neuroscience, 47*, 100901. CC by 4.0

4.7: Neurons- Structure and Function

The Structure of Neurons

The human brain is arguably the most complex of all biological systems. The adult brain is composed of more than 100 billion neurons (Pakkenberg and Gundersen 1997). Neurons are the information processing cells in the brain (see Figure 4.7.1). There are many different kinds of neurons that vary in their size and shape as well as in their function. Neurons make connections with other neurons to form the information processing networks that are responsible for all of our thoughts, sensations, feelings and actions. Since each neuron can make connections with more than 1,000 other neurons, the adult brain is estimated to have more than 60 trillion neuronal connections! [1]

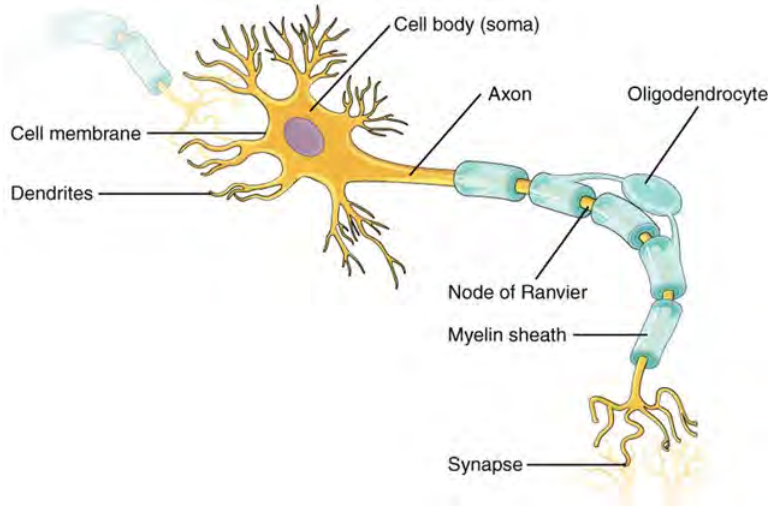


Figure 4.7.1: Structure of a neuron. ([2])

Populations of neurons are connected to one another by fibers that extend from cell bodies of the individual neurons. There are two kinds of connecting fibers, dendrites and axons. Dendrites are arrays of short fibers that look like the branches of a tree. They extend only a short distance away from the neuron cell body. Their main function is to receive the electrochemical input signals from other neurons. Axons are long connecting fibers that extend over long distances and make connections with other neurons, often at the dendrites. Axons act a little like telephone wires in that they are responsible for sending electrochemical signals to neurons located in distant locations. Bundles of individual axons from many different neurons within one region of the brain form fiber tracts that extend to, and make connections with, groups of neurons in other regions of the brain forming the information processing networks. Axons are wrapped in a fatty substance called myelin that, like insulation on a telephone wire, makes the transmission of electrochemical signals between regions efficient. Myelin is white in appearance, thus fiber pathways of the brain are often referred to as “white matter”, or “white matter pathways”. [3]

Neurons communicate with each other through “chemical signaling,” a process in which they exchange chemicals called “neurotransmitters. This is how it happens: an action potential is an electrical impulse that travels through a neuron, triggering it to release neurotransmitters into a small gap found in between two neurons, called a synapse. Then, the dendrites of the neuron on the other side of the synapse takes up the neurotransmitters, which then generates an action potential that travels along the axon of this second neuron. This process continues in several neurons that are connected to each other. [5]

While most of the brain’s 100 to 200 billion neurons are present at birth, they are not fully mature during infancy and toddlerhood. As they mature, neurons establish connections between each other. Synapses, the connections between neurons, undergo a period of transient exuberance or temporary dramatic growth. There is a proliferation of these synapses during the first two years so that by age 2, a single neuron might have thousands of connections. Figure 4.7.2 shows neurons and their connections from an area within the frontal lobe of the cortex. Image A (on the left of Figure 4.7.2) is from the brain of a one month old infant and image B is from the brain of a six year old. As we are born with most of the neurons we will ever have, the difference between these two images is not a difference in the quantity of neurons, rather the difference between them is the quantity and quality of connections.

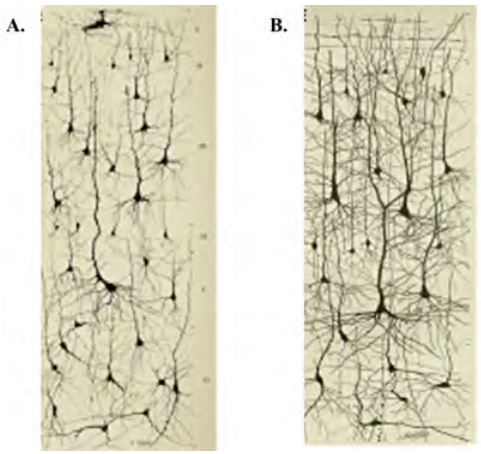


Figure 4.7.2:Change in neuronal connections from 1 year old to 6 years old.[6]

After the dramatic increase in synapses, the neural pathways that are not used will be eliminated thereby making those that are used much stronger. This process of elimination is called pruning. Experience will shape which of these connections are maintained and which of these are pruned. Ultimately, about 40 percent of the early connections will be lost (Webb, Monk, and Nelson, 2001). This activity is occurring primarily in the cortex or the thin outer covering of the brain involved in voluntary activity and thinking. The prefrontal cortex, located behind our forehead, continues to grow and mature throughout childhood and experiences an additional growth spurt during

adolescence. It is the last part of the brain to mature and will eventually comprise 85 percent of the brain's weight. As the prefrontal cortex matures, the child is increasingly able to regulate or control emotions, to think hypothetically, strategize, and have better judgment. Of course, this is not fully accomplished in infancy and toddlerhood, but continues throughout childhood and into adulthood (Uytun, 2018). [7]

Myelination

Another significant change occurring in the central nervous system is the development of myelin, a coating of fatty tissues around the axon of the neuron. Myelin helps insulate the nerve cell and speed the rate of transmission of impulses from one cell to another. This increase enhances the building of neural pathways and improves coordination and control of movement and thought processes. During infancy, myelination progresses rapidly, with increasing numbers of axons acquiring myelin sheaths. This corresponds with the development of cognitive and motor skills, including language comprehension, speech acquisition, sensory processing, reaching/grasping and crawling/walking. The development of myelin continues into adolescence but is most dramatic during the first several years of life. [8] [9]

---

[1] Stiles & Jernigan (2010). The basics of brain development. *Neuropsychology review*, *20*(4), 327-348. CC by 2.0

[2] Image from "Physical Growth and Brain Development in Infancy" by Tera Jones for Lumen Learning is licensed by CC by 4.0.

[3] Stiles & Jernigan (2010). The basics of brain development. *Neuropsychology Review*, *20*(4), 327-348. CC by 2.0

[5] Kaur et al., (2019). Using magnets to stimulate the brain helps people with depression. *Frontiers for Young Minds*, *7*, 1-8. CC by 4.0

[6] DeFelipe (2013). Going to school to sculpt the brain. *Frontiers for Young Minds*. CC by 4.0

[7] "Physical Growth and Brain Development in Infancy" by Tera Jones for Lumen Learning is licensed by CC by 4.0.

[8] "Brain Development" by: Nicole Arduini-Van Hoose provided by Hudson Valley Community College. CC BY-NC-SA 4.0

[9] "Physical Growth and Brain Development in Infancy" by Tera Jones for Lumen Learning is licensed by CC by 4.0.

4.8: Development of brain networks

Brain Networks

How does the brain retain so much information while also having the ability to quickly and efficiently process new information during infancy and toddlerhood? The adult brain is a highly organized network consisting of billions of interconnected neurons (Herculano-Houzel, 2009). Fast and efficient communication throughout the brain is necessary for nearly all cognitive processes. One theory suggests that the brain has sets of networks. Each network is composed of hubs that represent distinct brain regions, with pathways connecting these regions. Fransson et al. (2010) were the first to investigate the functional architecture of the infant brain. They reported that functional networks are already present, even if in basic form, in the newborn brain and are predominantly located in the sensory and motor regions of the brain--supporting early infant sensorimotor development.

Figure 4.8.1 illustrates the developmental changes in brain networks between 1 month olds, 1 year olds and 2 year olds. Compare the images for each age group, what similarities and differences do you notice? In 1 month olds, the network hubs are located in the anterior (near the front) and posterior (near the back) areas of the brain with limited connections between anterior and posterior hubs. In comparison, in one year olds, the network hubs are located more toward the center of the brain with more connections linking all the hubs together. Finally, in two year olds, the locations of hubs become more spatially distributed, with hubs located across the brain and connections linking all the network hubs together. In summary, this research shows that children are born with brain networks ready to process the many sensory and motor experiences of early infancy and within the first two years, these networks experience major transformations as they continue to support the rapidly developing child.

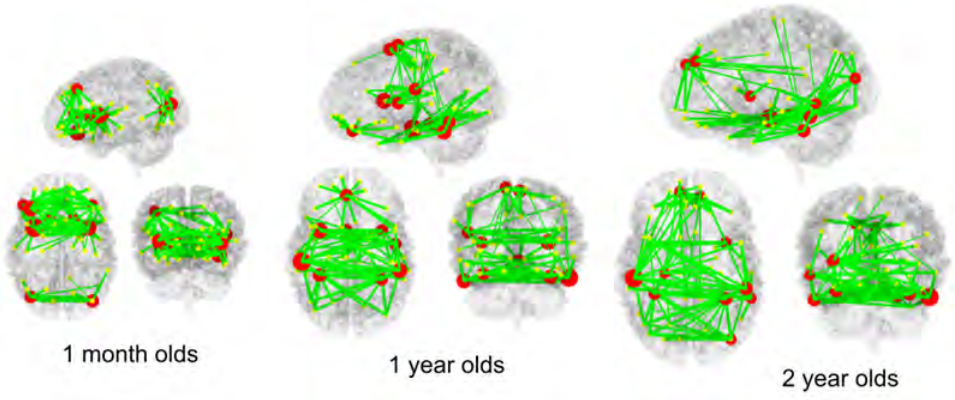


Figure 4.8.1: Location and connections between the top ten brain network hubs. In 1 month olds, the network hubs are located in the anterior (near the front) and posterior (near the back) areas of the brain with limited connections between anterior and posterior hubs. In comparison, in one year olds, the network hubs are located more toward the center of the brain with more connections linking all the hubs together. Finally, in two year olds, the locations of hubs become more spatially distributed, with hubs located across the brain and connections linking all the network hubs together ([1])

[1] Image from Gao et al., (2011). Temporal and spatial evolution of brain network topology during the first two years of life. *PloS One*, *6*(9), e25278. CC by 4.0

4.9: Growth Patterns of Brain Matter

Brain Matter

Looking at the tissue in the brain, there are regions that predominantly contain neuron cell bodies and dendrites and regions that are largely composed of just axons. These two regions are often referred to as **gray matter** (the regions with many cell bodies and dendrites) or **white matter** (the regions with many myelinated axons). Figure 4.9.1 demonstrates the appearance of these regions in the brain and spinal cord. The colors ascribed to these regions are what would be seen in "fresh," or unstained, brain tissue. Gray matter is not necessarily gray. It can be pinkish because of blood content, or even slightly tan, depending on how long the tissue has been preserved. But white matter is white because axons are insulated by a lipid-rich substance called myelin. Lipids can appear as white ("fatty") material, much like the fat on a raw piece of chicken or beef.

Actually, gray matter may have that color ascribed to it because next to the white matter, it is just darker—hence, gray. [1]

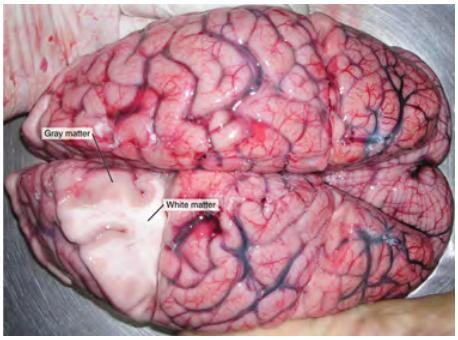


Figure 4.9.1: Gray Matter and White Matter of an exposed brain. ([2])

There is a rapid growth of total brain volume in the first three years, but the rate of growth is different for gray and white matter. Figure 4.9.2 depicts the pattern of average total brain volume growth across the first 547 days (approximately 18 months) of development as well as the individual growth trajectories of white and gray matter. Figure 4.9.2 illustrates the relatively faster growing trend of gray matter compared with white matter growth suggesting that early brain volume growth is dominated primarily by increases in gray matter. [3] Figure 4.9.3 and Figure 4.9.4 show the growth of gray and white matter for females and males separately, across the first three years and for each year after that, until eighteen years of age. These graphs further emphasize the rapid growth of brain volume, for both white and gray matter, during infancy and toddlerhood.

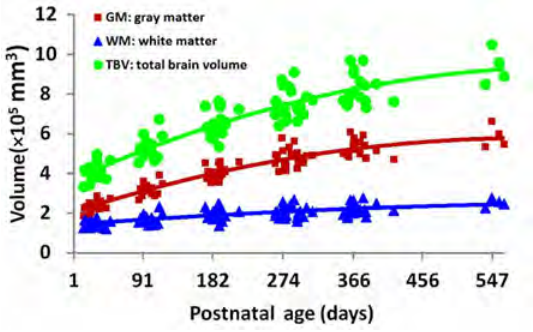


Figure 4.9.2: Depicts the pattern of average total brain volume growth across the first 547 days (approximately 18 months) of development as well as the individual growth trajectories of white and gray matter. Postnatal age and Volume ($x10^5$ mm^3) Total brain Volume (TBV): 1 day =1 progressively increasing to 547 days=2, Gray matter(GM): 2 days - 2 increasing to 5 at 547 days, Total White matter (WM): 1 day = 4 progressively to 10 at 547 days. ([4])

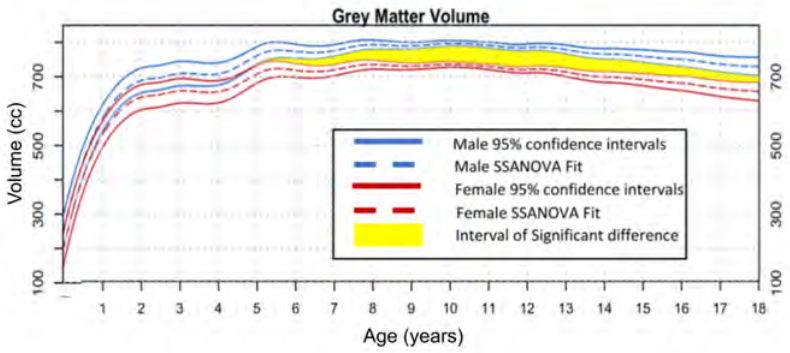


Figure 4.9.3: illustrates the relatively faster growing trend of gray matter compared with white matter growth suggesting that early brain volume growth is dominated primarily by increases in gray matter. Figure 4.9.3 and Figure 4.9.4 show the growth of gray and white matter for females and males separately, across the first three years and for each year after that, until eighteen years of age. ([5])

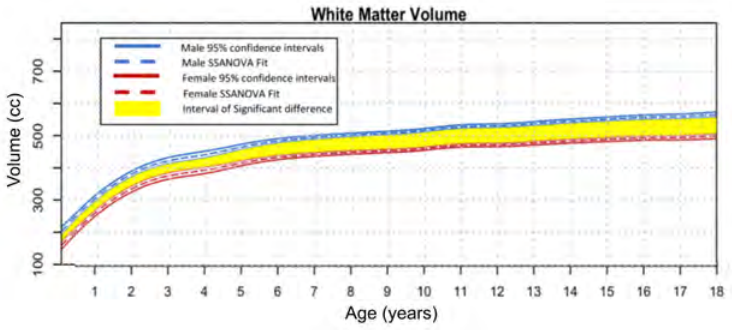


Figure 4.9.4: Growth trajectories of white matter. Figure 4.9.3 and Figure 4.9.4 show the growth of gray and white matter for females and males separately, across the first three years and for each year after that, until eighteen years of age ([6])

Social Justice Insight:

Family Income Affects the Rate of Infant & Toddler Brain Growth.

Hanson et al., (2013) analyzed repeated measures of brain development of children between five months and four years of age from economically diverse backgrounds. The data suggest that low socioeconomic status (SES) environments influence the rate of human infant brain development. As Figure# shows, infants and toddlers from lower income families began their lives with similar gray matter brain volumes but by toddlerhood, they had lower total gray matter compared with those from middle and high-income households.

Growth trajectories of gray matter by SES group. [7]

As infants aged—and presumably had increased exposure to the effects of their environments— the differences in brain volume between children from lower SES homes and those from higher SES homes widened. Furthermore, smaller volumes in this brain tissue were related to greater behavior problems in the preschool years.

Questions to consider:

- What are the different environmental factors between high versus low SES families that may be mainly driving this data?
- Are group care facilities that primarily serve high or low SES families different? In which ways?
- In what ways may infant and toddler care facilities be biased toward serving a particular SES population?
- What policies and practices can we better implement in an attempt to improve the environments for infants and toddler in group care?

[1] "Anatomy and Physiology" on OpenStax is licensed under CC by 4.0

[1] Image from "Anatomy and Physiology" on OpenStax is licensed under CC by 4.0

[3] Wang et al., (2012). 4D multi-modality tissue segmentation of serial infant images. CC by 4.0

[4] Image from Wang et al., (2012). 4D multi-modality tissue segmentation of serial infant images. CC by 4.0

[5] Image adapted from Peterson et al., (2021). Normal childhood brain growth and a universal sex and anthropomorphic relationship to cerebrospinal fluid. *Journal of Neurosurgery: Pediatrics*. Used with permission.

[6] Image adapted from Peterson et al., (2021). Normal childhood brain growth and a universal sex and anthropomorphic relationship to cerebrospinal fluid. *Journal of Neurosurgery: Pediatrics*. Used with permission.

[1] Image from Hanson et al., (2013). Family poverty affects the rate of human infant brain growth. *PloS One*, *8*(12), e80954. CC by 3.0

4.10: Brain Systems Underlying Development

Supporting Brain Development

During the first two years of life, the brain undergoes dramatic growth while supporting the development of various behavioral and cognitive abilities. As a caregiver, you cannot directly observe this brain growth, but you are able to witness the many developmental milestones infants and toddlers rapidly progress through. Neuroscience has shown that many developmental achievements are supported by specific underlying brain systems.

The type of secure attachment young children develop is related to the relationships they have with caregivers. In six month old infants, caregiver sensitivity and brain functional connectivity were related between the hippocampus and brain regions important to emotion regulation, cognitive flexibility and social communication (Rifkin-Graboi et al., 2015). Between 6-8 months of age, infant brains are able to distinguish between the sounds of any language, but by around one year of age, they neurally commit and become more efficient at processing their native language and less proficient at distinguishing between sounds not found in their native language (Kuhl et al., 2006; Rivera-Gaxiola, Silva-Pereyra & Kuhl, 2005). At twelve months of age, the achievement of walking is correlated with functional brain connectivity of motor networks in the infant brain (Marrus et al., 2018). Joint attention, the coordinated focus of two people on an object, emerges over the first 2 years of life and supports social-communicative functioning related to the healthy development of language, empathy, and theory of mind. The functional organization of the brain is related to the emergence of joint attention in infants and toddlers (Eggebrecht et al., 2017). The accelerated vocabulary development after 18 months that many children experience is related to a rapid myelination phase in language-related temporal and frontal brain regions (Pujol et al., 2006). As these studies demonstrate, not only is the brain experiencing overall growth in volume and functionality, specific brain systems are supporting childrens' evolving abilities, many of which we, as caregivers, observe in their behaviors. [1]

[1] Eggebrecht et al., (2017). Joint attention and brain functional connectivity in infants and toddlers. *Cerebral Cortex*, *27*(3), 1709-1720. CC by NC 4.0

4.11: Conclusion

Conclusion to Overview of Brain Development

As caregivers, we have the wonderful opportunity to witness the remarkable development that takes place from infancy through toddlerhood. During these first three years, the brain is also experiencing dramatic developmental change. This section presented an overview of some of the basics of brain physiology with special attention given to the transformative changes that take place during the first three years of life as the brain continues to support the many discoveries and experiences of infants and toddlers.

4.12: References

References to Overview of Brain Development

- Belsky, J., & De Haan, M. (2011). Annual research review: Parenting and children's brain development: The end of the beginning. *Journal of Child Psychology and Psychiatry, 52*(4), 409-428.
- Brito, N. H., Troller-Renfree, S. V., Leon-Santos, A., Isler, J. R., Fifer, W. P., & Noble, K. G. (2020). Associations among the home language environment and neural activity during infancy. *Developmental Cognitive Neuroscience*, 100780.
- Courchesne, E., Chisum, H. J., Townsend, J., Cowles, A., Covington, J., Egaas, B., Harwood, M., Hinds, S. & Press, G. A. (2000). Normal brain development and aging: Quantitative analysis at in vivo MR imaging in healthy volunteers. *Radiology, 216*(3), 672-682.
- Eggebrecht, A. T., Elison, J. T., Feczko, E., Todorov, A., Wolff, J. J., Kandala, S., Adams, C. M., Snyder, A. Z., Lewis, J. D., Estes, A. M., Zwaigenbaum, L., Botteron, K. N., McKinstry, R. C., Constantino, J. N., Evans, A., Hazlett, H. C., Dager, S., Paterson, S. J., Schultz, R. T., Styner, M. A.,Gerig, G., Das, S., Kostopoulos, P., The IBIS Network, Schlaggar, B. L., Petersen, S. E., Piven, J.John R Pruett, J. & Pruett Jr, J. R. (2017). Joint attention and brain functional connectivity in infants and toddlers. *Cerebral Cortex, 27*(3), 1709-1720.
- Garcia-Sierra, A., Rivera-Gaxiola, M., Percaccio, C. R., Conboy, B. T., Romo, H., Klarman, L., Ortiz, S. & Kuhl, P. K. (2011). Bilingual language learning: An ERP study relating early brain responses to speech, language input, and later word production. *Journal of Phonetics, 39*(4), 546-557.
- Iwasaki, N., Hamano, K., Okada, Y., Horigome, Y., Nakayama, J., Takeya, T., Takita, H., & Nose, T. (1997). Volumetric quantification of brain development using MRI. *Neuroradiology, 39*(12), 841-846.
- Kaur, M., Richardson, K. E., & Fitzgerald, P. B. (2019). Using magnets to stimulate the brain helps people with depression. *Frontiers for Young Minds, 7*, 1-8.
- Kennedy, D. N., Makris, N., Herbert, M. R., Takahashi, T., & Caviness Jr, V. S. (2002). Basic principles of MRI and morphometry studies of human brain development. *Developmental Science, 5*(3), 268-278.
- Knickmeyer, R. C., Gouttard, S., Kang, C., Evans, D., Wilber, K., Smith, J. K., Hamer, R. M., Lin, W., Gerig, G., & Gilmore, J. H. (2008). A structural MRI study of human brain development from birth to 2 years. *Journal of Neuroscience, 28*(47), 12176-12182.
- Kuhl, P. K., Stevens, E., Hayashi, A., Deguchi, T., Kiritani, S., & Iverson, P. (2006). Infants show a facilitation effect for native language phonetic perception between 6 and 12 months. *Developmental Science, 9*(2), F13-F21.
- Leblanc, É., Dégeilh, F., Daneault, V., Beauchamp, M. H., & Bernier, A. (2017). Attachment security in infancy: a preliminary study of prospective links to brain morphometry in late childhood. *Frontiers in Psychology, 8*, 2141.
- Lenroot, R. K., & Giedd, J. N. (2006). Brain development in children and adolescents: insights from anatomical magnetic resonance imaging. *Neuroscience & Biobehavioral Reviews, 30*(6), 718-729.
- Levitt, P. (2003). Structural and functional maturation of the developing primate brain. *The Journal of Pediatrics, 143*(4), 35-45.
- Lust, J. M., Geuze, R. H., Groothuis, A. G. G., Van der Zwan, J. E., Brouwer, W. H., Van Wolffelaar, P. C., & Bouma, A. (2011). Driving performance during word generation—testing the function of human brain lateralization using fTCD in an ecologically relevant context. *Neuropsychologia, 49*(9), 2375-2383.
- Marrus, N., Eggebrecht, A. T., Todorov, A., Elison, J. T., Wolff, J. J., Cole, L., Gao, W., Pandey, J., Shen, M. D., Swanson, M. R., Emerson, R. W., Klohr, C. L., Adams, C. M., Estes, A. M., Zwaigenbaum, L., Botteron, K. N., McKinstry, R. C., Constantino, J. N., Evans, A. C., Hazlett, H. C., Dager, S. R., Paterson, S. J., Schultz, R. T., Styner, M. A., Gerig, G., The IBIS Network, Schlaggar, B. L., Piven, J. & Pruett Jr, J. R. (2018). Walking, gross motor development, and brain functional connectivity in infants and toddlers. *Cerebral Cortex, 28*(2), 750-763.
- Mills, D. L., Coffey-Corina, S., & Neville, H. J. (1997). Language comprehension and cerebral specialization from 13 to 20 months. *Developmental Neuropsychology, 13*(3), 397-445.
- Mills, D. L., Plunkett, K., Prat, C., & Schafer, G. (2005). Watching the infant brain learn words: Effects of vocabulary size and experience. *Cognitive Development, 20*(1), 19-31.
- Mills, D. L., Prat, C., Zangl, R., Stager, C. L., Neville, H. J., & Werker, J. F. (2004). Language experience and the organization of brain activity to phonetically similar words: ERP evidence from 14-and 20-month-olds. *Journal of Cognitive Neuroscience, 16*(8), 1452-1464.

- Nelson III, C. A., Zeanah, C. H., & Fox, N. A. (2019). How early experience shapes human development: The case of psychosocial deprivation. *Neural Plasticity*.
- Pakkenberg, B., & Gundersen, H. J. G. (1997). Neocortical neuron number in humans: Effect of sex and age. *Journal of Comparative Neurology*, *384*(2), 312-320.
- Paus, T., Collins, D. L., Evans, A. C., Leonard, G., Pike, B., & Zijdenbos, A. (2001). Maturation of white matter in the human brain: A review of magnetic resonance studies. *Brain Research Bulletin*, *54*(3), 255-266.
- Peterson, M. R., Cherukuri, V., Paulson, J. N., Ssentongo, P., Kulkarni, A. V., Warf, B. C., Monga, V., & Schiff, S. J. (2021). Normal childhood brain growth and a universal sex and anthropomorphic relationship to cerebrospinal fluid. *Journal of Neurosurgery: Pediatrics* (published online ahead of print 2021).
- Pujol, J., Soriano-Mas, C., Ortiz, H., Sebastián-Gallés, N., Losilla, J. M., & Deus, J. (2006). Myelination of language-related areas in the developing brain. *Neurology*, *66*(3), 339-343.
- Reiss, A. L., Abrams, M. T., Singer, H. S., Ross, J. L., & Denckla, M. B. (1996). Brain development, gender and IQ in children: A volumetric imaging study. *Brain*, *119*(5), 1763-1774.
- Rifkin-Graboi, A., Kong, L., Sim, L. W., Sanmugam, S., Broekman, B. F. P., Chen, H., Wong, E., Kwek, K., Saw, S. M., Chong, Y. S., Gluckman, P. D., Fortier, M. V., Pederson, D., Meaney M. J. & Qiu, A. (2015). Maternal sensitivity, infant limbic structure volume and functional connectivity: a preliminary study. *Translational Psychiatry*, *5*(10), e668-e668.
- Rivera-Gaxiola, M., Silva-Pereyra, J., & Kuhl, P. K. (2005). Brain potentials to native and non-native speech contrasts in 7-and 11-month-old American infants. *Developmental Science*, *8*(2), 162-172.
- Romeo, R. R., Leonard, J. A., Robinson, S. T., West, M. R., Mackey, A. P., Rowe, M. L., & Gabrieli, J. D. (2018). Beyond the 30-million-word gap: Children's conversational exposure is associated with language-related brain function. *Psychological Science*, *29*(5), 700-710.
- Uytun, M. C. (2018). Development period of prefrontal cortex. In *Prefrontal Cortex*. IntechOpen.
-
- Webb, S. J., Monk, C. S., & Nelson, C. A. (2001). Mechanisms of postnatal neurobiological development: implications for human development. *Developmental Neuropsychology*, *19*(2), 147-171.
- Wedderburn, C. J., Subramoney, S., Yeung, S., Fouche, J. P., Joshi, S. H., Narr, K. L., Rehman, A. M., Roosa, A., Ipser, J., Robertson, F. C., Groenewold, N. A., Gibb, D. M., Zarak, H. J., Stein, D. J. & Donald, K. A. (2020). Neuroimaging young children and associations with neurocognitive development in a South African birth cohort study. *NeuroImage*, *219*, 116846.
- Whitehouse, A. J., & Bishop, D. V. (2009). Hemispheric division of function is the result of independent probabilistic biases. *Neuropsychologia*, *47*(8-9), 1938-1943.
- Wickens, A. (2009). *Introduction to biopsychology*. Pearson Education.

CHAPTER OVERVIEW

5: Infant and Toddler Mental Health

5.1: Introduction

Introduction to Infant and Toddler Mental Health

Across the world, 10% to 20% of children and adolescents suffer from mental health disorders (Bethell et al., 2022; Kessler et al., 2007) that can have a severe, negative impact on children's development and their long-term capacity to live healthy, productive and fulfilling lives (Lyons-Ruth et al., 2017). Mental health disorders have a profound impact on all aspects of health, happiness and productivity. As mental health difficulties early in life have a significant impact on the future health trajectory of an individual, it is essential to build the foundations of good mental health during the critical period of infancy and toddlerhood (Lewis et al., 2014; Moore et al., 2017). This section will discuss mental health and adverse childhood experiences during infancy and toddlerhood and the role of caregivers in supporting the development of optimal mental health.[1]

[1] Izett et al., (2021). Prevention of mental health difficulties for children aged 0–3 years: A review. *Frontiers in Psychology, 2794*. CC by 4.0

5.2: Mental Health in Infancy and Toddlerhood

Mental Health

While it is widely accepted that we are in the midst of a mental health crisis for young people, what is often missed is that the precursors of mental health challenges can begin as early as the perinatal period and also in early infancy (Robinson et al., 2008). This makes the infant and early childhood period a crucial window for intervention, with the goal of promoting good mental health for infants and young children (Robinson et al., 2008). [1]

Good mental health in infancy and toddlerhood refers to healthy social and emotional development. It includes a child's ability to experience, regulate and express emotions, to develop close and secure interpersonal relationships, and to explore the environment and learn (Clinton, Feller & Williams, 2016). All of these capacities develop best within the context of a caregiving environment that includes family, community, and cultural expectations for young children (Parlakian & Seibel, 2002). [1]

Figure 5.2.1: Happy hugs. ([2])

Research has established that infants and toddlers can suffer from mental health disorders that require treatment in their own right (Warner & Pottick, 2006; Zero to Three, 2012). Difficulties in infancy include regulatory disturbances such as excessive crying, sleeping or feeding difficulties and attachment difficulties (Postert et al., 2012; Zero to Three, 2016). Early childhood mental health problems include externalizing behaviors such as aggression and oppositional defiance (Egger & Angold, 2006; Loeber et al., 2009), and internalizing problems such as anxiety and depression (Bayer et al., 2011; Costello, Egger & Angold, 2005; Rapee, Schniering & Hudson, 2009). [1]

Several epidemiological studies have determined the prevalence of mental health disorders in infants and young children, indicating a 16% to 18% prevalence of mental health disorders amongst children between 1 to 5 years of age, with approximately half of these children being severely impacted (von Klitzing, Döhnert, Kroll & Grube, 2015). One study found that almost 35% of children between 12 to 18 months of age scored high on the Problem Scale of the Brief Infant Toddler Social Emotional Assessment (BITSEA) (Horwitz et al., 2013), while another study found that by 18 months of age, 16% to 18% of children met criteria for one or more diagnoses of a mental health or developmental disorder (Skovgaard et al., 2007). Similar results were reported by an Australian study, which found that by 2 years of age, 12% of children had clinically significant emotional, behavioral, or social problems in the context of caregiver-child relationship disturbance (Bayer et al., 2011). In addition to this, a different Australian study found that by age five, 20% of the children studied had clinically significant behavioral problems (Robinson et al., 2008). It is important to recognize that most recent epidemiological studies have been conducted in developed, economically stable, peaceful countries (Lyons-Ruth et al., 2017). Evidence suggests that rates of mental health difficulties may be much higher in countries where extreme poverty, war, family displacement and trauma exist (Tomlinson et al., 2014). [1]

Figure 5.2.2:Toddler experiencing emotion ([1])

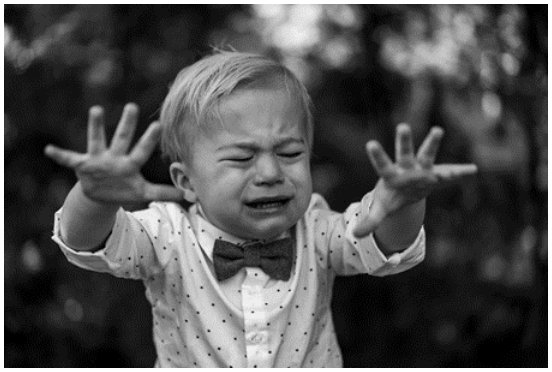


Figure 5.2.3: Toddler experiencing a negative emotion. ([4])

If not treated, mental health difficulties that begin early in life can become more serious over time (Briggs-Gowan et al., 2006; Clinton et al., 2016; Lavigne et al., 1998; Shaw, Gilliom Ingoldsby & Nagin, 2003; Slemming et al., 2010; Suveg, Southam-Gerow, Goodman & Kendall, 2007), and can persist into adolescence and adulthood (Bayer et al., 2011; Bor, McGee & Fagan, 2004; National Scientific Council on the Developing Child, 2008). Children with mental health problems are at higher risk for later difficulties at school, difficulties with peers, difficulty participating in employment, drug and alcohol problems, relationship breakdown, family violence, criminal activity, juvenile delinquency and suicide (Bayer et al., 2008; National Scientific Council on the Developing Child, 2008). [1]

Risk Factors for Infant and Toddler Mental Health Problems

There is international consensus that the first 1,000 days of life the period of development from conception to age two represent a crucial period of rapid physical, psychological and neurological growth (Darling, Bamidis, Burberry & Rudolf, 2020; Moore et al., 2017). During this time there is an increased likelihood that detrimental experiences such as early trauma or deprivation will be especially harmful and greatly impact future development, with adverse effects potentially developing into lifelong consequences (Lyons-Ruth et al., 2017; Moore et al., 2017; Shonkoff et al., 2012). [1]

Researchers have identified several risk factors for poor mental health in infants, taking into account the interaction between the individual child's genetics, temperament and environment (McLuckie et al., 2019). Risks in the child include the presence of physical health difficulties, a difficult temperament, and insecure and disorganized attachment patterns (Bosquet & Egeland, 2006; Edwards et al., 2010; Miner & Clarke-Stewart, 2008; Van Zeijl et al., 2006; Wlodarczyk et al., 2017). Family based risk factors include parenting interactions that are insensitive, lack warmth, or are controlling, as well as caregiver interactions that are over involved or over protective. Other factors include overly harsh discipline, caregiver mental health difficulties or stress, parental substance abuse, family violence, limited parental education, and parental conflict or separation/divorce (Ashford et al., 2008; Bayer et al., 2011; Bayer, Sanson & Hemphill, 2006; Dwyer et al., 2003; Edwards et al., 2010; McCarty, Zimmerman, Digiuseppe & Christakis, 2005; Miner & Clarke-Stewart, 2008; Pike et al., 2006; Van Zeijl et al., 2006; Wlodarczyk et al., 2017). [1]

Infant & Toddler Mental Health: Protective Factors

Attachment theory asserts that the relationship between the infant and their primary caregivers has an important influence on the development of the capacity for emotional and behavioral regulation (Ainsworth et al., 1978; Bowlby, 1969). A large body of evidence has identified that an infant's developing brain is shaped by the quality of the caregiving environment provided by their

primary caregivers (Kerns & Brumariu, 2014; Lally & Mangione, 2017). Secure primary attachment relationships, although not a guarantee against future mental health difficulties, are influential protective factors for infant and young children's mental health. A secure attachment relationship allows the infant's developing brain to develop capacities in building and maintaining relationships, emotional regulation, attention and self-control and sets a strong foundation for the later development of resilience, confidence and adaptability (Balbernie, 2013; Benoit, 2004). Researchers have consistently found that securely attached children experience stronger relationships with their caregivers as well as enhanced problem solving abilities, improved peer relationships and longer lasting friendships (Abraham & Kerns, 2013; Guild et al., 2017; Schneider, Atkinson & Tardif, 2001). These children may also have better sibling relationships, more positive self-esteem, an increased sense of hopefulness, greater trust in people and relationships, and heightened optimism about their future compared to children with insecure attachment styles. In contrast, insecure and disorganized attachment styles in infancy have been associated with elevated rates of emotional, social and behavioral disturbances in infancy, toddlerhood, preschool and beyond (Berlin, 2008; Fearon et al., 2010; Granot & Mayseless, 2001; Madigan, Atkinson, Laurin & Benoit, 2013; Sroufe, 2005; Van Ijzendoorn, Schuengel & Bakermans–Kranenburg, 1999). A 30-year prospective study of infants with insecure attachment styles at 8 months of age, found insecure attachment to be associated with a higher risk of mental health concerns later in adulthood at 30 years of age (Fan et al., 2014). Disorganized attachment in infancy is associated with the highest risk of later social and cognitive difficulties and psychopathology with an association found between disorganized infant attachment and childhood behavior problems (Van Ijzendoorn et al., 1999), externalizing and internalizing problems in early school years, aggression and oppositional defiant disorder (Fearon et al., 2010; Green & Goldwyn, 2002), and personality disorder (Steele & Siever, 2010). Studies have found disorganized attachment is significantly correlated with psychopathology in adolescence (Carlson et al., 1998), borderline personality disorder symptoms in adulthood (Carlson et al., 2009), dissociation (Lyons-Ruth, 2003); and post-traumatic stress disorder (PTSD) (Macdonald et al., 2008). [1]

Figure 5.2.4: Caregiver holding an infant. [5]

Ideally, caregivers are able to tune into their baby's cues, interpret their meaning, and respond to them in a contingent, consistent and competent way, which has been termed sensitive parenting (Ensink et al., 2016; Petch et al., 2012). Caregivers who provide care in this way allow their infant to develop optimal early social-emotional skills, secure infant-caregiver relationships and cognitive ability (The National Health and Medical Research Council, 2017).

Infant & Toddler Mental Health: Prevention & Early Intervention

Research highlights the importance of childhood experiences across the lifespan, starting in infancy and toddlerhood, emphasizing the importance of addressing risk factors early in life (Felitti et al., 1998; Jones, Nurius, Song & Fleming, 2018). The cost of mental health disorders on individuals and society demands a response that focuses on early investment, health promotion and early intervention in an effort to positively impact future health (Jenkins et al., 2002). The World Health Organization has asserted that prevention is the only sustainable approach for reducing the health burden associated with mental health disorders (World Health Organization, 2004). It is well established that early detection, assessment and intervention of mental health problems in infancy and early childhood is more successful and cost effective than treatment when symptoms become more severe (Davis et al., 2010; Huberty, 2012; The National Health and Medical Research Council, 2017). [1]

This shift in focus toward the prevention of mental illness means that we must consider the mental health and wellbeing of infants, young children, and their parents (Guy, Furber, Leach & Segal, 2016). While the period of infancy and early childhood is a time when mental health difficulties can develop, it is also an enormously influential developmental stage with the potential to modify or

prevent these same difficulties (Karevold, Røysamb, Ystrom & Mathiesen, 2009; Lewis et al., 2014; Moore et al., 2017). Since many disorders can be prevented through developmentally appropriate, high quality programs and services, it is becoming increasingly acknowledged that it is not enough to merely treat mental health disorders as they emerge (Andrews & Wilkinson, 2002; Waddell et al., 2007). Instead, research suggests that efforts should focus on the prevention of mental health difficulties before they arise, particularly during the earliest stages of life when there is the greatest capacity to effect change (Bayer et al., 2010; Maldonado-Duran, Lartigue & Feintuch, 2000; The National Health and Medical Research Council, 2017). [1]

To support optimal mental health in infants and toddlers, caregivers can:

- Continue to learn and stay informed about the epidemiology (incidence and possible causes) of mental health in children under three years of age.
- Establish secure relationships with infants and toddlers, with a focus on children who show early signs of an insecure attachment.
- Engage in sensitive caregiving by tuning into a child's unique cues, interpreting their meaning, and responding to them in a contingent, consistent and competent way.
- Create safe physical and social environments where children can practice regulating and expressing their emotions.
- Share knowledge of positive caregiving practices and awareness of infant and toddler mental health with families.

[1] Izett et al., (2021). Prevention of mental health difficulties for children aged 0–3 years: A review. *Frontiers in Psychology, 2794*. CC by 4.0

[2] Image by Nina Hill on Unsplash.

[3] Image by Alexander Dummer on Unsplash.

[4] Image by Zachary Kadolph on Unsplash.

[5] Image by Katie Emslie on Unsplash.

5.3: Adverse Childhood Experiences

Childhood Experiences

Throughout our lives, from childhood into adulthood, we will likely encounter adverse experiences unfavorable experiences that have the potential to hold us back from success or development. Specific types of adverse experiences that occur during childhood are especially concerning because they can decrease the likelihood that children will develop optimally (Bethell, Simpson & Solloway, 2017; Shonkoff, 2010) by threatening the development of positive social, emotional, and cognitive growth in children (Belsky, 1984; Bradley & Corwyn, 2002). Adverse Childhood Experiences, or ACEs, are potentially traumatic events that occur in childhood (0 to 17 years) such as experiencing violence, abuse, or neglect; witnessing violence in the home; and having a family member attempt or die by suicide (Felitti et al., 1998).[1] [2]

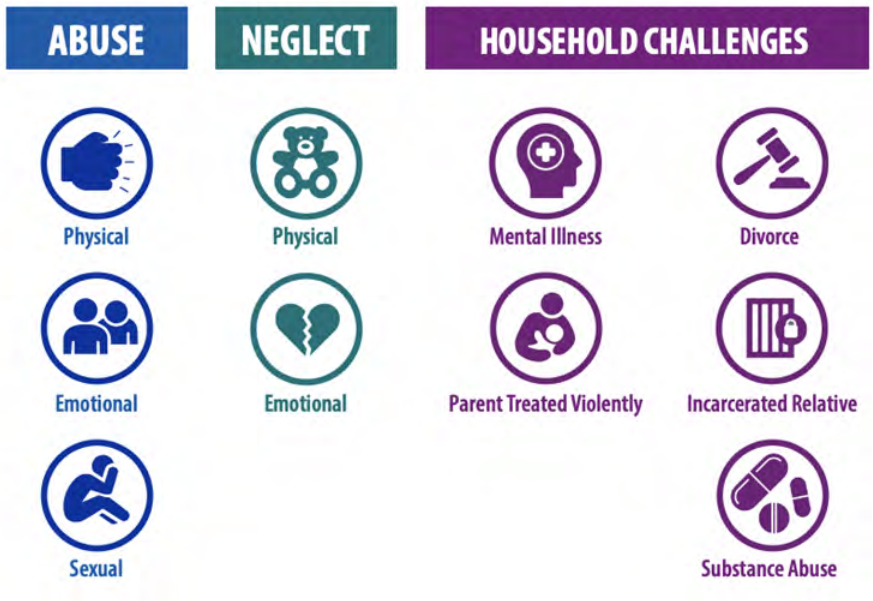


Figure 5.3.1: The ten ACE indicators. ([1])

The ACE index (Anda et al. 2006; CDC, 2022; Felitti 1993) includes the ten indicators listed in Figure 5.3.1. Half of the indicators assess child maltreatment, including physical, sexual, and emotional abuse and physical and emotional neglect. The remaining five indicators are characteristics of the caregiver or home environment. These include living with a family member with a mental illness, a substance use problem, a history of incarceration, living in a home with domestic violence, or living in a home with parents who have separated or divorced. The Centers for Disease Control reported 61% of adults across twenty-five U.S. states have experienced exposure to one or more ACEs and 16% have experienced four or more ACEs. National Survey of Children's Health data suggests 33.3% of children aged birth to 17 in the U.S. have experienced at least one family adversity (Health Resources and Services Administration 2019).[1] [2]

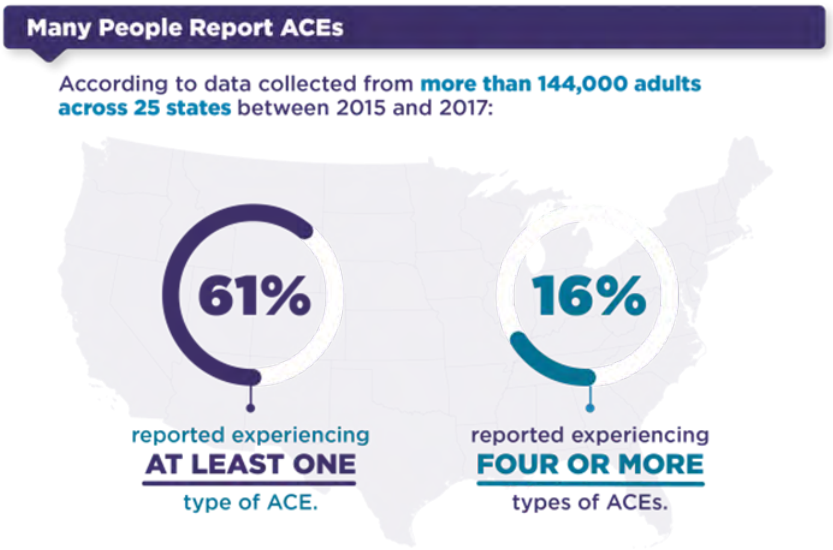


Figure 5.3.2: Prevalence of ACEs in the U.S. ([6])

The ACEs study documented a set of specific events in childhood that were linked to chronic diseases and even early mortality later in adulthood (Anda et al. 2006; Felitti et al. 1998; Oh et al., 2018). The ACEs study found relationships between developmental outcomes and the number of early ACEs. As the number of ACEs increased, the likelihood of less optimal outcomes also increased. Anda et al. (2006) reported that individuals with the highest number of ACEs experienced nearly three times the number of comorbid outcomes compared with those with no ACEs exposure. A growing body of research has since further confirmed that childhood adversity is associated with chronic disease and early death (Brown et al., 2009; Campbell, Walker & Egede, 2016; Gilbert et al., 2015; Kalmakis & Chandler, 2015). [1] [7]

The Center for Youth Wellness analyzed ACEs data specific to California (Center for Youth Wellness, 2014). In California, 61.7% of adults have experienced at least one ACE and 16.7% have experienced four or more, very similar to the national averages reported by the CDC. The three most common types of ACES were emotional abuse or verbal abuse (34.9%), parental separation or divorce (26.7%) and substance abuse by a household member (26.1%). The prevalence of ACEs differed by county. Butte county had the highest prevalence of four or more ACEs at 30.3%, while San Francisco had the lowest prevalence of four or more ACEs at only 9%. Importantly, ACEs were associated with health outcomes. Individuals with four or more ACEs were five times more likely to suffer from depression and were more likely to smoke and binge drink.

ACEs are a global concern with high rates of prevalence worldwide. Approximately 61% of women living in Mexico reported at least one ACE and 14% reported four or more (Flores-Torres et al., 2020). In Malawi, 72% of adolescents (aged 10 to 16 years) reported four or more ACEs (Kidman, Piccolo & Kohler, 2020). About 63.9 % of adults in Singapore have experienced at least one ACE (Subramaniam et al., 2020). In Canada, 61.6% reported at least one ACE and 35.6% reported at least two ACEs (Joshi et al., 2021).

Figure 5.3.3: Caregiver experiencing negative emotions while holding an infant. ([8])

Awareness of ACEs and their potential negative impact on the health and wellness of individuals is increasing. For example, in 2019, California appointed its first ever Surgeon General, Nadine Burke Harris. Dr. Burke Harris is a pediatrician and her research and interests include ACEs as a top concern (Harris, 2018). Nadine helped establish the ACEs Aware Initiative and corresponding website which offers free information, training and ACEs screening tools.

Figure 5.3.4: Nadine Burke Harris. ([9])

Most ACEs research is conducted by asking adults to reflect upon their childhood. This approach is limited because many adults are not able to remember most events that occur before the age of three (Hayne, 2004). As the first three years are so critical for establishing a strong foundation of health and development, it is important to know how prevalent ACEs are in the lives of infants and toddlers.

Evidence suggests that many children are at risk of experiencing ACEs during the first three years. While most children under three years of age have not experienced any ACEs, 20% had experienced one ACE and 8% had experienced two or more ACEs (Novoa & Morrissey, 2020). Toddlers were twice as likely to experience at least one ACE (11%), compared to infants (5%). Infants and toddlers of color disproportionately experience ACEs, especially multiple ACEs. For example, compared to only 7% of white children, 15% of Black children under three years of age had experienced multiple ACEs. There were differences in the level of ACEs in infants and toddlers across states in the U.S. Oregon and Oklahoma had the highest percentage of children who had only experienced one ACE, both at 26%, compared to Maryland that had the lowest percentage at 15%. For children experiencing two or more ACEs, the highest percentage was in Oklahoma at 21%, while Maryland and Massachusetts had the lowest percentage, both at 3%. In California, 23% of infants and toddlers had experienced one ACE and 5% had experienced two or more ACEs.

One study examined ACEs in 2,361 fourteen month old toddlers by asking parents to complete an ACEs questionnaire (McKelvey, Whiteside-Mansell, Zhang & Selig, 2020). Their data identified three different patterns. One pattern was for infants exposed to relatively low incidences of ACEs (they called this group ‘low-ACEs’). Two groups of higher ACE exposures were also identified: an ‘ACEs-parent maltreatment’ group who experienced moderate level of overall ACEs, mainly related to forms of maltreatment

and an ‘ACEs-household dysfunction’ group with the highest overall ACE scores who mainly experienced multiple forms of family and household dysfunction. [1]

Figure 5.3.5 shows the prevalence of each of the three groups for each of the ten ACEs indicators. The low-ACEs group shows relatively low levels of ACE exposure with some elevation on physical neglect (27%) and parent separation (17%). For example, only 1% of this group exhibited emotional abuse compared with 37% and 14% in the other groups. The ACEs-parent maltreatment group has the highest levels of exposure to emotional abuse (37%), physical abuse (23%), and physical neglect (57%) compared with rates of 1%, 6%, and 27% respectively in the low-ACEs group and 14%, 15% and 42% respectively in the ACEs-household dysfunction group. The ACEs-household dysfunction group has the highest levels of exposure for parent separation (36%), domestic violence (53%), substance abuse (55%), mental illness (48%), and jailed family members (68%). [1]

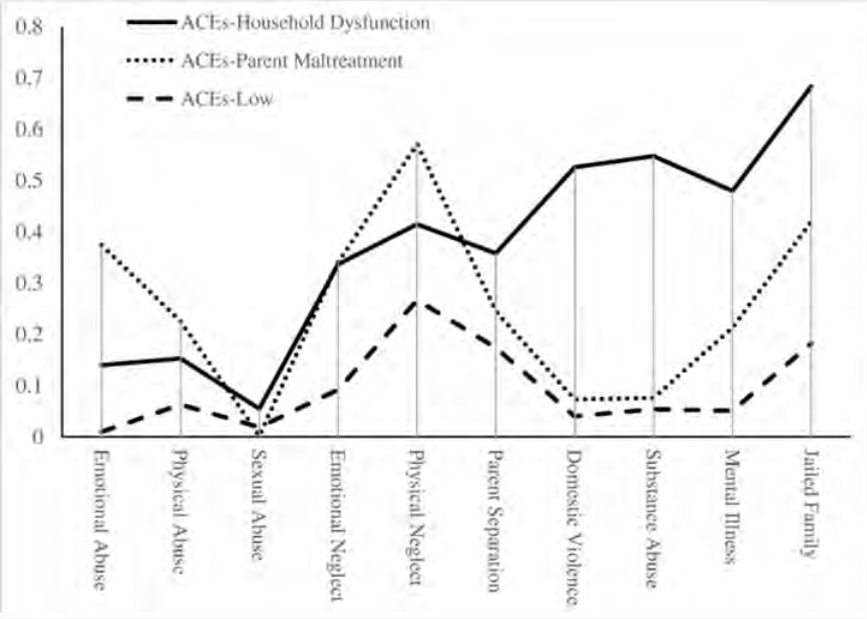


Figure 5.3.5: Figure shows the proportion of each of the three groups having each of the ten ACEs. The first of the three groups (ACEs-low, $N = 1431$, $M = 0.84$, SD = 0.77, 60.6%) shows relatively low levels of ACE exposure with some elevation on physical neglect (27%) and parent separation (17%). For example, only 1% of this group exhibited emotional abuse compared with 37% and 14% in the other groups. The second ACE exposure group (ACEs-parent maltreatment, $N = 636$, $M = 2.91$, SD = 1.06, 26.9%) has the highest levels of exposure to emotional abuse (37%), physical abuse (23%), and physical neglect (57%) compared with rates of 1%, 6%, and 27% respectively in the ACEs-low group and 14%, 15% and 42% respectively in the ACEs-household dysfunction group. The third group (ACEs-household dysfunction, $N = 294$, $M = 3.94$, $SD = 1.30$, 12.5%) has the highest levels of exposure for parent separation (36%), domestic violence (53%), substance abuse (55%), mental illness (48%), and jailed family (68%) compared with rates of 17%, 4%, 5%, 5%, and 18% respectively in the ACEs-low group and 25%, 7%, 8%, 21%, and 42% respectively in ACEs-parent maltreatment group. [10]

The groups were significantly different in level of maternal education with the lowest educated mothers being more likely to be in the ACEs-parent maltreatment group and higher educated mothers being more likely in the ACEs-household dysfunction group. The groups also differed by race, such that Black mothers were more likely to be in the ACEs-parent maltreatment group, and Hispanic mothers were more likely to be in the low-ACEs group relative to other groups. For maternal age, the low-ACEs group had the oldest mothers and the ACEs-parent maltreatment group were the youngest. [1]

While the findings of ACEs prevalence are robust, there are potential weaknesses in the tools used to collect the data. One concern is that each of the ACE risks is weighted equally. This is a concern because some risks are more likely to predict difficult outcomes than others. For example, ACEs include sexual abuse and parental divorce/separation. Both are associated with less optimal outcomes, but research suggests that sexual abuse is a more robust predictor of negative developmental outcomes. Furthermore, the stress response to an ACE may differ amongst individuals–we do not all respond in the same way to adverse events. Therefore, to truly understand the potential negative impact ACEs can have, we must understand the relationship between adversity and stress. [1]

[1] McKelvey et al., (2020). Adverse childhood experiences in infancy: a latent class approach exploring interrelatedness of risks. *Adversity and Resilience Science*, 1-13. CC by 4.0

[2] Centers for Disease Control and Prevention (2019). *Preventing adverse childhood experiences: Leveraging the best available evidence*. Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention. Public domain.

[3] Image from the Centers for Disease Control and Prevention (2019). *Preventing adverse childhood experiences: Leveraging the best available evidence*. Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention. Public domain.

[4] McKelvey et al., (2020). Adverse childhood experiences in infancy: a latent class approach exploring interrelatedness of risks. *Adversity and Resilience Science*, 1-13. CC by 4.0

[5] "Preventing Adverse Childhood Experiences" from the CDC is in the public domain.

[6] Image from the Centers for Disease Control and Prevention (2019). *Preventing adverse childhood experiences: Leveraging the best available evidence*. Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention. Public domain.

[7] Oh et al., (2018). Systematic review of pediatric health outcomes associated with childhood adversity. *BMC Pediatrics*, *18*(1), 1-19. CC by 4.0

[8] Image by Sharon McCutcheon on Unsplash.

[9] Image by Christopher Michel on Wikipedia is licensed under CC by 2.0

[10] Figure 1 from McKelvey et al., (2020). Adverse childhood experiences in infancy: a latent class approach exploring interrelatedness of risks. *Adversity and Resilience Science*, 1-13. CC by 4.0

5.4: Adversity and Toxic Stress

Overview of Impacts of Adversity and Toxic Stress

Stress is a term commonly used to describe the response to the demands encountered on a daily basis throughout one's lifetime, and it is related to both positive experiences and negative experiences. Stressors are agents that produce stress. Stressors may be physical, emotional, environmental or theoretical, and all may equally affect the body's stress response. The stress response, also known as the "fight or flight" response comprises the physiologic changes that occur with any encounter of stress or perceived stress to the individual (Cannon, 2013; Selye, 1976). This stress response is a result of stimulation of the sympathetic nervous system resulting in a cascade of neuro-endocrine-immune responses that include an increase in respirations, heart rate, blood pressure, and overall oxygen consumption (Chrousos & Gold, 1992; Dusek & Benson, 2009). As Figure# shows, the sympathetic nervous system is composed of many pathways that perform a variety of functions on various organ systems. The main overall end effect of the sympathetic nervous system is to prepare the body for physical activity—a whole-body reaction affecting many organ systems throughout the body (McCorry, 2007). In most situations, the physiologic changes associated with the stress response are short lived, with the body returning to its baseline state when the stressor is removed. [1] [2]

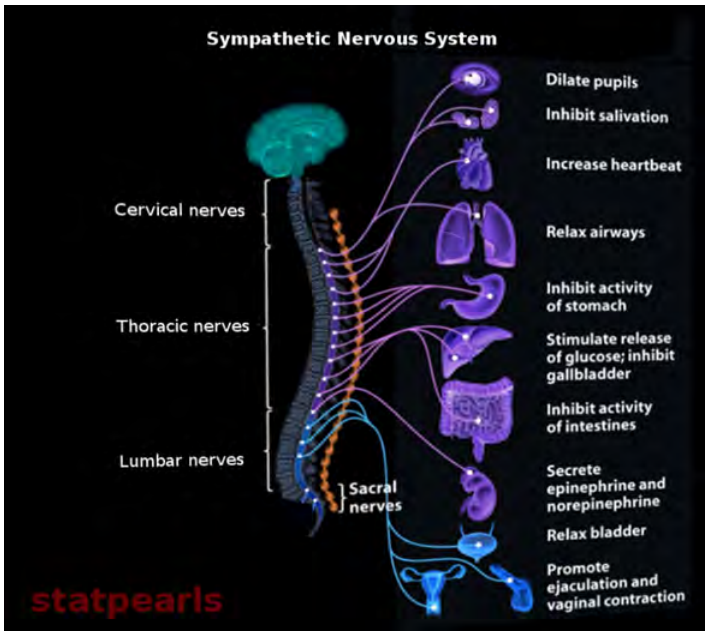


Figure 5.4.1: The sympathetic nervous system ([3])

While some degree of stress and adversity is normal and an essential part of human development, exposure to frequent and prolonged adversity, especially in the absence of protective factors, can result in toxic stress. Childhood toxic stress is severe, prolonged, or repetitive adversity with a lack of the necessary nurturance or support of a caregiver to prevent an abnormal stress response (National Scientific Council on the Developing Child, 2014). This abnormal stress response consists of a derangement of the neuro-endocrine-immune response resulting in prolonged cortisol activation and a persistent inflammatory state, with failure of the body to normalize these changes after the stressor is removed (Johnson, Riley, Granger & Riis, 2013; Wolf, Miller & Chen, 2008). Children who experience early life toxic stress are at risk of long-term adverse health effects that may not manifest until adulthood. These adverse health effects include maladaptive coping skills, poor stress management, unhealthy lifestyles, mental illness and physical disease (Boyce et al., 2021; Garner et al., 2012; Johnson, Riley, Granger & Riis, 2013). [4] [5]

There are three general types of responses to stress: [5]

- **Positive stress response**. A positive stress response is a normal stress response and is essential for the growth and development of a child. Positive stress responses are infrequent, short-lived, and mild. The child is supported through this stressful event with strong social and emotional buffers such as reassurance and parental protection. The child gains motivation and resilience from every positive stress response, and the biochemical reactions that occur with such a stressful event return to baseline (National Scientific Council on the Developing Child, 2014). Examples include meeting new people or learning a new task.

- **Tolerable stress response**. Tolerable stress responses are more severe, frequent or sustained. The body responds to a greater degree compared to the positive stress response, and these biochemical responses have the potential to negatively affect brain architecture. Examples include divorce or the death of a loved one. In tolerable stress responses, once the adversity has passed, the brain and organs can recover fully if the child is protected with responsive relationships and strong social and emotional support. Therefore, an important feature of the tolerable stress response is the role of caregivers. The risks for short-term and long-term psychological impact can be reduced if children have protective relationships that support them to cope with these events (Shonkoff & Levitt, 2010). [6]
- **Toxic stress response**. Toxic stress results in prolonged activation of the stress response, with a failure of the body to recover fully. It differs from a normal stress response in that there is a lack of caregiver support, reassurance, or emotional attachments. The insufficient caretaker support prevents the buffering of the stress response or the return of the body to baseline function. Examples of toxic stress include abuse, neglect, extreme poverty, violence, household dysfunction, and food scarcity. Caretakers with substance abuse or mental health conditions also predispose a child to a toxic stress response. Exposure to less severe yet chronic, ongoing daily stressors can also be toxic to children (Yates, 2007). Early life toxic stressors increase one's vulnerability to maladaptive health outcomes such as an unhealthy lifestyle, socioeconomic inequity, and poor health; however, these stressors do not solely predict or determine an adult's behavior or health (Odgers & Jaffee, 2013; Shonkoff, Boyce & McEwen, 2009).

---

[1] Franke (2014). Toxic stress: effects, prevention and treatment. *Children*, *1*(3), 390-402. CC by 4.0

[2] Alshak & Das (2021). Neuroanatomy, sympathetic nervous system. *StatPearls*. CC by 4.0

[3] Image from Alshak & Das (2021). Neuroanatomy, sympathetic nervous system. *StatPearls*. CC by 4.0

[4] Centers for Disease Control and Prevention. (2021). *Adverse childhood experiences prevention strategy*. National Center for Injury Prevention and Control, Centers for Disease Control and Prevention.

[5] Franke (2014). Toxic stress: effects, prevention and treatment. *Children*, *1*(3), 390-402. CC by 4.0

[2] Branco & Linhares (2018). The toxic stress and its impact on development in the Shonkoff's Ecobiodevelopmental Theoretical approach. *Estudos de Psicologia*, *35*, 89-98. CC by 4.0

5.5: Resilience

Concept of Resilience

Resilience is the ability to properly adapt to adversity despite the conditions. It is dynamic and plays a large role in a toxic stress response. Not all individuals who experience repeated childhood adversity experience poor health, and resilience may provide a buffer. Resilience factors are numerous and change over time in an individual. Children with resilience have been identified as having the following characteristics: higher IQ, easy temperament, a perception of self-competence, a positive self concept, a realistic sense of control of the situation, empathy, and social problem solving skills (Cadamuro et al., 2021; Cowen, Wyman & Work, 1996; Miller-Lewis et al., 2013; Zolkoski & Bullock, 2012). Factors that predict resilience in children experiencing adversity include a solid relationship between the child and parent as well as a high quality relationship between the child and teacher (Miller-Lewis et al., 2013). Additional resilience factors identified include adequate social support, parental marriage quality, parental physical and mental health, and the parent's sense of efficacy. Focus on early childhood interventions to strengthen resilience factors may help to minimize a toxic stress response (Garner, 2013). [1]

Figure 5.5.1: Resiliency. ([2])

Childcare attendance can be a protective factor against early ACEs. For infants and toddlers who experience adverse experiences, being cared for by their parents is associated with lower cognitive abilities, but attending childcare during the first three years was associated with higher cognitive abilities (Larose et al., 2020). To promote resilience in all infants and toddlers, and especially those who have experienced ACEs, caregivers can:

- Create secure attachments that provide children with a sense of dependency and safety. Children with a stronger connection to their caregiver are more likely to have greater self-regulation skills—a key component of resilience (Bethell et al., 2022).
- Implement program policies purported by the Program for Infant and Toddler Care (PITC) such as primary care, individualized care and continuity of care.
- Respond to infants' and toddlers' social and emotional needs in a respectful and sensitive way.
- Help infants and toddlers to learn how to regulate their own emotions in a positive and secure way. Research has revealed that when caregivers help children to regulate their own emotions, it promotes resilience in the children (Humphreys, King, Guyon-Harris & Zeanah, 2021).
- Label emotions and openly discuss them with children.
- Provide safe opportunities for children to take risks such as engaging with new people and physical challenges with climbing equipment.

[1] Franke (2014). Toxic stress: Effects, prevention and treatment. *Children, 1*(3), 390-402. CC by 4.0

[2] Image by Wokandapix on Pixabay.

5.6: Trauma-informed Care

Trauma and Care

Toxic stresses in general are strongly linked to poor health outcomes across the lifespan and trauma-informed care is one approach to caregiving based on the recognition of this relationship. Caregivers of trauma-informed care strive to understand children's behavior in light of previous traumas they have experienced, such as ACEs. Thus, trauma-informed care for infants and toddlers begins with first recognizing the prevalence and potential impact toxic stress and ACEs can have during the first three years. Caregivers also provide supportive care that enhances children's feelings of safety and security, to prevent their re-traumatization in a current situation that may potentially overwhelm their coping skills. [1]

Several key concepts of trauma-informed care applied to infants and toddlers include: [1]

- realizing the impact that trauma can have on infants and toddlers, and that reactions to a past trauma may inform the child's current response to a potentially traumatic situation;
- recognizing the signs and symptoms of trauma in infants and toddlers and the staff caring for them; and
- resisting re-traumatization, to prevent a situation that represents a tolerable stress from evolving into a toxic stress (Substance Abuse and Mental Health Services Administration, 2014).

Figure 5.6.1 : Six guiding principles to a trauma-informed approach. ([2])

Adopting a trauma-informed approach is not accomplished through any single particular technique or checklist. It requires constant attention, caring awareness, sensitivity, and possibly a cultural change at an organizational level. A trauma-informed approach reflects adherence to six key principles rather than a prescribed set of practices or procedures. The six key principles fundamental to a trauma-informed approach include: [3] [4]

1. **Safety**. Children feel physically and psychologically safe. The physical setting is safe and the interpersonal interactions infants and toddlers have with caregivers promote a sense of safety. This principle supports the belief from experts that positive relationships are at the heart of infant and toddler care and education (Lally & Mangione, 2017) and the critical importance of program policies such as primary caregiving, continuity of care and small groups in establishing and fostering such positive and secure relationships (De Schipper, Riksen-Walraven & Geurts, 2006; McMullen, 2018; Ogren & Johnson, 2021).
2. **Trustworthiness and transparency**. Organizational operations and classroom practices are conducted with transparency and the goal of building and maintaining trust with children, families, among staff and others involved in the organization. This principle emphasizes open communication between a childcare program and enrolled families about foundational policies and practices as well as everyday routines and daily child updates.
3. **Peer support**. The term "peers" refers to individuals with lived experiences of trauma, or in the case of infants and toddlers, this can be family members of children who have experienced traumatic events. Peer support is a key vehicle for establishing safety and hope, building trust, enhancing collaboration and utilizing their stories and lived experiences to promote recovery and healing. This principle can mean a child care program explicitly creates a culture of respect and support and invites families of enrolled children and community members, especially those with lived experiences of trauma, into an open dialogue about how best to support children and families who have experienced trauma.
4. **Collaboration and mutuality**. Importance is placed on partnering because healing happens in relationships and in the meaningful sharing of power and decision-making. The organization recognizes that everyone has a role to play in a trauma-informed approach. For a child care program to become more trauma-informed may mean reaching out to other organizations or individuals for information, assistance and resources. National organizations such as the National Association for the Education

of Young Children (NAEYC) and Zero to Three both have information and resources about trauma-informed care, but local organizations can be a great resource as well.

5. **Empowerment, voice and choice**. Throughout the organization and the families served, children's strengths and experiences are recognized and built upon. The organization fosters a belief in resilience and in the ability of caregivers and communities to heal and promote recovery from trauma. Child care programs can provide training specially on infant and toddler mental health and trauma-informed care, emphasizing the significant role of relationships between caregivers and children. Staff are empowered to do their work as well as possible with adequate organizational support staff need to feel safe as well. Recognition of caregivers' personal trauma and its potential impact on children is also necessary. One study found that 73% of early childhood educators had experienced at least one ACE, 22% had experienced four or more ACEs and educators who reported higher numbers of ACEs contributed to lower social and emotional climate scores in classrooms (Hubel et al., 2020).
6. **Cultural, historical and gender issues**. The organization actively moves past cultural stereotypes and biases (e.g., based on race, ethnicity, sexual orientation, age, religion, gender-identity, etc.,); incorporates policies, protocols and processes that are responsive to the racial, ethnic and cultural needs of the children and families and recognizes and addresses historical trauma. This principle requires child care programs to actively take steps to recognize the prevalence of trauma and its role in providing trauma-informed care to infants and toddlers and their families, as well as employed caregivers and staff. Institutional policies and protocols need to be established and supported, as well as everyday practices and processes between children, caregivers and families.

[1] Sanders & Hall (2018). Trauma-informed care in the newborn intensive care unit: Promoting safety, security and connectedness. *Journal of Perinatology*, *38*(1), 3-10. CC by NC SA 4.0

[2] 6 Guiding Principles from a trauma-informed approach from the CDC is in the public domain.

[3] "Infographic: 6 Guiding Principles To A Trauma-Informed Approach" from the CDC is in the public domain.

[4] Substance Abuse and Mental Health Services Administration (2014). SAMHSA's concept of trauma and guidance for a trauma-informed approach. HHS Publication. Located in the public domain.

5.7: Conclusion

Conclusion of Infant and Toddler Mental Health

The high prevalence of mental health difficulties and adverse childhood experiences, even in children under three years of age, is a growing concern; however, the first three years are also the optimal time to establish a positive and healthy social and emotional foundation in children's lives. Therefore, it is critical that caregivers are knowledgeable of the research, risks and preventative strategies to best support the mental health of infants and toddlers. To address the mental health of infants and toddlers, trauma-informed care recognizes the prevalence and potential impact of trauma and offers principles that child care programs can strive toward implementing. The most important step we can take to encourage the healthy mental health of infants and toddlers is to create positive and secure relationships between caregivers and children.

5.8: References

References for Infant and Toddler Mental Health

- Abraham, M. M., & Kerns, K. A. (2013). Positive and negative emotions and coping as mediators of mother-child attachment and peer relationships. *Merrill-Palmer Quarterly, 59*(4), 399-425.
- Ainsworth, M. D. S., Blehar, M. C., Waters, E., and Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation*. Oxford: Erlbaum.
- Anda, R. F., Felitti, V. J., Bremner, J. D., Walker, J. D., Whitfield, C. H., Perry, B. D., Dube, S. R., & Giles, W. H. (2006). The enduring effects of abuse and related adverse experiences in childhood. *European Archives of Psychiatry and Clinical Neuroscience, 256*(3), 174-186.
- Andrews, G., & Wilkinson, D. D. (2002). The prevention of mental disorders in young people. *Medical Journal of Australia, 177*, S97-S100.
- Ashford, J., Smit, F., Van Lier, P. A., Cuijpers, P., & Koot, H. M. (2008). Early risk indicators of internalizing problems in late childhood: A 9-year longitudinal study. *Journal of Child Psychology and Psychiatry, 49*(7), 774-780.
- Balbernie, R. (2013). The importance of secure attachment for infant mental health. *Journal of Health Visiting, 1*(4), 210-217.
- Barlow, J., Sleed, M., & Midgley, N. (2021). Enhancing parental reflective functioning through early dyadic interventions: A systematic review and meta-analysis. *Infant Mental Health Journal, 42*(1), 21-34.
- Bayer, J. K., Hiscock, H., Ukoumunne, O. C., Price, A., & Wake, M. (2008). Early childhood aetiology of mental health problems: A longitudinal population-based study. *Journal of Child Psychology and Psychiatry, 49*(11), 1166-1174.
- Bayer, J. K., Rapee, R. M., Hiscock, H., Ukoumunne, O. C., Mihalopoulos, C., & Wake, M. (2011). Translational research to prevent internalizing problems early in childhood. *Depression and Anxiety, 28*(1), 50-57.
- Bayer, J. K., Sanson, A. V., & Hemphill, S. A. (2006). Parent influences on early childhood internalizing difficulties. *Journal of Applied Developmental Psychology, 27*(6), 542-559.
- Bayer, J. K., Ukoumunne, O. C., Lucas, N., Wake, M., Scalzo, K., & Nicholson, J. M. (2011). Risk factors for childhood mental health symptoms: National longitudinal study of Australian children. *Pediatrics, 128*(4), e865-e879.
- Belsky, J. (1984). The determinants of parenting: A process model. *Child Development*, 83-96.
- Benoit, D. (2004). Infant-parent attachment: Definition, types, antecedents, measurement and outcome. *Paediatrics & Child Health, 9*(8), 541-545.
- Berlin, N. (2008). Tripartite therapy with older children: mutuality in the relationship of a parent–child attachment. *Journal of Child Psychotherapy, 34*(3), 335-363.
- Bethell, C. D., Garner, A. S., Gombojav, N., Blackwell, C., Heller, L., & Mendelson, T. (2022). Social and relational health risks and common mental health problems among U.S. children: The mitigating role of family resilience and connection to promote positive socioemotional and school-related outcomes. *Child and Adolescent Psychiatric Clinics, 31*(1), 45-70.
- Bethell, C. D., Simpson, L. A., & Solloway, M. R. (2017). Child well-being and adverse childhood experiences in the United States. *Academic Pediatrics, 17*(7), S1-S3.
- Bor, W., McGee, T. R., & Fagan, A. A. (2004). Early risk factors for adolescent antisocial behaviour: An Australian longitudinal study. *Australian & New Zealand Journal of Psychiatry, 38*(5), 365-372.
- Bosquet, M., & Egeland, B. (2006). The development and maintenance of anxiety symptoms from infancy through adolescence in a longitudinal sample. *Development and Psychopathology, 18*(2), 517-550.
- Bowlby, J. (1969). *Attachment and loss: Attachment*. New York, NY: Basic Books.
- Boyce, W. T., Levitt, P., Martinez, F. D., McEwen, B. S., & Shonkoff, J. P. (2021). Genes, environments, and time: The biology of adversity and resilience. *Pediatrics, 147*(2).
- Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. *Annual Review of Psychology, 53*(1), 371-399.
- Briggs-Gowan, M. J., Carter, A. S., Bosson-Heenan, J., Guyer, A. E., & Horwitz, S. M. (2006). Are infant-toddler social-emotional and behavioral problems transient? *Journal of the American Academy of Child & Adolescent Psychiatry, 45*(7), 849-858.
- Brown, D. W., Anda, R. F., Tiemeier, H., Felitti, V. J., Edwards, V. J., Croft, J. B., & Giles, W. H. (2009). Adverse childhood experiences and the risk of premature mortality. *American Journal of Preventive Medicine, 37*(5), 389-396.
- Cadamuro, A., Birtel, M. D., Di Bernardo, G. A., Crapolicchio, E., Vezzali, L., & Drury, J. (2021). Resilience in children in the aftermath of disasters: A systematic review and a new perspective on individual, interpersonal, group, and intergroup level

factors. *Journal of Community & Applied Social Psychology, 31*(3), 259-275.
- Campbell, J. A., Walker, R. J., & Egede, L. E. (2016). Associations between adverse childhood experiences, high-risk behaviors, and morbidity in adulthood. *American Journal of Preventive Medicine, 50*(3), 344-352.
- Camoirano, A. (2017). Mentalizing makes parenting work: A review about parental reflective functioning and clinical interventions to improve it. *Frontiers in Psychology, 8*, 14.
- Cannon, W.B. (2013). *Bodily changes in pain, hunger, fear and rage, an account of recent researches into the function of emotional excitement*. New York, NY: Hardpress Ltd.
- Carlson, E. A. (1998). A prospective longitudinal study of attachment disorganization/disorientation. *Child Development, 69*(4), 1107-1128.
- Centers for Disease Control and Prevention (2019). *Preventing adverse childhoodexperiences: Leveraging the best available evidence*. Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention.
- CDC (2022, January 15). *About the CDC-Kaiser ACE Study*. Centers for Disease Control and Prevention. https://www.cdc.gov/violenceprevention/childabuseandneglect/acestudy/about.html.
- Chrousos, G. P., & Gold, P. W. (1992). The concepts of stress and stress system disorders: Overview of physical and behavioral homeostasis. *Jama, 267*(9), 1244-1252.
- Clinton, J., Feller, A. F., & Williams, R. C. (2016). The importance of infant mental health. *Paediatrics & Child Health, 21*(5), 239-241.
- Cook, F., Giallo, R., Hiscock, H., Mensah, F., Sanchez, K., & Reilly, S. (2019). Infant regulation and child mental health concerns: A longitudinal study. *Pediatrics, 143*(3).
- Costello, E. J., Egger, H. L., & Angold, A. (2005). The developmental epidemiology of anxiety disorders: Phenomenology, prevalence, and comorbidity. *Child and Adolescent Psychiatric Clinics, 14*(4), 631-648.
- Cowen, E. L., Wyman, P. A., & Work, W. C. (1996). Resilience in highly stressed urban children: Concepts and findings. *Bulletin of the New York Academy of Medicine, 73*(2), 267.
- Darling, J. C., Bamidis, P. D., Burberry, J., & Rudolf, M. C. (2020). The first thousand days: Early, integrated and evidence-based approaches to improving child health: Coming to a population near you? *Archives of Disease in Childhood, 105*(9), 837-841.
- Davis, E., Sawyer, M. G., Lo, S. K., Priest, N., & Wake, M. (2010). Socioeconomic risk factors for mental health problems in 4–5-year-old children: Australian population study. *Academic Pediatrics, 10*(1), 41-47.
- DeGangi, G. A., Breinbauer, C., Roosevelt, J. D., Porges, S., & Greenspan, S. (2000). Prediction of childhood problems at three years in children experiencing disorders of regulation during infancy. *Infant Mental Health Journal, 21*(3), 156-175.
- De Schipper, E. J., Riksen-Walraven, J. M. & Geurts, S. A. (2006). Effects of child–caregiver ratio on the interactions between caregivers and children in child-care centers: An experimental study. *Child Development, 77*(4), 861-874.
- Dunst, C. J., Bruder, M. B., & Espe-Sherwindt, M. (2014). Family capacity-building in early childhood intervention: Do context and setting matter? *School Community Journal, 24*(1), 37-48.
- Dusek, J. A., & Benson, H. (2009). Mind-body medicine: a model of the comparative clinical impact of the acute stress and relaxation responses. *Minnesota Medicine, 92*(5), 47.
- Dwyer, S. B., Nicholson, J. M., & Battistutta, D. (2003). Population level assessment of the family risk factors related to the onset or persistence of children's mental health problems. *Journal of Child Psychology and Psychiatry, 44*(5), 699-711.
- Edwards, S. L., Rapee, R. M., & Kennedy, S. (2010). Prediction of anxiety symptoms in preschool-aged children: Examination of maternal and paternal perspectives. *Journal of Child Psychology and Psychiatry, 51*(3), 313-321.
- Egger, H. L., & Angold, A. (2006). Common emotional and behavioral disorders in preschool children: Presentation, nosology, and epidemiology. *Journal of Child Psychology and Psychiatry, 47*(3-4), 313-337.
- Ensink, K., Borelli, J. L., Roy, J., Normandin, L., Slade, A., & Fonagy, P. (2019). Costs of not getting to know you: Lower levels of parental reflective functioning confer risk for maternal insensitivity and insecure infant attachment. *Infancy, 24*(2), 210-227.
- Ensink, K., Normandin, L., Plamondon, A., Berthelot, N., & Fonagy, P. (2016). Intergenerational pathways from reflective functioning to infant attachment through parenting. *Canadian Journal of Behavioural Science, 48*(1), 9.
- Fan, A. P., Buka, S. L., Kosik, R. O., Chen, Y. S., Wang, S. J., Su, T. P., & Eaton, W. W. (2014). Association between maternal behavior in infancy and adult mental health: A 30-year prospective study. *Comprehensive Psychiatry, 55*(2), 283-289.
- Fearon, R. P., Bakermans-Kranenburg, M. J., Van IJzendoorn, M. H., Lapsley, A. M., & Roisman, G. I. (2010). The significance of insecure attachment and disorganization in the development of children's externalizing behavior: A meta-analytic study. *Child Development, 81*(2), 435-456.

- Felitti, V. J. (1993). Childhood sexual abuse, depression, and family dysfunction in adult obese patients: a case control study. *Southern Medical Journal, 86*(7), 732-736.
- Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventive Medicine, 14*(4), 245-258.
- Flores-Torres, M. H., Comerford, E., Signorello, L., Grodstein, F., Lopez-Ridaura, R., de Castro, F., Familiar, I., Ortiz-Panozoa, E. & Lajous, M. (2020). Impact of adverse childhood experiences on cardiovascular disease risk factors in adulthood among Mexican women. *Child Abuse & Neglect, 99*, 104175.
- Fonagy, P., Gergely, G., Jurist, E., and Target, M. (2002). *Mentalization, affective regulation and the development of the self*. New York, NY: Other Press.
- Fonagy, P., Steele, M., Steele, H., Moran, G. S., & Higgitt, A. C. (1991). The capacity for understanding mental states: The reflective self in parent and child and its significance for security of attachment. *Infant Mental Health Journal, 12*(3), 201-218.
- Fonagy, P., & Target, M. (1997). Attachment and reflective function: Their role in self-organization. *Development and Psychopathology, 9*(4), 679-700.
- Garner, A. S. (2013). Home visiting and the biology of toxic stress: opportunities to address early childhood adversity. *Pediatrics, 132*, S65-S73.
- Garner, A. S., Shonkoff, J. P., Siegel, B. S., Dobbins, M. I., Earls, M. F., McGuinn, L., Pascoe, J., Wood, D. L. & Committee on Early Childhood, Adoption, and Dependent Care. (2012). Early childhood adversity, toxic stress, and the role of the pediatrician: Translating developmental science into lifelong health. *Pediatrics, 129*(1), e224-e231.
- Gilbert, L. K., Breiding, M. J., Merrick, M. T., Thompson, W. W., Ford, D. C., Dhingra, S. S., & Parks, S. E. (2015). Childhood adversity and adult chronic disease: An update from ten states and the District of Columbia, 2010. *American Journal of Preventive Medicine, 48*(3), 345-349.
- Granot, D., & Mayseless, O. (2001). Attachment security and adjustment to school in middle childhood. *International Journal of Behavioral Development, 25*(6), 530-541.
- Green, J., & Goldwyn, R. (2002). Annotation: attachment disorganisation and psychopathology: New findings in attachment research and their potential implications for developmental psychopathology in childhood. *Journal of Child Psychology and Psychiatry, 43*(7), 835-846.
- Guild, D. J., Toth, S. L., Handley, E. D., Rogosch, F. A., & Cicchetti, D. (2017). Attachment security mediates the longitudinal association between child–parent psychotherapy and peer relations for toddlers of depressed mothers. *Development and Psychopathology, 29*(2), 587-600.
- Guy, S., Furber, G., Leach, M., & Segal, L. (2016). How many children in Australia are at risk of adult mental illness? *Australian & New Zealand Journal of Psychiatry, 50*(12), 1146-1160.
- Harris, N. B. (2018). *The deepest well: Healing the long-term effects of childhood adversity*. Houghton Mifflin Harcourt.
- Hayne, H. (2004). Infant memory development: Implications for childhood amnesia. *Developmental Review, 24*(1), 33-73.
- Health Resources and Services Administration. (2019). *National survey of children's health fact sheet*.
- Hemmi, M. H., Wolke, D., & Schneider, S. (2011). Associations between problems with crying, sleeping and/or feeding in infancy and long-term behavioural outcomes in childhood: A meta-analysis. *Archives of Disease in Childhood, 96*(7), 622-629.
- Horwitz, S. M., Hurlburt, M. S., Heneghan, A., Zhang, J., Rolls-Reutz, J., Landsverk, J., & Stein, R. E. (2013). Persistence of mental health problems in very young children investigated by US child welfare agencies. *Academic Pediatrics, 13*(6), 524-530.
- Huberty, T. J. (2012). *Anxiety and depression in children and adolescents: Assessment, intervention, and prevention*. New York, NY: Springer.
- Humphreys, K. L., King, L. S., Guyon-Harris, K. L., & Zeanah, C. H. (2021). Caregiver regulation: A modifiable target promoting resilience to early adverse experiences. *Psychological Trauma: Theory, Research, Practice, and Policy*.
- Jenkins, R., McCulloch, A., Friedli, L., and Parker, C. (2002). *Developing a national mental health policy*. East Sussex: Psychology Press.
- Johnson, S. B., Riley, A. W., Granger, D. A., & Riis, J. (2013). The science of early life toxic stress for pediatric practice and advocacy. *Pediatrics, 131*(2), 319-327.
- Jones, T. M., Nurius, P., Song, C., & Fleming, C. M. (2018). Modeling life course pathways from adverse childhood experiences to adult mental health. *Child Abuse & Neglect, 80*, 32-40.
- Joshi, D., Raina, P., Tonmyr, L., MacMillan, H. L., & Gonzalez, A. (2021). Prevalence of adverse childhood experiences among individuals aged 45 to 85 years: A cross-sectional analysis of the Canadian Longitudinal Study on Aging. *CMAJ Open, 9*(1), E158.

- Kalmakis, K. A., & Chandler, G. E. (2015). Health consequences of adverse childhood experiences: A systematic review. *Journal of the American Association of Nurse Practitioners*, *27*(8), 457-465.
- Karevold, E., Røysamb, E., Ystrom, E., & Mathiesen, K. S. (2009). Predictors and pathways from infancy to symptoms of anxiety and depression in early adolescence. *Developmental Psychology*, *45*(4), 1051.
- Keenan, K., Shaw, D., Delliquadri, E., Giovannelli, J., & Walsh, B. (1998). Evidence for the continuity of early problem behaviors: Application of a developmental model. *Journal of Abnormal Child Psychology*, *26*(6), 441-452.
- Kelly, K., Slade, A., & Grienenberger, J. F. (2005). Maternal reflective functioning, mother–infant affective communication, and infant attachment: Exploring the link between mental states and observed caregiving behavior in the intergenerational transmission of attachment. *Attachment & Human Development*, *7*(3), 299-311.
- Kerns, K. A., & Brumariu, L. E. (2014). Is insecure parent–child attachment a risk factor for the development of anxiety in childhood or adolescence? *Child Development Perspectives*, *8*(1), 12-17.
- Kessler, R. C., Angermeyer, M., Anthony, J. C., De Graaf, R. O. N., Demyttenaere, K., Gasquet, I., De Girolamo, G., Gluzman, S., Guereje, O., Haro, J. M., Kawakami, N., Karam, A., Levinson, D., Mora, M., Browne, M., Posada-Villa, J., Stein, D. J., Tsang, C., Aguilar-Gaxiola, S., Alonso, J., Lee, S., Heeringa, S., Pennell, B., Berglund, P., Gruber, M. J., Petukhova, M., Chatter, S., & Uestuen, T. B. (2007). Lifetime prevalence and age-of-onset distributions of mental disorders in the World Health Organization's World Mental Health Survey Initiative. *World Psychiatry*, *6*(3), 168.
- Kidman, R., Piccolo, L. R., & Kohler, H. P. (2020). Adverse childhood experiences: Prevalence and association with adolescent health in Malawi. *American Journal of Preventive Medicine*, *58*(2), 285-293.
- Lally, J. R., & Mangione, P. (2017). Caring relationships: The heart of early brain development. *YC Young Children*, *72*(2), 17-24.
- Larose, M. P., Côté, S. M., Ouellet-Morin, I., Maughan, B., & Barker, E. D. (2021). Promoting better functioning among children exposed to high levels of family adversity: The protective role of childcare attendance. *Journal of Child Psychology and Psychiatry*, *62*(6), 762-770.
- Lavigne, J. V., Arend, R., Rosenbaum, D., Binns, H. J., Christoffel, K. K., & Gibbons, R. D. (1998). Psychiatric disorders with onset in the preschool years: I. Stability of diagnoses. *Journal of the American Academy of Child & Adolescent Psychiatry*, *37*(12), 1246-1254.
- Lewis, A. J., Galbally, M., Gannon, T., & Symeonides, C. (2014). Early life programming as a target for prevention of child and adolescent mental disorders. *BMC Medicine*, *12*(1), 1-15.
- Loeber, R., Burke, J. D., Lahey, B. B., Winters, A., & Zera, M. (2000). Oppositional defiant and conduct disorder: A review of the past 10 years, part I. *Journal of the American Academy of Child & Adolescent Psychiatry*, *39*(12), 1468-1484.
- Lyons-Ruth, K. (2015). Dissociation and the parent–infant dialogue: A longitudinal perspective from attachment research. *Attachment*, *9*(3), 253-276.
- Lyons-Ruth, K., Todd Manly, J., Von Klitzing, K., Tamminen, T., Emde, R., Fitzgerald, H., Paul, C., Keren, M., Berg, A., Foley, M., & Watanabe, H. (2017). The worldwide burden of infant mental and emotional disorder: Report of the task force of the world association for infant mental health. *Infant Mental Health Journal*, *38*(6), 695-705.
- MacDonald, H. Z., Beeghly, M., Grant-Knight, W., Augustyn, M., Woods, R. W., Cabral, H., Rose-Jacobs, R., Saxe, G. N., & Frank, D. A. (2008). Longitudinal association between infant disorganized attachment and childhood posttraumatic stress symptoms. *Development and Psychopathology*, *20*(2), 493-508.
- Madigan, S., Atkinson, L., Laurin, K., & Benoit, D. (2013). Attachment and internalizing behavior in early childhood: A meta-analysis. *Developmental Psychology*, *49*(4), 672.
- Maldonado-Durán, J. M., Lartigue, T., & Feintuch, M. (2000). Perinatal psychiatry: Infant mental health interventions during pregnancy. *Bulletin of the Menninger Clinic*, *64*(3), 317.
- McCarty, C. A., Zimmerman, F. J., Digiuseppe, D. L., & Christakis, D. A. (2005). Parental emotional support and subsequent internalizing and externalizing problems among children. *Journal of Developmental & Behavioral Pediatrics*, *26*(4), 267-275.
- McCorry, L. K. (2007). Physiology of the autonomic nervous system. *American Journal of Pharmaceutical Education*, *71*(4).
- McKelvey, L. M., Conners Edge, N. A., Fitzgerald, S., Kraleti, S., & Whiteside-Mansell, L. (2017). Adverse childhood experiences: Screening and health in children from birth to age 5. *Families, Systems, & Health*, *35*(4), 420.
- McKelvey, L. M., Whiteside-Mansell, L., Zhang, D., & Selig, J. P. (2020). Adverse childhood experiences in infancy: A latent class approach exploring interrelatedness of risks. *Adversity and Resilience Science*, 1-13.
- McLuckie, A., Landers, A. L., Curran, J. A., Cann, R., Carrese, D. H., Nolan, A., Corrigan, K., & Carrey, N. J. (2019). A scoping review of mental health prevention and intervention initiatives for infants and preschoolers at risk for socio-emotional difficulties. *Systematic Reviews*, *8*(1), 1-19.

- McMullen, M. B. (2018). The many benefits of continuity of care for infants, toddlers, families, and caregiving staff. *Young Children*, *73*(3), 38-39.
- Mihelic, M., Morawska, A., & Filus, A. (2017). Effects of early parenting interventions on parents and infants: A meta-analytic review. *Journal of Child and Family Studies*, *26*(6), 1507-1526.
- Miller-Lewis, L. R., Searle, A. K., Sawyer, M. G., Baghurst, P. A., & Hedley, D. (2013). Resource factors for mental health resilience in early childhood: An analysis with multiple methodologies. *Child and Adolescent Psychiatry and Mental Health*, *7*(1), 1-23.
- Miner, J. L., & Clarke-Stewart, K. A. (2008). Trajectories of externalizing behavior from age 2 to age 9: Relations with gender, temperament, ethnicity, parenting, and rater. *Developmental Psychology*, *44*(3), 771.
- Moore, T. G., Arefadib, N., Deery, A., West, S., & Keyes, M. (2017). The first thousand days: An evidence paper-summary.
- National Scientific Council on the Developing Child (2008). *Mental health problems in early childhood can impair learning and behavior for life. Working paper No. 6*. National Scientific Council on the Developing Child. Cambridge, MA: Harvard University.
- National Scientific Council on the Developing Child (2014). *Excessive stress disrupts the architecture of the developing brain: Working paper 3*. Updated Edition. http://www.developingchild.harvard.edu
- Novoa, C. & Morrissey, T. (2020). *Adversity in early childhood: The role of policy in creating and addressing adverse childhood experiences*. Center for American Progress.
- Odgers, C. L., & Jaffee, S. R. (2013). Routine versus catastrophic influences on the developing child. *Annual Review of Public Health*, *34*, 29-48.
- Ogren, M., & Johnson, S. P. (2021). Primary caregiver emotional expressiveness relates to toddler emotion understanding. *Infant Behavior and Development*, *62*, 101508.
- Oh, D. L., Jerman, P., Marques, S. S., Koita, K., Boparai, S. K. P., Harris, N. B., & Bucci, M. (2018). Systematic review of pediatric health outcomes associated with childhood adversity. *BMC Pediatrics*, *18*(1), 1-19.
- Parlakian, R., & Seibel, N. L. (2002). *Building strong foundations: Practical guidance for promoting the social-emotional development of infants and toddlers*. Zero to Three, 2000 M Street, NW, Suite 200, Washington, DC 20036-3307.
- Petch, J. F., Halford, W. K., Creedy, D. K., & Gamble, J. (2012). A randomized controlled trial of a couple relationship and co-parenting program (Couple CARE for Parents) for high-and low-risk new parents. *Journal of Consulting and Clinical Psychology*, *80*(4), 662.
- Postert, C., Averbeck-Holocher, M., Achtergarde, S., Müller, J. M., & Furniss, T. (2012). Regulatory disorders in early childhood: Correlates in child behavior, parent–child relationship, and parental mental health. *Infant Mental Health Journal*, *33*(2), 173-186.
- Rapee, R. M., Schniering, C. A., & Hudson, J. L. (2009). Anxiety disorders during childhood and adolescence: Origins and treatment. *Annual review of clinical psychology*, *5*, 311-341.
- Robinson, M., Oddy, W. H., Li, J., Kendall, G. E., De Klerk, N. H., Silburn, S. R., Zubrick, S. R., Newnham, J. P., Stanley, F. J., & Mattes, E. (2008). Pre-and postnatal influences on preschool mental health: A large-scale cohort study. *Journal of Child Psychology and Psychiatry*, *49*(10), 1118-1128.
- Rosenblum, K. L., McDonough, S. C., Sameroff, A. J., & Muzik, M. (2008). Reflection in thought and action: Maternal parenting reflectivity predicts mind-minded comments and interactive behavior. *Infant Mental Health Journal*, *29*(4), 362-376.
- Schneider, B. H., Atkinson, L., & Tardif, C. (2001). Child–parent attachment and children's peer relations: A quantitative review. *Developmental Psychology*, *37*(1), 86.
- Selye, H. (1976). Forty years of stress research: principal remaining problems and misconceptions. *Canadian Medical Association Journal*, *115*(1), 53.
- Shaw, D. S., Gilliom, M., Ingoldsby, E. M., & Nagin, D. S. (2003). Trajectories leading to school-age conduct problems. *Developmental Psychology*, *39*(2), 189.
- Shonkoff, J. P. (2010). Building a new biodevelopmental framework to guide the future of early childhood policy. *Child Development*, *81*(1), 357-367.
- Shonkoff, J. P., Boyce, W. T., & McEwen, B. S. (2009). Neuroscience, molecular biology, and the childhood roots of health disparities: Building a new framework for health promotion and disease prevention. *JAMA*, *301*(21), 2252-2259.
- Shonkoff, J. P., Garner, A. S.,The Committee on Psychosocial Aspects of Child and Family Health, Committee on Early Childhood, Adoption, and Dependent Care, and Section on Developmental and Behavioral Pediatrics (2012). The lifelong effects of early childhood adversity and toxic stress. *Pediatrics*, *129*(1), e232-e246.

- Shonkoff, J. P., & Levitt, P. (2010). Neuroscience and the future of early childhood policy: Moving from why to what and how. *Neuron*, *67*(5), 689-691.
- Skovgaard, A. M., Houmann, T., Christiansen, E., Landorph, S., Jørgensen, T., CCC 2000 Study Team, Olsen, E. M., Heering, K., Kaas-Nielsen, S., Samberg, V., & Lichtenberg, A. (2007). The prevalence of mental health problems in children 1½ years of age–the Copenhagen Child Cohort 2000. *Journal of Child Psychology and Psychiatry*, *48*(1), 62-70.
- Slade, A., Grienenberger, J., Bernbach, E., Levy, D., & Locker, A. (2005). Maternal reflective functioning, attachment, and the transmission gap: A preliminary study. *Attachment & Human Development*, *7*(3), 283-298.
- Slemming, K., Sørensen, M. J., Thomsen, P. H., Obel, C., Henriksen, T. B., & Linnet, K. M. (2010). The association between preschool behavioural problems and internalizing difficulties at age 10–12 years. *European Child & Adolescent Psychiatry*, *19*(10), 787-795.
- Sroufe, L. A. (2005). Attachment and development: A prospective, longitudinal study from birth to adulthood. *Attachment & Human Development*, *7*(4), 349-367.
- Stacks, A. M., Muzik, M., Wong, K., Beeghly, M., Huth-Bocks, A., Irwin, J. L., & Rosenblum, K. L. (2014). Maternal reflective functioning among mothers with childhood maltreatment histories: Links to sensitive parenting and infant attachment security. *Attachment & Human Development*, *16*(5), 515-533.
- Steele, H., & Siever, L. (2010). An attachment perspective on borderline personality disorder: Advances in gene–environment considerations. *Current Psychiatry Reports*, *12*(1), 61-67.
- Subramaniam, M., Abdin, E., Seow, E., Vaingankar, J. A., Shafie, S., Shahwan, S., Lim, M., Fung, D., Lyn, J., Verma, S. & Chong, S. A. (2020). Prevalence, socio-demographic correlates and associations of adverse childhood experiences with mental illnesses: results from the Singapore mental health study. *Child Abuse & Neglect*, *103*, 104447.
- Substance Abuse and Mental Health Services Administration (2014). *SAMHSA's concept of trauma and guidance for a trauma-informed approach*. Substance Abuse and Mental Health Services Administration: Rockville, M.D.
- Suchman, N. E., DeCoste, C., Leigh, D., & Borelli, J. (2010). Reflective functioning in mothers with drug use disorders: Implications for dyadic interactions with infants and toddlers. *Attachment & Human Development*, *12*(6), 567-585.
- Suveg, C., Southam-Gerow, M. A., Goodman, K. L., & Kendall, P. C. (2007). The role of emotion theory and research in child therapy development. *Clinical Psychology: Science and Practice*, *14*(4), 358.
- The National Health and Medical Research Council (2017). *NHMRC report on the evidence: Promoting social and emotional development and wellbeing of infants in pregnancy and the first year of life*. Canberra: NHMRC.
- Tomlinson, M., Bornstein, M. H., Marlow, M., & Swartz, L. (2014). Imbalances in the knowledge about infant mental health in rich and poor countries: Too little progress in bridging the gap. *Infant Mental Health Journal*, *35*(6), 624-629.
- Van Ijzendoorn, M. H., Schuengel, C., & Bakermans–Kranenburg, M. J. (1999). Disorganized attachment in early childhood: Meta-analysis of precursors, concomitants, and sequelae. *Development and Psychopathology*, *11*(2), 225-250.
- van Ravesteyn, L. M., Lambregtse-van den Berg, M. P., Hoogendijk, W. J., & Kamperman, A. M. (2017). Interventions to treat mental disorders during pregnancy: A systematic review and multiple treatment meta-analysis. *PLoS One*, *12*(3), e0173397.
- Van Zeijl, J., Mesman, J., Stolk, M. N., Alink, L. R., Van IJzendoorn, M. H., Bakermans-Kranenburg, M. J., Juffer, F., & Koot, H. M. (2006). Terrible ones? Assessment of externalizing behaviors in infancy with the Child Behavior Checklist. *Journal of Child Psychology and Psychiatry*, *47*(8), 801-810.
- von Klitzing, K., Döhnert, M., Kroll, M., & Grube, M. (2015). Mental disorders in early childhood. *Deutsches Ärzteblatt International*, *112*(21-22), 375.
- Waddell, C., Hua, J. M., Garland, O. M., Peters, R. D., & McEwan, K. (2007). Preventing mental disorders in children. *Canadian Journal of Public Health*, *98*(3), 166-173.
- Warner, L. A., & Pottick, K. J. (2006). Functional impairment among preschoolers using mental health services. *Children and Youth Services Review*, *28*(5), 473-486.
- Wlodarczyk, O., Pawils, S., Metzner, F., Kriston, L., Klasen, F., & Ravens-Sieberer, U. (2017). Risk and protective factors for mental health problems in preschool-aged children: cross-sectional results of the BELLA preschool study. *Child and Adolescent Psychiatry and Mental Health*, *11*(1), 1-12.
- Wolf, J. M., Miller, G. E., & Chen, E. (2008). Parent psychological states predict changes in inflammatory markers in children with asthma and healthy children. *Brain, Behavior, and Immunity*, *22*(4), 433-441.
- World Health Organization (2004). *Prevention of mental disorders: Effective interventions and policy options*. Geneva: World Health Organization.
- Yates, T. M. (2007). The developmental consequences of child emotional abuse: A neurodevelopmental perspective. *Journal of Emotional Abuse*, *7*(2), 9-34.

- Zero to Three (2012). *Making it happen: Overcoming barriers to providing infant-early childhood mental health*. Washington, DC: Zero to Three.
- Zero to Three (2016). *DC0-5. Diagnostic classification of mental health and developmental disorders of infancy and early childhood*. Washington, DC: Zero to Three.
- Zolkoski, S. M., & Bullock, L. M. (2012). Resilience in children and youth: A review. *Children and Youth Services Review, 34*(12), 2295-2303.

CHAPTER OVERVIEW

6: Motor Development

6.1: Introduction

Introduction to Motor Development

Motor development may not initially seem like the most interesting topic, especially compared to language and cognitive development. In fact, motor development has been considered the “Cinderella of developmental science”, central to children's experiences, but rarely in the spotlight (Adolph et al., 2010; Rosenbaum, 2005). Historically, a maturational approach to motor skills was predominant in the early twentieth century, which mainly argued that motor development unfolds via predetermined biological changes, with little to no influence from environmental or cognitive domains (Gesell & Amatruda, 1945). Isolation of motor skills resulted in very little research focusing on the role of motor skills on other domains of development. However, recent research is embracing the possibility of cross domain interactions resulting in cascading developmental changes (Gibson, 1988; Masten & Cicchetti, 2010; Spencer et al., 2011; Thelen & Smith, 2006). Furthermore, motor development is about more than just milestones—because motor development can be easily observed by caregivers, it reveals the inner workings of an infant’s mind and introduces the child to new experiences that enrich cognitive and language growth. [1]

This section will introduce you to the early motor development of infants and toddlers with special attention to the role the physical environment and caregivers have in supporting and encouraging optimal motor development.

[1] Gonzalez et al., (2019). Do gross and fine motor skills differentially contribute to language outcomes? A systematic review. *Frontiers in Psychology*, *10*, 2670

6.2: Reflexes

Infant Reflexes

Before infants produce self-initiated movements, they exhibit inborn reflexes. Infants are born with a number of reflexes which are involuntary movements in response to stimulation controlled by the brain stem. These include the sucking reflex (infants suck on objects that touch their lips automatically), the rooting reflex (which involves turning toward any object that touches the cheek), the palmar grasp demonstrated in Figure 6.2.1 (the infant will tightly grasp any object placed in its palm), and the dancing reflex (evident when the infant is held in a standing position and moves its feet up and down alternately as if dancing). These movements occur automatically and are signals that the infant is functioning well neurologically.[1]

Figure 6.2.1: The palmer grasp reflex in an infant. ([2])

Over the first few months of life these reflexes are replaced with voluntary movements. For example, the grasping reflex develops by 28 weeks gestation and disappears by six months of age (Schott & Rossor, 2003; Zafeiriou, 2004). The asymmetrical tonic neck reflex is performed by manual rotation of the infant's head to one side. The infant will extend its arm to the side of the rotated face and flex the contralateral arm (see Figure# for a picture of this reflex). The asymmetrical tonic neck reflex develops by 35 weeks gestation and disappears by three months of age (Zafeiriou, 2004). These inborn reflexes fade within predictable timeframes and can be a sign of concern if they remain longer (Futagi, Toribe & Suzuki, 2012). Children with reflexes that persist for longer than expected, show lower motor abilities, learning difficulties in school and are linked to attention-deficit and hyperactivity disorder (ADHD) symptoms (Bilbilaj, Gjipali & Shkurti, 2017; Konicarova, Bob & Raboch, 2013; Pecuch et al., 2021).[1] [3]

Figure 6.2.2: The asymmetrical tonic neck reflex in a two-week-old infant. ([4])

[1] Lifespan Development - Module 4: Infancy by Lumen Learning references Psyc 200 Lifespan Psychology by Laura Overstreet, licensed under CC BY 4.0

[2] Image by jarmoluk on Pixabay.

[3] Modrell & Tadi (2021). Primitive reflexes. In *StatPearls.* Treasure Island (FL): StatPearls Publishing. CC by 4.0

[4] Image from Yan Ots on Unsplash.

6.3: Developing a Sense of Peripersonal Space

Peripersonal Space

Throughout the first few months, infants move their limbs frequently (driven initially by reflexes and later by self-initiation) and as they do, they come into contact with their body and various objects and people around them. While these early movements may not seem important, they are actually a way for infants to begin to learn about themselves and the world around them.

Developing a sense of our body is an essential prerequisite for our interactions with the world. Sensing our body entails knowing where our limbs are in space and time, being aware of how fast or how far our limbs can move, or even knowing how much space our body occupies in our environment. Peripersonal space is defined as the space surrounding the body where we can reach or be reached by external entities, including objects or other individuals. Knowing the limits and extent of our peripersonal space is fundamental for navigating our social and physical world, and for situating and orienting ourselves in everyday activities. [1] [2]

Figure 6.3.1: An infant exploring peripersonal space. ([3])

With every touch of their body and surrounding areas, infants are receiving feedback that informs them about their posture, any changes in limb position and about contact with themselves or other surfaces, thereby allowing them to discover knowledge of not only their limbs and their range of motion, but also an understanding of their peripersonal space. These self-generated movements, as infants move their limbs freely, provide a foundation for exploratory behavior and build a basic understanding of body representation and of the world (Hoffmann, 2017). Touches to the body in particular provide information about the limb posture in space, the part of the limb making contact with the body, and the body area being touched (Rochat & Hespos, 1997). [1]

Research that has studied young infants exploring peripersonal space through touch have found that infants produce nearly 200 contacts on their bodies and the surrounding surface area in a 10 minute time period and touch as many as 18 different areas, mainly their upper body and the floor (DiMercurio, Connell, Clark & Corbetta, 2018). Infants also spent about 50% of that time moving their arms in the air, going from one place of contact to another. Figure 6.3.2 maps the frequency of touches to various areas of the body and surrounding surface area from one infant. The blue dots are contacts performed by the infant's right hand, the red dots are contacts performed by the infant's left hand. Such touching is fundamental for developing an early sense of the body and for discovering the boundaries of the peripersonal space in which future developing goal-directed actions will take place. In fact, other research has found that greater arm movement in early infancy is related to larger increases in language and cognitive abilities (Shida-Tokeshi et al., 2018). Together, this research suggests that infants are active explorers of their peripersonal space and that these early self-generated sensorimotor experiences form the critical foundation from which future motor behaviors and knowledge of the world develop. [1]

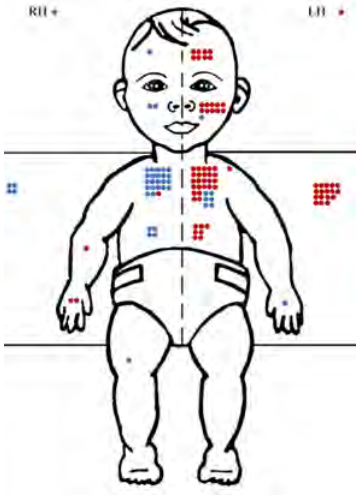


Figure 6.3.2: Frequency of touches by area for one infant. ([4])

To support the exploration of peripersonal space, infants need time and space to freely move and explore with their limbs. Caregivers can ensure that infants have ample time lying comfortably on their backs on floors to support limb movement. Young infants also need space without the consistent overcrowding of play objects or frequently being placed in an activity gym device. Additionally, infant swings, car seats and many other devices limit limb movement and therefore restrict exploration of peripersonal space. To freely move their limbs, infants need clothes that allow for full-range reaching (compared to clothes or swaddles that reduce limb movement). Realizing how important it is for infants to explore their peripersonal space, caregivers should be cognizant of the significance of providing the time and space for infants to move their limbs as they learn about their bodies and the surrounding surface areas.

[1] DiMercurio et al., (2018). A naturalistic observation of spontaneous touches to the body and environment in the first 2 months of life. *Frontiers in Psychology*, *9*, 2613. CC by 4.0

[2] Rabellino et al., (2020). Peripersonal space and bodily self-consciousness: Implications for psychological trauma-related disorders. *Frontiers in Neuroscience*, *14*, 1256. CC by 4.0

[3] Image from Alex Bodini on Unsplash.

[4] Image adapted from DiMercurio et al., (2018). A naturalistic observation of spontaneous touches to the body and environment in the first 2 months of life. *Frontiers in Psychology*, *9*, 2613. CC by 4.0

6.4: Pikler and Gerber

Emmi Pikler and Magda Gerber

The research on the importance of peripersonal space supports some of the methods Emmi Pikler and Magda Gerber touted; however, their influence on the field of early childhood education goes much further and continues to inform current practices in infant and toddler care and development, especially motor development.

Pikler was born in 1902 and spent her early childhood in Vienna. She obtained her medical degree in 1927 and became a pediatrician. Later she founded the Pikler Institute in Budapest in 1946, which she headed until 1979. Pikler believed that infants should be put on their backs until they can themselves move into different positions. By being on their back, she argued infants learn about their bodies and how to move their bodies as they reach, bend and touch while playing with various movements (Gonzalez-Mena, 2014). Importantly, an infant's movements are driven by their own internal motivation to move. Pikler advised caregivers to not place infants on their stomachs until they move themselves into that position (Tardos, 2010). Her observations and years of work with children informed her belief in allowing children the freedom of self-initiated movement. [1]

Although Pikler's work provides various principles to learn from (Chahin & Tardos, 2017; Gonzalez-Mena, Chahin & Briley, 2005; Tardos, 2010) here are four core principles: [2]

- Deep respect for the child and their individuality, recognizing them as an individual with rights rather than as an object.
- Promotion of the child's autonomous activity, based on their own initiatives.
- The importance of the bond between the adult caregiver and the child, based on a respectful and affective relationship in quality moments of care.
- Respect for the child's freedom of movement, for playing and exploring their peripersonal space and surroundings.

Figure 6.4.1: Emmi Pikler. ([3])

Magda Gerber was born in Budapest, Hungary in 1910. Inspired by Pikler, Gerber earned a Master's degree in early childhood education in Budapest and in 1945 she began working with Pikler at the Pikler Institute. Overtime, Pikler became Gerber's mentor and friend. In 1978, Gerber and Thomas Forrest co-founded the non-profit organization Resources for Infant Educarers (RIE) in Los Angeles to further their work with families and child care professionals. At RIE, Gerber taught caregivers to observe infants and toddlers as they played, while a facilitator modeled how and when to intervene. [4]

The basic principles of the RIE approach are (Gerber & Johnson, 1998): [4]

- Basic trust in the child to be an initiator, an explorer, and a self-learner.
- An environment for the child that is physically safe, cognitively challenging and emotionally nurturing.
- Time for uninterrupted play.
- Freedom to explore and interact with other infants.
- Involvement of the child in all care-giving activities to allow the child to be an active participant rather than a passive recipient.
- Sensitive observation of the child in order to understand her needs.
- Consistency and clearly defined limits and expectations to develop discipline.

RIE's mission is to improve the lives of infants and young children through respectful care. Gerber believed that infants and toddlers are whole, competent beings from birth and should be treated as such. Gerber wrote "We not only respect babies, we demonstrate our respect every time we interact with them. Respecting a child means treating even the youngest infant as a unique human being, not as an object" (Gerber, 2002). [4]

As you reflect on the ideas and principles from Pikler and Gerber, consider these questions:

- Do you agree or disagree with their ideas and principles?
- How do their ideas and principles challenge common advice and caregiving practices about supporting infant and toddler motor development?
- In your experience working with infants and toddlers, have you seen their ideas and principles implemented?
- What does respecting an infant and toddler look like?
- What are the benefits and challenges caregivers and group care programs could experience when implementing their ideas and principles?

---

[1] "Emmi Pikler" on Wikipedia is licensed under CC by SA 4.0

[2] Dalledone & Coutinho (2020). As contribuições da abordagem Pikler-Lóczy para a constituição de uma pedagogia para os bebês: Uma análise dos princípios orientadores. *Zero-a-seis, 22*(41), 47-72. CC by 4.0

[3] Photo by lucia vichi is licensed under CC by SA 4.0

[4] "Magda Gerber" on Wikipedia is licensed under CC by SA 4.0

6.5: Motor Development Trends

Trends

The physical bodies of infants and toddlers show common growth trends and these trends relate to motor development. There are two important trends: cephalocaudal and proximodistal. The cephalocaudal trend acknowledges a top-down growth trend. For example, infants may use their upper limbs before their lower limbs. The proximodistal trend, on the other hand, acknowledges growth from the center of the body outwards. For example, infants use their arms before they can use their fingers effectively.

Figure 6.5.1: Infant using both feet to interact with a book. . ([1])

Resources on infant and toddler development sometimes mistakenly reference cephalocaudal and proximodistal trends as principles (i.e., Gonzalez-Mena, 2014). The reason they are trends and not principles is that they only describe what typically happens (a trend) as not all infants show motor development that exactly follows these trends. For example, research has shown that some infants will reach for and interact with objects using their feet before they are able to do so with their hands (Galloway & Thelen, 2004; Heathcock & Galloway, 2009), which does not follow the cephalocaudal trend. Figure# is a picture of an infant using both feet to interact with a book while being read to by a caregiver. [2]

[1] Image by Todd LaMarr is licensed under CC by NC 4.0.

[2] "Cephalocaudal trend" from Wikipedia is licensed under CC by SA 4.0.

6.6: Gross and Fine Motor Development

Two Types of Motor Development

Motor skills are often broadly divided into gross motor and fine motor skills. Gross motor skills pertain to skills involving large muscle movements, such as independent sitting, crawling or walking. Fine motor skills involve use of smaller muscles, such as grasping, object manipulation, or drawing. [1]

Figure 6.6.1: Infant in a seated position. ([2])

Motor Milestones

Infants and toddlers are constantly learning about the world as they experience it and actively engage with it during the first three years of life. Milestones represent what most children (75% or more) can do by specific ages. This chart represents the new and improved milestone charts provided by the CDC in 2022 with substantial evidence-based updates. These milestone charts are meant to prompt surveillance and conversation and, if needed, identification and early intervention. The CDC adopts a proactive stance—we should take action early when developmental concerns arise rather than the perspective of waiting to see if a child "catches up". While children do develop at individual paces, being proactive during these critical early years is essential (Morgan et al., 2021; Noritz et al., 2013). The chart below lists milestones that, if children are not achieving by specific ages, caregivers should encourage parents to communicate with their family's pediatrician. Most caregivers are not professionally trained to officially assess the developmental abilities of children; however, caregivers have the ability to track developmental progress and are often the first to notice developmental concerns. Here is a table of some of the motor milestones for infants and toddlers.

Motor Milestones

Age	What Most Children Can Do By Each Age [3]
2 months	● Hold their head up when on their tummy. ● Move both arms and both legs. ● Open hands briefly.
4 months	● Hold their head steady without support while being held. ● Hold a toy when placed in their hand. ● Use their arms to swing at toys. ● Bring their hands to their mouth. ● Push up onto their elbows/forearms when on their tummy.

Age	What Most Children Can Do By Each Age [3]
6 months	● Roll from tummy to back. ● Push up with straight arms when on their tummy. ● Lean on their hands for support when sitting.
9 months	● Stand while holding on for support. ● Can get into a sitting position. ● Sit without support. ● Pull up into a standing position. ● Crawl.
12 months	● Pull up to stand. ● Walk, holding on to furniture. ● Drink from a cup without a lid, as you hold it. ● Pick things up between thumb and pointer finger, like small bits of food.
15 months	● Take a few steps independently. ● Use fingers to feed themselves some food.
18 months	● Walk without holding on to anyone or anything. ● Scribble. ● Drink from a cup without a lid and may spill sometimes. ● Feed themselves with their fingers. ● Try to use a spoon. ● Climb on and off a couch or chair without help.
24 months	● Kick a ball. ● Run. ● Walk (not climb) up a few stairs with or without help. ● Eat with a spoon.
30 months	● Use their hands to twist things, like turning door knobs or unscrewing lids. ● Take some clothes off independently, like loose pants or an open jacket. ● Jump off the ground with both feet. ● Turn book pages, one at a time, when you read with them.
36 months	● String items together, like large beads or macaroni. ● Put on some clothes independently, like loose pants or a jacket. ● Use a fork.

Motor Development Concerns

The motor milestones from the CDC are based on data from infants and toddlers in the U.S., which may not accurately represent the motor development of children from other countries (Karasik, Tamis-LeMonda, Adolph & Bornstein, 2015). Figure 6.6.2 is based on research conducted by the World Health Organization (WHO Multicentre Growth Reference Study Group, & de Onis, 2006). It presents windows of achievement for six gross motor development milestones based on infants and toddlers from five countries: Ghana, India, Norway, Oman and the USA. The six milestones in the chart are sitting without support, standing with assistance, hand and knees crawling, walking with assistance, standing alone and walking alone.

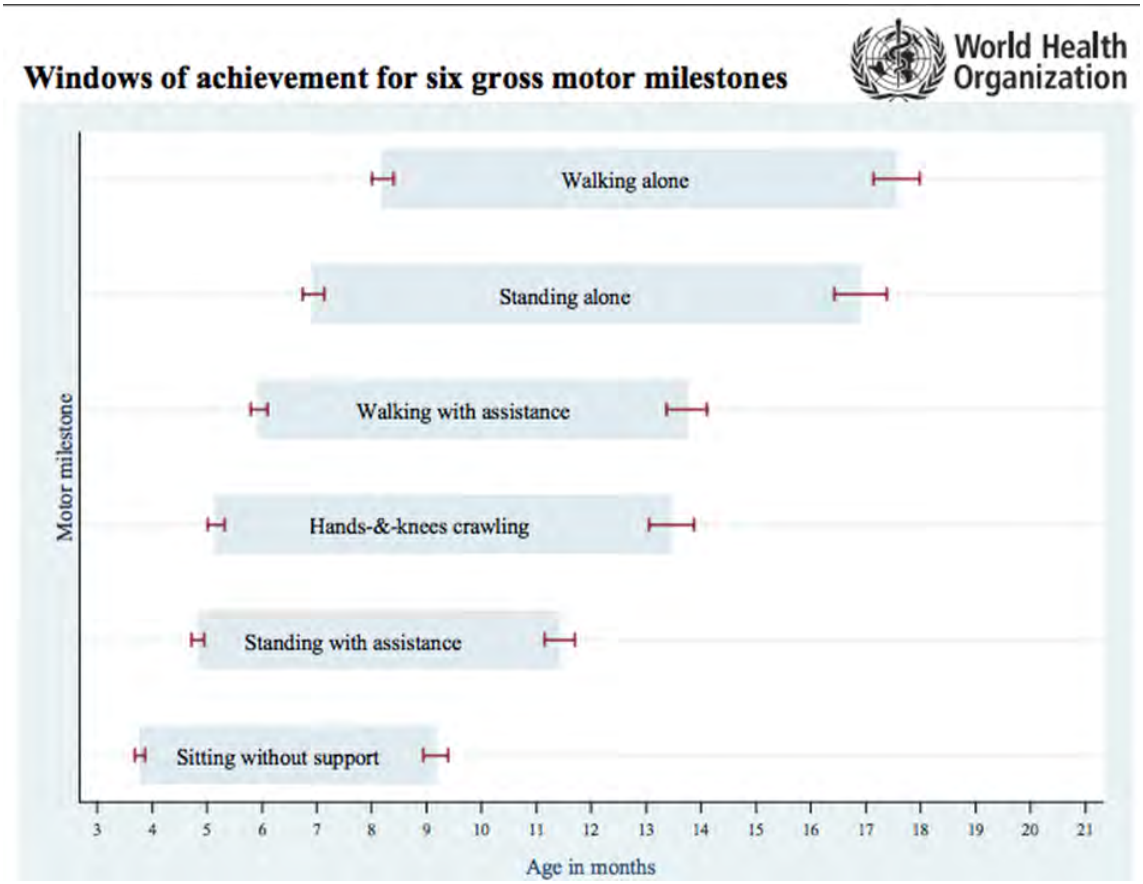


Figure 6.6.2: Windows of achievement for six gross motor milestones. The chart is based on research conducted by the World Health Organization (WHO Multicentre Growth Reference Study Group, & de Onis, 2006). It presents windows of achievement for six gross motor development milestones based on infants and toddlers from five countries: Ghana, India, Norway, Oman and the USA. The six milestones in the chart are sitting without support, standing with assistance, hand and knees crawling, walking with assistance, standing alone and walking alone. ([4])

Based on the research, there are a few findings worth noting:

- In general, there is a common order in achieving these milestones. First children are able to sit without support, then achieve standing with assistance, followed by walking with assistance which then leads to standing alone and lastly walking alone.
- The one milestone that did not always follow the general order was hand-and-knees crawling. Sometimes children would crawl on their hands and knees before being able to stand with assistance.
- 4.3% of infants did not exhibit hand-and-knees crawling at all—they skipped this milestone and went straight into walking.
- The windows of achievement overlap—Figure 6.6.2 clearly depicts this. The start of each window of achievement for every milestone does not begin near the end of the previous milestone window, but rather begins near the beginning of the previous milestone window. This overlap acknowledges the wide age variability of infants and toddlers achieving these milestones.
- The length of each milestone window varies across the motor skills. Walking alone and standing alone have the longest achievement window, suggesting that these two abilities have the most variability in age of achievement. For example, some children began walking alone around eight months of age, while others did not achieve this milestone until after seventeen months of age. On the other hand, sitting without support and standing with assistance showed the two most narrow windows of achievement, suggesting that these two abilities have the least variability in age of achievement.

Motor Milestone Chart Limitations

Gross motor milestone charts, while important, do not capture the complex developments that lead up to achieving specific milestones. Take for example the process to be able to sit independently. The ability to maintain balance in the sitting posture gradually emerges between 2 and 9 months of age (Butler et al., 2010). When infants are 5 to 6 months old, they are able to ‘prop sit’ or sit independently for short periods (Shumway-Cook & Woollacott, 2003). At 6 months, hip joint mobility increases, allowing the thighs to rest on the contact surface and the infant is able to sit with their legs in a ring position (Bly, 1994), i.e., symmetrically flexed, abducted with externally rotated hips and flexed knees. Between 8 to 9 months, the trunk and pelvis muscles stabilize the

sitting position, allowing the infant to narrow the support base for balanced independent sitting (Harbourne, Lobo, Karst & Galloway, 2013; van der Fits et al., 1999). After being able to sit independently, infants learn to perform a coordinated action between upper limbs, trunk and lower limbs as they are able to use their lower body to balance as they reach with their upper limbs (Rochat & Goubet, 1995). Thus, unlike milestone charts that simply show sitting to occur, sitting without support is a process that takes place over many months and involves a complex interplay between various muscles that prepare for the eventual achievement of sitting. [5]

Figure 6.6.3: Infant in a sitting posture. ([6])

Another limitation of motor milestones is that they convey the idea that once an infant performs a motor milestone, like walking, that the infant has fully achieved this milestone. The reality is that motor development involves numerous bouts of successes and failures with each milestone ability. An infant that successfully walks once, may fall the very next attempt. Karen Adolph and her colleagues (2012) have documented the number of steps and falls toddlers have as they learn to walk. Toddlers between 12 to 18 months of age take an average of 2,368 steps in just one hour and cover a distance of 701 meters—the length of almost eight football fields! This is just one hour; multiplying these numbers by the total number of hours toddlers are awake is even more eye-opening. In six hours, a toddler could accumulate around 14,000 total steps and cover the distance of 46 football fields! Despite these infants clearly being able to walk, they also continue to fall. In fact, the average toddler fell seventeen times each hour, one toddler even fell sixty-nine times in one hour.

Figure 6.6.4: A caregiver supporting an infant learning to walk ([7])

Every day, infants are practicing various motor skills and body positions. For example, Figure 6.6.5 provides insight into the various motor behaviors and body positions from one 10 month old infant. While the majority of time was spent in a seated position (40.5%), the infant was consistently practicing various other positions, frequently rotating between them.

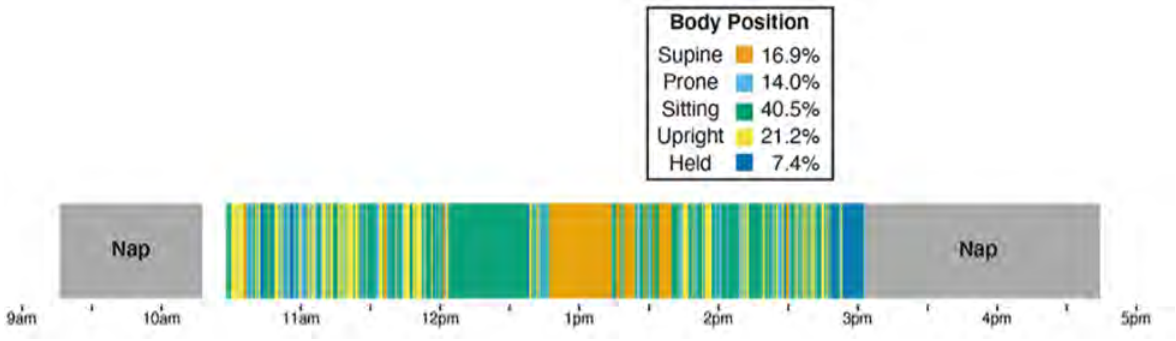


Figure 6.6.5: Frequency of body positions during one day from one 10-month-old infant. ([8])

Gross Motor Development

In the process of gross motor development, the first mobility that infants usually acquire is crawling. There are different types of infant crawling (see Figure 6.6.6 for a depiction) such as belly crawling and hands-and-knees crawling (Patrick, Noah & Yang, 2012). Belly crawling is the action in which infants move by pulling the body along the ground on the abdomen. Hands-and-knees crawling means moving by lifting the abdomen up on both arms and knees. Some infants experience both belly crawling and hands-and-knees crawling, others experience only hands-and-knees crawling (Kalmar, 2017). Previous studies have explored a relationship between belly crawling and hands-and-knees crawling: infants who formerly belly-crawled showed more proficient hands-and-knees crawling than those who skipped the belly crawling period (Adolph, Vereijken & Denny, 1998). Infants who spend a greater amount of awake time in the prone position (abdomen on ground, such as during tummy time) achieve hands-and-knees crawling at an earlier age (Davis, Moon, Sachs & Ottolini, 1998). [9]

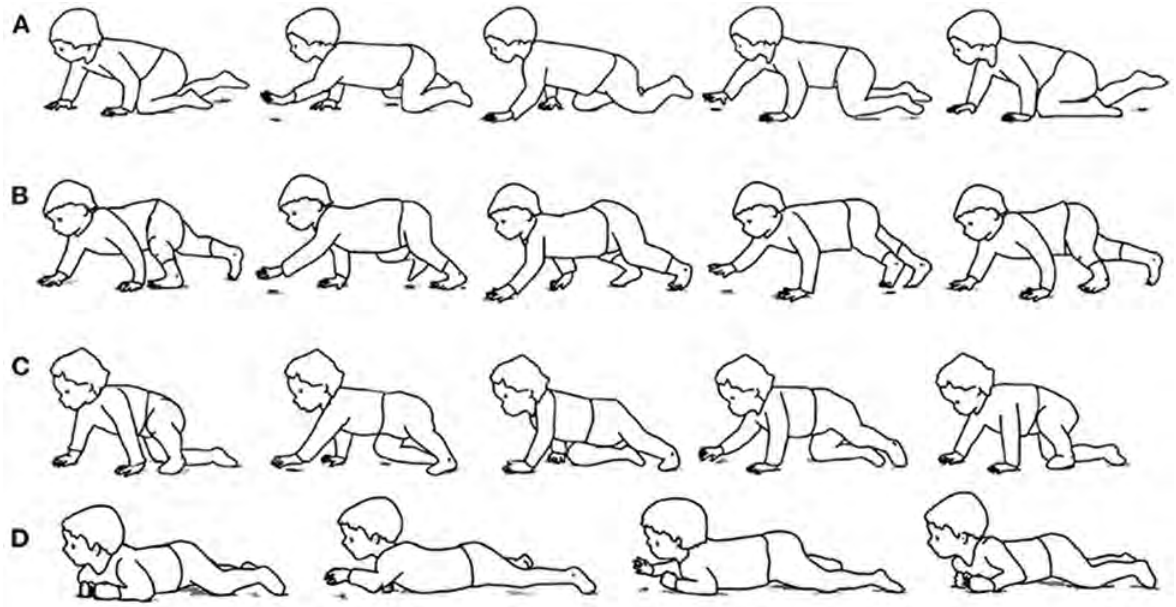


Figure 6.6.6: Examples of various infant crawling styles: (A) Hands-and-knees crawling. (B) hands-and-feet crawling. (C) Step–crawl mix, using foot and right knee. (D) Belly crawling ([10])

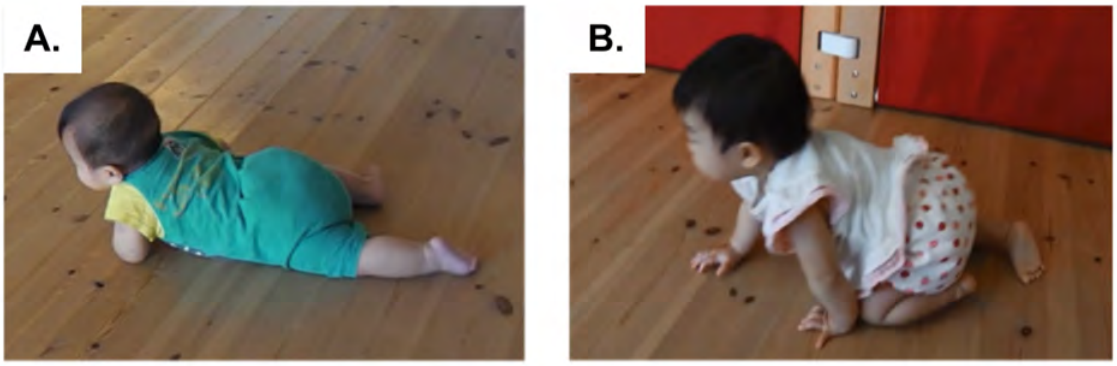


Figure 6.6.7: An infant belly crawling (A.) and an infant hands-and-knees crawling (B.). . ([11])

Tummy Time.

Tummy time describes the times when a caregiver places an infant on their stomach while the infant is awake and someone is watching. Tummy time is not only an important way to prevent flat spots on a baby's head, it is also an important part of a baby's normal growth. In fact, tummy time is positively related to overall gross motor development (Buchanan et al., 2021; Carson et al., 2022; Hewitt et al., 2020). Tummy time is especially important for infants who are at risk of motor delays and/or who have a motor-related disability (Uzark et al., 2021; Wentz, 2017). While tummy time is supported by many professionals and well-respected organizations, there are arguments against the necessity of the practice (see Gerber & Johnson, 1998). [1]

Figure 6.6.8:Infant practicing tummy time. ([13])

Tummy time is important for many reasons:[12]

- Tummy time helps prevent flat spots on the back of an infant’s head.
- Makes neck and shoulder muscles stronger so infants can start to sit up, crawl, and walk.
- Improves infant motor skills.

Infants benefit from 2 to 3 tummy time sessions each day for a short period of time (3 to 5 minutes). As they grow and show enjoyment of tummy time, the length of the sessions can be increased. As infants grow older, more tummy time helps build strength for sitting up, rolling over, crawling, and walking. [12]

Tummy Time Tips: [12]

These suggestions can help make tummy time more enjoyable:

- Spread out a blanket in a clear area of the floor for tummy time.
- Try short tummy time sessions after a diaper change or after an infant wakes from a nap.
- Put a toy or toys within an infant's reach during tummy time to help them learn to play and interact with their surroundings.
- Have an adult be in the infant’s field of view during tummy time to encourage interaction and bonding.
- As an infant gets older, tummy time sessions can last longer, and can take place more often throughout the day.

Gross Motor Development: Postural Affordances

Postures—the particular body and limb configurations used at any moment—mediate motor development in meaningful ways (Rochat & Bullinger, 1994). For example, the acquisition of each new posture provides a unique lens through which infants can view the world as they accrue a range of motor possibilities for moving about and physically interacting with the environment (e.g., Adolph, 2008; Thurman & Corbetta, 2019). [14]

Depending on the motor skill level and posture used, physical interactions with objects can be facilitated or reduced. For example, when sitting, infants' hands are free allowing them to manually manipulate and explore objects in sophisticated ways (Lobo & Galloway, 2013; Lobo et al., 2014; Rochat, 1989; Soska & Adolph, 2014; Soska, Adolph & Johnson, 2010). When in a prone position (lying abdomen down), however, infants are limited to using one hand to lift their torso up off the ground, while using the other to reach out for an object, which greatly reduces the range of actions (Rocha & Tudella, 2008). In older infants, crawling and walking positions have different affordances. During crawling, infants are less likely than walking infants to carry objects (Karasik et al., 2012). In comparison, when walking, infants' hands are free to interact with objects in complex ways and the change of position opens up a new field of view for further exploration. Thus, each posture provides unique affordances on how the body can be used (Adolph, 2008). Consider Figure 6.6.9 which shows an image of an infant holding an object with one hand while using the other hand for balance. In which ways does the infant's current crawling posture afford and restrict how the infant can explore the object? If the infant transitioned into a standing or walking position, how would the affordances and restrictions change? [14]

Figure 6.6.9: Infant holding an object with one hand while using the other hand for balance. ([15])

Postures can also alter the stability of the body, the demand of attentional resources, and what can be perceived in the surroundings (Franchak, Kretch & Adolph, 2018; Kretch, Franchak & Adolph, 2014). Certain postures and their relative stability can even influence the use of the limbs and hands. For example, transitioning from sitting to crawling, and from crawling to walking affects the way infants use their arms for reaching and retrieving objects (Corbetta & Bojczyk, 2002; Corbetta & Thelen, 2002). Unstable postures often require more of the infants' effort for balance such as when the hands are needed to hold onto surfaces during cruising (Berger, Chan & Adolph, 2014), or when the hands may be needed to balance the body when standing is a new motor skill still being learned (Ledebt, 2000). When the hands are used for balance, they are less likely to be used for holding and exploring objects. [14]

Thus, research has shown that postural progression and postural control can influence infants' experiences with objects, people, and their wider environments. Infants' expanding repertoire of postural skills as they acquire locomotor skills, affects their manipulatory behaviors and interactive activities with objects in their surroundings. [14]

Gross Motor Development: Environmental Affordances

Think about the physical environment where you live, how does the furniture influence where and how people stand and sit, where eating takes place, the posture and arrangement people are in when socializing, how objects like televisions, windows or fireplaces influence the structure and positioning of furniture which results in how and where people sit and orient in the room, etc. Just as the physical environment is important for considering how adults sit, stand and move about in a space, the physical environment for infants and toddlers affords various physical movement possibilities.

Figure 6.6.10: Infant using a structure for support while standing. ([16])

The theory of affordance (Gibson, 1950; 2014) represents an important theoretical framework for considering the environment's role in supporting and encouraging physical development in infants and toddlers. In this theory, the physical environment is believed to afford or allow the child possibilities and actions. The characteristics and features of the indoor environment can therefore be hypothesized to influence children's gross motor development. The affordances of the physical environment are what the environment offers the child. For example, a toddler's classroom's affordances are the physical size of the classroom, the toys and materials available, the number of peers for potential play partners, and adults who set up the play environment, ensure its overall safety, manage the day-to-day operations, and interact with the children. [17] [18]

Figure 6.6.11: Structure supporting gross motor development inside a toddler classroom. ([1])

Let's look again at the gross motor windows of achievement for six gross motor milestones chart again (Figure 6.6.12). The six milestones in the chart are sitting without support, standing with assistance, hand and knees crawling, walking with assistance, standing alone and walking alone.

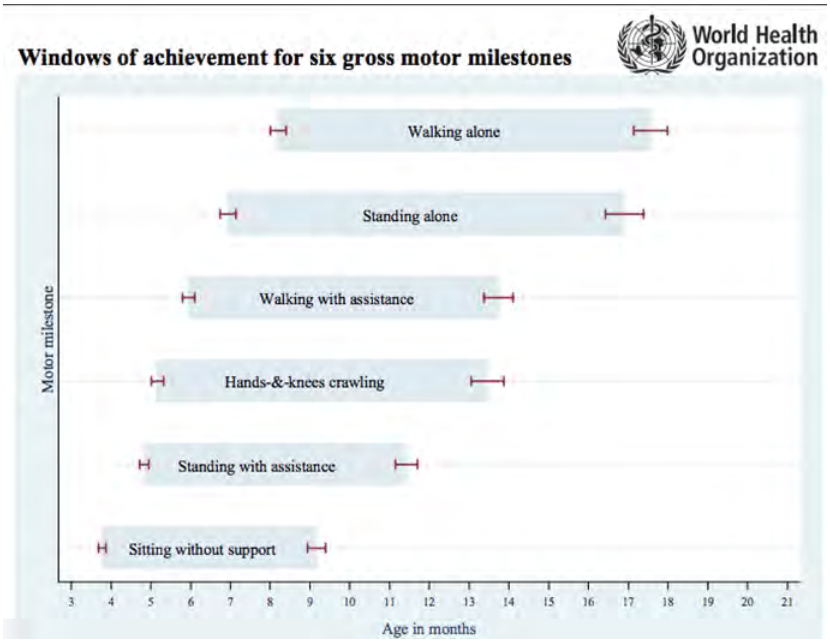


Figure 6.6.12: Windows of achievement for six gross motor milestones. Sitting without support 3.8 - 9.4, Standing with assistance 4.8-11.7 months, Hands-&-knees crawling 5.2-13.9 months, Walking with assistance 6.0 - 14.1 months, Standing alone 6.9 - 17.4 months, Walking alone 8.2 - 18.0 months
([20])

For each milestone, how could the physical environment support and encourage the infant or toddler as they progress toward achieving a specific milestone? For example, consider the milestone of standing with assistance, what role could the environment have? As the child is not yet able to stand independently, they are taking advantage of structures in the environment that afford assistance in getting into a standing position and remaining upright. Therefore, structures that allow a child to hold onto and pull up are important, as are structures that can be used for support to remain standing. When an environment includes structures at a low height, it supports a child's progress toward achieving this milestone. If an environment only has high structures built for adults, the motor and movement possibilities for a child are more limited.

Caregivers should consider how both the indoor and outdoors environments afford infants and toddlers the opportunity to practice and challenge their current motor skills safely. As caregivers observe and reflect upon the motor development progress of infants and toddlers they should consider how to modify the environment to continue to support and encourage motor development. For example, for infants practicing standing with support, caregivers should ensure there are structures that can be used to help infants pull themselves up and offer continual support at an appropriate height. Outside, is the play equipment age-appropriate and supportive of gross motor development? Figure 6.6.13 shows two angles of the same play structure geared for toddlers. Considering the construction of it, what elements are there that can support the developmental progression of toddlers' gross motor skills? While parts of the structure may be challenging for some toddlers, what elements are built in to support toddlers as their gross motor skills improve?

Figure 6.6.13: Outside structure supporting toddler gross motor development. . ([21])

Fine Motor Development

Fine motor skills involve more exact movements of the feet, toes, hands, and fingers. While fine motor skills are slower to develop (in accordance with the proximodistal trend), remarkable progress is made in fine motor development during the first two years. In just the first few years of life, children go from having no intentional fine motor control to being able to manipulate objects to play and learn, as well as beginning to take care of themselves. [22]

Just as with gross motor milestones, there are complex developments that lead up to achieving specific fine motor milestones. Take for example the fine motor milestone of grasping an object. Reaching to grasp an object, which could be perceived as a relatively simple action, requires a complex compilation of smaller abilities working synchronously together. Successful reaching to a stimulus, whether it is located on the body or in external space, typically involves the coordination of at least two different action systems: reaching and grasping (Jeannerod, 1996). Effective reaching requires individuals not only to extend their hands to the location of an object, but to also open and orient the hand to prepare to grasp the specific object. Developmentally, research indicates that the reaching system develops before grasping (Piaget, 1952; Bruner, 1973), reflecting a proximodistal sequence in the development of grasping (Lockman & Ashmead, 1983). For example, before 4 months, infants develop the ability to extend their hand to the location of an object (Bruner & Koslowski, 1972; Piaget, 1952), but during this period the hand is often fisted when it contacts the object. By 4 months, however, infants begin to open the hand in advance of contacting the object. Likewise, with regard to self-touch, closed hand contacts prevail in the first 2 or 3 months, and open hand contacts begin to increase in frequency between 3 and 5 months (Thomas, Karl & Whishaw, 2015). [23]

Even after infants achieve the ability to reach for and grasp an object, there is still further development in this milestone that occurs. There is an improvement in reaching kinematics as 6 month-old infants develop a straight arm trajectory accompanied by fewer movements (Von Hofsten, 1991). During this phase of reaching development, there are many factors that influence arm trajectory; however, the development of postural control for maintaining stability during reaching is one of the most significant (Bertenthal & Von Hofsten, 1998). Since reaching requires “whole body engagement” (Rochat & Goubet, 1995), its achievement is highly dependent on posture. At about 3 months, when arm extensions are being replaced by goal directed reaches but upright sitting is not mastered, infant reaching is better with external support. As infants generate the ability to sit independently, reaching becomes more coordinated and they can use their body to balance as they reach outward. [24]

Figure 6.6.14:Nine month old infant using the pincer grasp. ([25])

Development of Grasping

The development of grasping is an important part of fine motor development. As infants and toddlers develop, they progress through different types of grasps. Children are born with a palmar reflex grasp. It is an involuntary reflexive response present in newborns, but begins to appear around 16 weeks gestation (Sherer, 1993). To elicit the reflex, a caregiver can use their finger to stroke the palm of the infant. The palmar grasp reflex comprises two phases: finger closure and clinging. The infant's fingers undergo flexion to enclose the examiner's finger and the pressure applied to the palm produces traction on the fingers' tendons, leading to the clinging action. The thumb is not involved in this reflex. The palmar grasp reflex disappears typically by six months of age, signifying healthy brain maturation and is replaced by the development of voluntary grasping (Schott & Rossor, 2003). The palmar reflex probably serves to create a basic motor pattern that lays the foundation for obtaining later grasping ability. Additionally, it creates interaction and bonding between the infant and the caregiver. [26]

The palmar reflex grasp is replaced by the ulnar grasp, which is a “clumsy motion in which an infant’s fingers close against the palm” (Berk & Meyers, 2016). The ulnar grasp typically develops around 3 to 4 months of age and increases infants’ ability to explore objects. As infants learn to sit independently, both hands are freed up to explore objects; therefore around 4 to 5 months of age infants are able to transfer objects between their hands. The pincer grasp is when the pointer finger and the thumb squeeze together to grasp an object. Infants are usually able to perform a pincer grasp by the age of 9 to 10 months (Sgandurra et al., 2012). With each change in grasping ability, infants are able to interact with different objects and in new ways. For example, the ulnar grasp only allows for larger objects to be held onto while the pincer grasp permits an infant to pick up smaller objects.

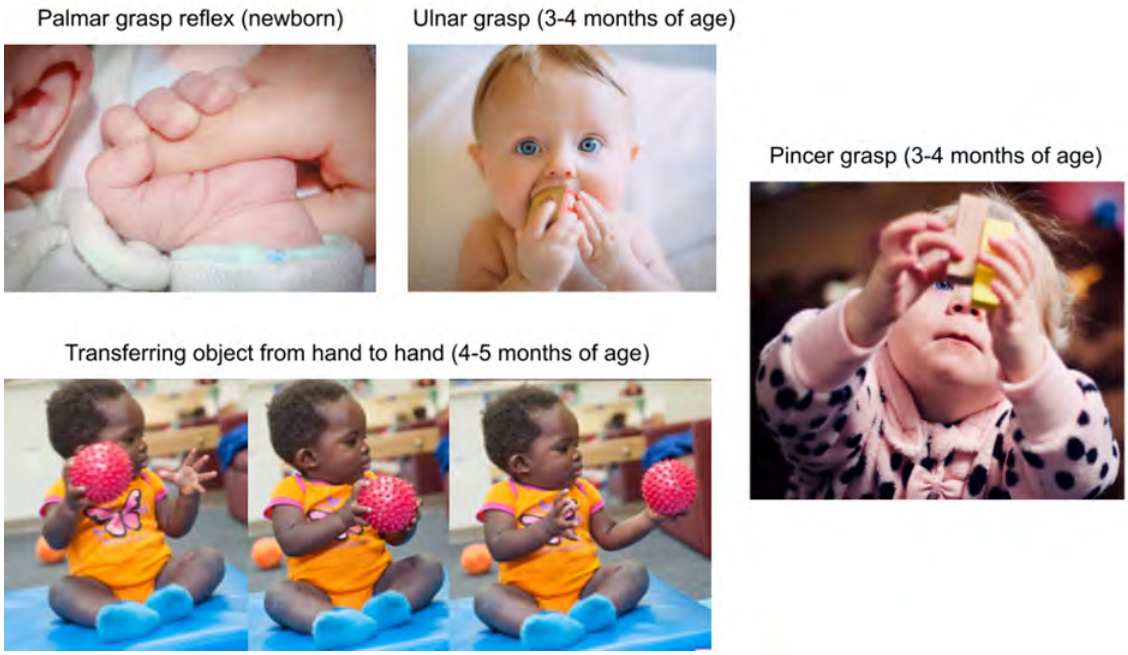


Figure 6.6.15: Development of grasping during infancy. ([27])

To support infants, caregivers should carefully observe infants' grasping progression and provide materials that can easily be manipulated based on their current grasping techniques. Active object exploration emerges around 3 to 6 months of age with the onset of reaching and grasping (Lobo & Galloway, 2008; Rochat, 1989; Ruff, 1984). At 6 months of age, infants spend the majority of their time mouthing and grasping objects and this sharply declined with concurrent improvements in complex manual exploratory behaviors such as fingering, transferring, and rotating objects (Belsky & Most, 1981; Ruff, 1984). As a result, caregivers should provide young infants with materials that they can easily grasp onto and that are safe for mouthing. Once infants begin to sit and develop more complex grasping techniques, such as the ulnar grasp, caregivers should provide materials that are more complex in design characteristics, but still light, easy to hold in one hand, easy to transfer between hands and safe for mouthing. [28]

Figure 6.6.16: Assortment of wooden objects. ([29])

Infant exploratory behaviors are influenced by object properties including size, shape, texture, and weight of objects. Infants change their grasping patterns depending on object size—smaller objects are grasped unimanually and larger objects are grasped bimanually. Research has demonstrated variations in infants' grasping patterns based on object structure, such as two-handed grasps for larger objects and pincer grips for smaller and softer objects (Newell et al., 1989; Newman et al., 2001). Additionally, 12 to 14 month old infants showed appropriate, anticipatory changes in grasp formation based on object shape and size (Barrett, Traupman & Needham, 2008; Fagard, 2000). Nine to twelve month old infants explored object properties such as shape, size, and texture by rotating, fingering, and transferring objects, whereas they explored properties such as weight, sound, and rigidity by banging and shaking objects (Ruff, 1984). This research suggests that with older infants, caregivers should provide materials that

are more complex in design and diverse in characteristics such as size, shape, texture and weight. As older infants use their developing grasping abilities to explore materials, caregivers can continue to observe how they interact with the materials, and provide materials based on what characteristics infants seem most interested in exploring. [28]

Figure 6.6.17 shows various manipulative objects: A) cardboard tube; B) wood clothes pin; C) metal jar lid; D) plastic bottle lid; E) cork; F) plastic hair curlers; G) wood ring. As you look over the objects, consider which objects would best support the different grasping abilities of infants? For infants using a ulnar grasp, which objects would be best to share with them? For infants using a pincer grasp, which objects would be best to share with them? How might the physical properties of each object change how the infants explore them?

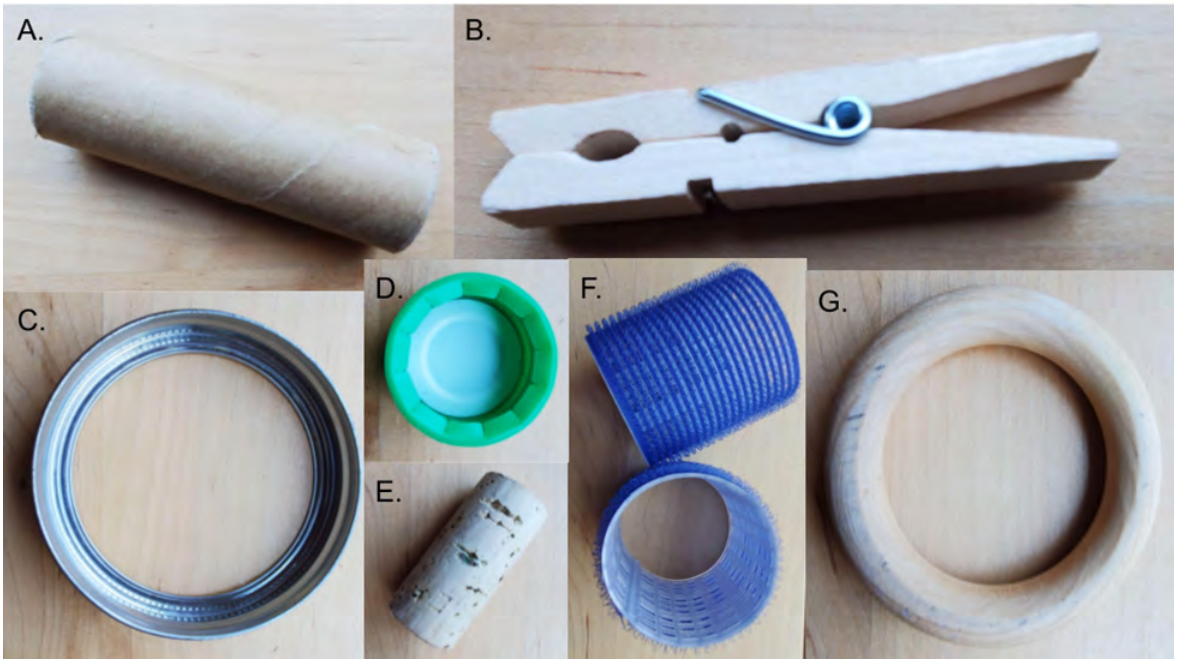


Figure 6.6.17: Various manipulative objects. ([30])

[1] Gonzalez et al., (2019). Do gross and fine motor skills differentially contribute to language outcomes? A systematic review. *Frontiers in Psychology, 10*, 2670. CC by 4.0

[2] Image by krakenimages on Unsplash.

[3] CDC's Developmental Milestones by the Centers for Disease Control and Prevention is in the public domain.

[4] Image from the WHO is in the public domain.

[5] Sato & Tudella (2018). Influence of sitting positions and level of trunk control during reaching movements in late preterm and full-term infants. *Frontiers in Pediatrics, 6*, 185. CC by 4.0

[6] Image from Juan Encalada on Unsplash.

[7] Image from julio andres rosario ortiz on Unsplash

[8] Image adapted from Franchak et al., (2021). A contactless method for measuring full-day, naturalistic motor behavior using wearable inertial sensors. *Frontiers in Psychology*, 4632. CC by 4.0

[9] Yamamoto et al., (2021). The applied ability in infant crawling and the importance of prone motor experience for subsequent development. Preprint. CC by 4.0

[10] Image from Xiong et al., (2021). Measurement and analysis of human infant crawling for rehabilitation: A narrative review. *Frontiers in Neurology, 1747*. CC by 4.0

[11] Image adapted from Yamamoto et al., (2021).The applied ability in infant crawling and the importance of prone motor experience for subsequent development. Preprint. CC by 4.0

[12] "Babies need tummy time!" from NICHD is in the public domain.

[13] Image from Minnie Zhou is on Unsplash.

[14] Thurman & Corbetta (2019). Changes in posture and interactive behaviors as infants progress from sitting to walking: a longitudinal study. *Frontiers in Psychology, 10*, 822. CC by 4.0

[15] Image by Minnie Zhou on Unsplash.

[16] Image from Jen Theodore on Unsplash.

[17] Sando (2019). The physical indoor environment in ECEC settings: Children's well-being and physical activity. *European Early Childhood Education Research Journal*, *27*(4), 506-519. CC by 4.0

[18] Stanton-Chapman & Schmidt (2021). How do the children play? The influence of playground type on children's play styles. *Frontiers in Psychology*, 4337. CC by 4.0

[19] Image by Todd LaMarr is licensed under CC by 4.0

[20] Image from the WHO is in the public domain.

[21] Image by Todd LaMarr is licensed under CC by 4.0

[22] "Child Growth and Development" by College of the Canyons, Jennifer Paris, Antoinette Ricardo, and Dawn Rymond is used under CC BY 4.0.

[23] Chinn et al., (2019). Development of infant reaching strategies to tactile targets on the face. *Frontiers in Psychology, 10*, 9. CC by 4.0

[24] Rachwani et al., (2015). The development of trunk control and its relation to reaching in infancy: A longitudinal study. *Frontiers in Human Neuroscience, 9*, 94. CC by 4.0

[25] Image from the CDC is in the public domain.

[26] Anekar & Bordoni (2020). Palmar grasp reflex. *StatPearls*. CC by 4.0

[27] Images adapted from Unsplash, Pixabay and the CDC all are in the public domain.

[28] Kaur et al., (2015). Atypical object exploration in infants at-risk for autism during the first year of life. *Frontiers in Psychology, 6*, 798. CC by 4.0

[29] Assortment of wooden objects by Todd LaMarr is licensed under CC by 4.0

[30] Various manipulative objects by Todd LaMarr is licensed under CC by 4.0

6.7: Individual Differences- The Role of Cultural Childcare Practices

Culture and Childcare Practices

Despite a common sequence of motor skill acquisition, there are individual differences in age for the acquisition of motor skills, highlighting the importance of the physical environment and caregiver practices. Ever since milestone charts attempted to document what “normal” ages to achieve motor milestones are, variation in type and timing of motor development have been reported (Karasik et al., 2015). For example, motor development in non-Western countries was found to differ from Western norms and these differences were related to differences in caregiving practices (Adolph et al., 2010; Cintas, 1995; Karasik et al., 2015). Even within the ‘Western world’, there is cultural variability in the timing of motor milestone attainment (e.g., De Kegel et al., 2013; Steenis et al., 2015; WHO Multicentre Growth Reference Study Group and de Onis, 2006). [1]

Figure 6.7.1: Caregiver supporting an infant’s walking practice. ([2])

Differences in cultural beliefs and caregiving practices lead to differences in when children achieve motor milestones (Oudgenoeg-Paz, Atun-Einy & van Schaik, 2020). For example, there are differences between Dutch and Israeli caregivers in their beliefs about motor development (Van Schaik et al., 2018), such that Israeli caregivers attribute more importance to encouraging motor development in the “right” order and obtaining expert advice. Dutch caregivers, on the other hand, attribute greater importance to letting children follow their own pace in motor development (Van Schaik et al., 2018). Studies show that motor development of Dutch children is delayed compared to children in other western countries, including Israel (Shapira & Harel, 1983; Steenis et al., 2015). [3]

Figure 6.7.1: Mother from Sierra Leone in West Africa wearing an infant on her back. ([4])

The body of cross-cultural research further supports the perspective that motor development is not a universal process—the social and physical environment has a significant role. For example, practicing standing and sitting, and applying massage or stretching of

the limbs is common in African and Caribbean cultures but less common in Western cultures (Adolph et al., 2010; Super & Harkness, 2015). [5]

In Tajikistan and other parts of Central Asia a traditional caregiving practice involves “gahvora” cradling. Children from birth to 20 months of age are bound on their backs in a tightly wrapped swaddle with arms extended along the sides of the torso and legs straightened and tied together for more than 20 hours per day for some children (Karasik et al., 2018). Infants are not unwrapped for feeding because mothers lean over the cradle to breastfeed and they are not removed for toileting because infants urinate through an external catheter and defecate through a hole in the bottom of the cradle. [6]

According to the prevailing view among pediatricians and psychologists, severe movement restriction in infancy could have deleterious effects, especially across the first two years of ife, a critical period in children’s health and development (Cunha, Leite & Almeida, 2015). For example, the extended and abducted position of the legs, especially in the first few months, could lead to hip dysplasia or pigeon-toed gait (Clarke, 2014; Van Sleuwen et al., 2007). Extended time in the supine position could lead to brachycephaly (flattening of the back of the head (Graham et al., 2005; van Vlimmeren et al., 2017). Restricted movement—especially in older infants—could delay development of postural and locomotor skills (Adolph & Robinson, 2015). [6]

Figure 6.7.1: (A) Gahvora with intricately carved details, fancy bindings, and coverings. (B) Plain-looking gahvora from a less affluent household ([7])

As Figure# shows, younger infants spent more hours in a gahvora than older toddlers; however, twenty percent of older infants (12 to 24 month olds) continued to be cradled for more than 15 hours per day. It is important to note that in Tajik families, children are prized and the center of family life. Tajik caregivers responded immediately to vocalizations from their cradled infants by feeding them, rocking them, or singing to them. Mothers, grandmothers, aunts, neighbors, and older siblings were available, interchangeable, and responsive and Tajik children of all ages, including siblings and village children, surrounded the gahvora and interacted with the infant. [5] [6]

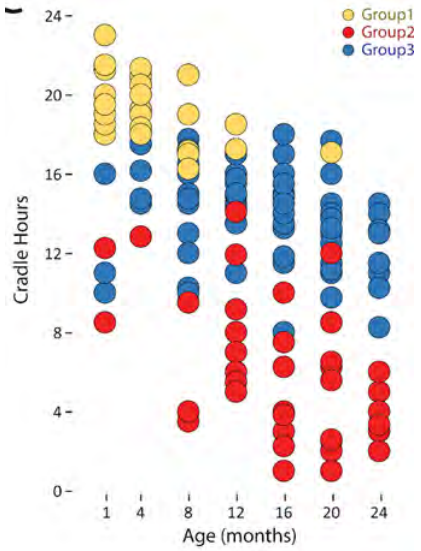


Figure 6.7.1: Number of hours children spent in the gahvora cradle at different ages. The 27 infants in Group 1 (yellow dots) spent long periods in the gahvora, accumulating M = 19.13 hours, distributed across the 24 hours. Indeed, 10 Group 1 infants spent ≥ 20 hours in the cradle. For the 44 infants in Group 2 (red dots) time in the gahvora occurred in short bursts, primarily between 10 a.m. and 10 p.m M = 6.09. To our surprise, Group 2 infants were out of the gahvora at night. The 76 infants in Group 3 (blue dots) spent most of their time in the gahvora between 9 p.m. and 7 a.m., accumulating M = 13.82 hours/day ([7])

One value of a cultural approach is the discovery of new phenomena that challenge widespread assumptions about caregiving practices and the "natural" course of child development. Cultural beliefs, customs, and practices, geography, climate, and village resources compel caregivers to find ways to keep their children healthy and safe. Gahvora cradling is a widespread cultural practice throughout Tajikistan and presumably other parts of Central Asia. Yet, the practice flies in the face of Western norms, theories, and even WHO standards. As caregivers of infants and toddlers, it is essential to be aware of and respect cultural differences in caregiving practices.[6]

[1] Oudgenoeg-Paz, Atun-Einy & van Schaik (2020). Two cultural models on infant motor development: Middle class parents in Israel and the Netherlands. *Frontiers in Psychology, 11*, 119. CC by 4.0

[2] Image from Nathan Dumlao is on Unsplash.

[3] Oudgenoeg-Paz, Atun-Einy & van Schaik (2020). Two cultural models on infant motor development: Middle class parents in Israel and the Netherlands. *Frontiers in Psychology, 11*, 119. CC by 4.0

[4] Image from Annie Spratt on Unsplash.

[5] Oudgenoeg-Paz, Atun-Einy & van Schaik (2020). Two cultural models on infant motor development: Middle class parents in Israel and the Netherlands. *Frontiers in Psychology, 11*, 119. CC by 4.0

[6] Karasik et al., (2018). The ties that bind: Cradling in Tajikistan. *PloS One, 13*(10), e0204428. CC by 4.0

[7] Cradle Hours and Infant Age from Karasiket al., (2018). The ties that bind: Cradling in Tajikistan. *PloS One, 13*(10), e0204428. CC by 4.0

6.8: Motor Development- Relation with Other Areas of Development

Mother Development and Other Developmental Domains

While motor development is often presented as an individual chapter separate from other developmental domains (e.g., language, social-emotional, cognition) the reality is that children's motor abilities are developing alongside these other domains and growth in one domain often influences the other domains. Motor skills are at the core of infants' and toddlers' everyday actions and interactions and consequently affect subsequent perceptual, cognitive, and language development (Bushnell & Boudreau, 1993; Gibson, 1988). Piaget (1952) suggested a relation between motor and cognitive development and noted that infants' own actions and resulting sensorimotor experiences are critical for their learning about the environment and the objects within it. Since Piaget's original observations, several studies have reported evidence for relations between motor skills and development in seemingly unrelated domains. [1]

Growing evidence suggests that acquiring more advanced control over body position affords infants' opportunities for learning and exploration (Franchak, 2020; Gibson, 1988; Libertus & Hauf, 2017). For example, infants' visual experiences differ according to body position: while prone, infants' field of view is dominated by the ground surface and objects near the body, whereas upright infants have a more expansive view of their surroundings that includes distant objects and faces (Franchak et al., 2011, 2018; Luo & Franchak, 2020; Kretch et al., 2014). Sitting facilitates visual and manual exploration of objects compared with laying prone or supine (Luo & Franchak, 2020; Soska & Adolph, 2014). Upright locomotion (walking) compared with prone locomotion (crawling) allows infants to travel farther, more easily carry objects, and elicits different social responses from caregivers (Adolph & Tamis-LeMonda, 2014; Gibson, 1988; Karasik et al., 2014). Accordingly, learning to sit and walk is linked with downstream improvements in language learning and spatial cognition (He et al., 2015; Moore et al., 2019; Oudgenoeg-Paz et al., 2012, 2015; Soska et al., 2010; Walle, 2016; Walle & Campos, 2014; West et al., 2019). Presumably, these facilitative effects result from infants spending more time sitting, standing, and walking. For example, mastering the ability to sit independently nearly doubled the amount of time that 6 month olds spent sitting (both independent and supported sitting) in daily life compared with 6 month old not yet sitting (Franchak, 2019) and infants who spend more time sitting have increased opportunities to explore objects with both hands. [2]

Developmental Cascades Theory

The developmental cascades hypothesis emphasizes the consequences following achievement of new motor skills as a driving force during development. Developmental cascades refer to the cumulative consequences of advances in one domain (e.g., motor skills) on later behaviors or abilities (Fry & Hale, 1996; Gottlieb, 1991; Masten & Cicchetti, 2010). Gaining a new skill leads to significant and long lasting changes in the child's everyday experience by altering what kind of information is accessible and how others respond to the child. According to the developmental cascades theory, the onset of a new motor skill may provide infants with access to new learning opportunities associated with that motor skill. For example, being able to sit without support frees the hands for manual exploration of objects and enables learning about object features such as weight, texture, and function (Lederman & Klatzky, 2009; Rochat & Goubet, 1995). Sitting also frees the hands for the production of communicative gestures, which have been found to support language development (Iverson & Goldin-Meadow, 2005). Further, sitting changes the infants' point-of-view, providing novel perceptual experiences and encouraging face-to-face exchanges with their caregivers. And finally, parents react to changes in infants' abilities and adjust how they respond to the child (e.g., Karasik et al., 2014). [1]

Relationship Between Motor Skills and Language Development

While motor and language development may seem like two very different developmental areas, research has shown, within the first three years of life, that these two areas are strongly related (Schneider & Iverson, 2021). Infants and toddlers who achieve motor milestones earlier show greater language abilities. For example, in a large group of children between 10 to 14 months of age, some will be walking while others will not yet be able to walk. Children who begin to walk earlier have larger receptive and productive vocabularies than those who are not yet able to walk (Carina, Leinweber & Ritterfeld, 2019; He, Walle & Campos, 2015; Walle & Campos, 2014). The onset of independent sitting and walking have both been found to predict later productive vocabulary sizes between 16 and 28 months (Oudgenoeg-Paz, Volman & Leseman, 2012). This relationship between motor development and language development actually begins even earlier. Infants, between 3 to 5 months of age, who can independently sit earlier than others, show greater language abilities as toddlers (Libertus & Violi, 2016). A large study of 62,944 children found that motor skills at 18 months were predictive of subsequent language skills at 36 months of age (Wang, Lekhal, Aarø & Schjølberg, 2014). In

addition to gross motor skills, fine motor skills between 12 and 18 months of age have been found to predict expressive language at 36 months in infants at a high genetic risk for ASD (LeBarton & Iverson, 2013). [1]

Why is there a relationship between motor abilities and later language abilities? It is unlikely that the acquisition of walking per se causes infants to develop language, just as it is unlikely that infant language causes the onset of walking. Rather, the onset of walking increases the infant's visual field (Kretch et al., 2014) and permits greater flexibility with which to view the environment (Frank et al., 2013). These physical changes may promote infant following of adult attentional cues, and thereby facilitate language learning. Engaging in joint attention behavior is essential for the development of language (Tomasello, 1988, 1995). Such episodes of joint engagement occur when one individual directs the attention of another to a shared referent, such as an object or event. Multiple studies have found that infant following of adult attentional cues is related to language development (Brooks & Meltzoff, 2005; Morales et al., 1998; Mundy et al., 1995; Smith et al., 1988; Tomasello & Todd, 1983). Likewise, infant initiation of joint engagement, such as pointing, is associated with later language development (Brooks & Meltzoff, 2008; LeBarton et al., 2015). Perhaps not surprisingly, infant joint attention, particularly following adult gaze, also develops markedly following the infant's first birthday (Morales et al., 2000; Morissette et al., 1995), when infants typically begin to walk. [3]

Furthermore, infant walking also has a significant impact on how the infant engages with the caregiver. Walking infants have been observed to be more likely to access objects located further away than crawling infants (Clearfield, 2011; Karasik et al., 2011). Additionally, engaging in mobile bids for the parent's attention, such as carrying an object to the parent, elicits more interactive, and verbally rich responses by the parent and such bids are more frequent by walking than crawling infants (Karasik et al., 2014). Walking infants have also been found to direct the parent's attention to objects using vocalizations and gestures more than crawling infants (Clearfield et al., 2008; Clearfield, 2011; Karasik et al., 2011). These findings indicate that not only may the walking infant be more attuned to follow adult attentional cues, but they also help to generate social contexts in which they themselves elicit parent attention. The onset of walking affords infants new ways to communicate (freeing the hands for gesture and by being able to carry move objects) and share their interests which results in richer language from caregivers (West & Iverson, 2021). [3]

Relationship between Motor Skills and Developmental Delays and Disabilities

As motor development can be tracked early on in infancy and toddlerhood, motor skills can be used as a potential early marker for later outcomes in children at-risk of a delay or disability (Bhat et al., 2012; Flanagan et al., 2012; Lebarton & Iverson, 2013; Libertus et al., 2014). Research has found that delays in motor development are linked to diagnoses such as Autism Spectrum Disorder (ASD) and developmental language disorders (Leonard & Hill, 2014; West, 2018). Infants at high familial risk for ASD (infants, who have an older sibling with an ASD diagnosis) and who receive an ASD diagnosis later in childhood, show reduced fine motor and grasping skills (Choi, Leech, Tager-Flusberg & Nelson, 2018; Libertus et al., 2014) and delayed development of posture skills (i.e., sitting and standing) (Nickel et al., 2013). More children with a developmental language disorder are late in reaching gross and particularly fine motor milestones, than children without a developmental language disorder (Diepeveen et al, 2018). Motor delays are also commonly reported in children with Down syndrome (Vicari, 2006), Williams syndrome (Masataka, 2001) and in children born preterm (Cameron et al., 2021; Caravale et al., 2005; van Haastert et al., 2006). [1] [4]

---

[1] Libertus & Violi (2016). Sit to talk: relation between motor skills and language development in infancy. *Frontiers in Psychology*, *7*, 475. CC by 4.0

[2] Franchak et al., (2021). A contactless method for measuring full-day, naturalistic motor behavior using wearable inertial sensors. *Frontiers in Psychology*, 4632. CC by 4.0

[3] Walle (2016). Infant social development across the transition from crawling to walking. *Frontiers in Psychology, 7*, 960. CC by 4.0

[2] Libertus & Landa (2014). Scaffolded reaching experiences encourage grasping activity in infants at high risk for autism. *Frontiers in Psychology, 5*, 1071. CC by 4.0

6.9: Conclusion

Conclusion of Motor Development

Motor development is an amazing domain to learn about because growth in motor abilities can be easily observed by caregivers and provides unique insight into children's developing understanding of the world. As motor abilities progress, caregivers have an important role in supporting children by providing materials and creative physical environments that both support and challenge developing skills.

6.10: References

References of Motor Development

- Adolph, K. E. (2008). Learning to move. *Current Directions in Psychological Science, 17*(3), 213-218.
- Adolph, K. E., Cole, W. G., Komati, M., Garciaguirre, J. S., Badaly, D., Lingeman, J. M., Chan, G. & Sotsky, R. B. (2012). How do you learn to walk? Thousands of steps and dozens of falls per day. *Psychological Science, 23*(11), 1387-1394.
- Adolph, K. E., & Hoch, J. E. (2019). Motor development: Embodied, embedded, enculturated, and enabling. *Annual Review of Psychology, 70*, 141-164.
- Adolph, K. E., Karasik, L. B., & Tamis-LeMonda, C. S. (2010). Motor skill. In M. H. Bornstein (Ed.),*Handbook of Cultural Developmental Science*, (pp. 61–88). New York, NY: Taylor & Francis).
- Adolph K. E., & Robinson S. R. (2015). Motor development. In Liben L. & Muller U. (Eds.), *Handbook of Child Psychology and Developmental Science* (7th ed., Vol. 2, pp. 114–157). New York: Wiley.
- Adolph, K. E., Vereijken, B., & Denny, M. A. (1998). Learning to crawl. *Child Development, 69*(5), 1299-1312.
- Barrett, T. M., Traupman, E., & Needham, A. (2008). Infants' visual anticipation of object structure in grasp planning. *Infant Behavior and Development, 31*(1), 1-9.
- Belsky, J., & Most, R. K. (1981). From exploration to play: A cross-sectional study of infant free play behavior. *Developmental Psychology, 17*(5), 630.
- Berger, S. E., Chan, G. L., & Adolph, K. E. (2014). What cruising infants understand about support for locomotion. *Infancy, 19*(2), 117-137.
- Berk, & Meyers, A. B. (2016). *Infants, children, and adolescents* (Eighth edition). Pearson.
- Bertenthal, B., & Von Hofsten, C. (1998). Eye, head and trunk control: The foundation for manual development. *Neuroscience & Biobehavioral Reviews, 22*(4), 515-520.
- Bilbilaj, S., Gjipali, A., & Shkurti, F. (2017). Measuring primitive reflexes in children with learning disorders. *European Journal of Multidisciplinary Studies, 2*(5), 285-298.
- Bly, L. (1994). *Motor skills acquisition in the first year: An illustrated guide to normal development*. Psychological Corporation. Virgínia University, TX: Therapy Skill Builders.
- Bruijns, B. A., Truelove, S., Johnson, A. M., Gilliland, J., & Tucker, P. (2020). Infants' and toddlers' physical activity and sedentary time as measured by accelerometry: A systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity, 17*(1), 14.
- Bruner, J. S. (1973). Organization of early skilled action. *Child Development*, 1-11.
- Bruner, J. S., & Koslowski, B. (1972). Visually preadapted constituents of manipulatory action. *Perception, 1*(1), 3-14.
- Buchanan, L., Xu, H., Hewitt, L., Taki, S., & Wen, L. M. (2021). A longitudinal analysis examining the associations of tummy time with active playtime, screen time, and sleep time. *Journal of Physical Activity and Health, 1*, 1-8.
- Butler, P., Saavedra, M. S., Sofranac, M. M., Jarvis, M. S., & Woollacott, M. (2010). Refinement, reliability and validity of the segmental assessment of trunk control. *Pediatric Physical Therapy, 22*(3), 246.
- Cameron, K. L., FitzGerald, T. L., McGinley, J. L., Allison, K., Cheong, J. L., & Spittle, A. J. (2021). Motor outcomes of children born extremely preterm; from early childhood to adolescence. *Seminars in Perinatology*, 151481–151481.
- Carina, L. Ü. K. E., Leinweber, J., & Ritterfeld, U. (2019). Walking, pointing, talking–the predictive value of early walking and pointing behavior for later language skills. *Journal of Child Language, 46*(6), 1228-1237.
- Carson, V., Lee, E. Y., Hewitt, L., Jennings, C., Hunter, S., Kuzik, N., ... & Tremblay, M. S. (2017). Systematic review of the relationships between physical activity and health indicators in the early years (0-4 years). *BMC Public Health, 17*(5), 33-63.
-
- Carson, V., Zhang, Z., Predy, M., Pritchard, L., & Hesketh, K. D. (2022). Longitudinal associations between infant movement behaviours and development. *International Journal of Behavioral Nutrition and Physical Activity, 19*(1), 1-15.
- Chahin, E., & Tardos, A. (2017). *In loving hands: How the rights for young children living in children's homes offer hope and happiness in today's world*. Xlibris Corporation.
- Choi, B., Leech, K. A., Tager-Flusberg, H., & Nelson, C. A. (2018). Development of fine motor skills is associated with expressive language outcomes in infants at high and low risk for autism spectrum disorder. *Journal of Neurodevelopmental Disorders, 10*(1), 1-11.
- Cintas, H. L. (1995). Cross-cultural similarities and differences in development and the impact of parental expectations on motor behavior. *Pediatric Physical Therapy, 7*(3), 103-111.

- Clarke, N. M. P. (2014). Swaddling and hip dysplasia: An orthopaedic perspective. *Archives of Disease in Childhood*, *99*, 5–6.
- Claxton, L. J., Haddad, J. M., Ponto, K., Ryu, J. H., & Newcomer, S. C. (2013). Newly standing infants increase postural stability when performing a supra-postural task. *PloS One*, *8*(8), e71288.
- Corbetta, D., & Bojczyk, K. E. (2002). Infants return to two-handed reaching when they are learning to walk. *Journal of Motor Behavior*, *34*(1), 83-95.
- Corbetta, D., and Thelen, E. (2002). Behavioral fluctuations and the development of manual asymmetries in infancy: Contribution of the dynamic systems approach. In S. J. Segalowitz and I. Rapin (Eds.), *Handbook of Neuropsychology: Vol. 8 – Child Neuropsychology (pp. 309–328)*. Amsterdam Elsevier Science Publishing Co.
- Cunha, A. J. L. A. D., Leite, Á. J. M., & Almeida, I. S. D. (2015). The pediatrician's role in the first thousand days of the child: the pursuit of healthy nutrition and development. *Jornal de Pediatria*, *91*, S44-S51.
- Davis, B. E., Moon, R. Y., Sachs, H. C., & Ottolini, M. C. (1998). Effects of sleep position on infant motor development. *Pediatrics*, *102*(5), 1135-1140.
- De Kegel, A., Peersman, W., Onderbeke, K., Baetens, T., Dhooge, I., & Van Waelvelde, H. (2013). New reference values must be established for the Alberta Infant Motor Scales for accurate identification of infants at risk for motor developmental delay in Flanders. *Child: Care, Health and Development*, *39*(2), 260-267.
- Dewey, C., Fleming, P., Golding, J., & ALSPAC Study Team. (1998). Does the supine sleeping position have any adverse effects on the child? II. Development in the first 18 months. *Pediatrics*, *101*(1), e5-e5.
- Diepeveen, F. B., van Dommelen, P., Oudesluys-Murphy, A. M., & Verkerk, P. H. (2018). Children with specific language impairment are more likely to reach motor milestones late. *Child: Care, Health and Development*, *44*(6), 857-862.
- DiMercurio, A., Connell, J. P., Clark, M., & Corbetta, D. (2018). A naturalistic observation of spontaneous touches to the body and environment in the first 2 months of life. *Frontiers in Psychology*, *9*, 2613.
- Dosso, J. A., & Boudreau, J. P. (2014). Crawling and walking infants encounter objects differently in a multi-target environment. *Experimental Brain Research*, *232*(10), 3047-3054.
- Fagard, J. (2000). Linked proximal and distal changes in the reaching behavior of 5-to 12-month-old human infants grasping objects of different sizes. *Infant Behavior and Development*, *23*(3-4), 317-329.
- Franchak, J. M., Kretch, K. S., & Adolph, K. E. (2018). See and be seen: Infant–caregiver social looking during locomotor free play. *Developmental Science*, *21*(4), e12626.
- Futagi, Y., Toribe, Y., & Suzuki, Y. (2012). The grasp reflex and moro reflex in infants: hierarchy of primitive reflex responses. *International Journal of Pediatrics*, *2012*.
- Galloway, J. C., & Thelen, E. (2004). Feet first: Object exploration in young infants. *Infant Behavior and Development*, *27*(1), 107-112.
- Gerber, M. (2002). *Dear parent: Caring for infants with respect* (2nd ed.). Resources for Infant Educarers.
- Gerber, M., & Johnson, A. (1998). *Your self-confident baby: How to encourage your child's natural abilities from the very start*. John Wiley and Sons, Inc., Professional, Reference and Trade Group, 605 Third Avenue, New York, NY 10158-0012.
- Gibson, J. J. (1950). *The perception of the visual world*. New York: Houghton Mifflin.
- Gibson, J. J. (2014). *The ecological approach to visual perception: Classic edition*. New York, NY:
- Taylor & Francis.
- Gonzalez, S. L., Alvarez, V., & Nelson, E. L. (2019). Do gross and fine motor skills differentially contribute to language outcomes? A systematic review. *Frontiers in Psychology*, *10*, 2670.
- Gonzalez-Mena, J. (2014). *Infants, toddlers, and caregivers: A curriculum of respectful, responsive, relationship-based care and education*. McGraw-Hill Higher Education.
- Gonzalez-Mena, J., Chahin, E., & Briley, L. (2005). The Pikler Institute: A unique approach to caring for children. *Childcare Exchange Press*, *166*, 49.
- Graham Jr, J. M., Kreutzman, J., Earl, D., Halberg, A., Samayoa, C., & Guo, X. (2005). Deformational brachycephaly in supine-sleeping infants. *The Journal of Pediatrics*, *146*(2), 253-257.
- Gubbels, J. S., Van Kann, D. H., & Jansen, M. W. (2012). Play equipment, physical activity opportunities, and children's activity levels at childcare. *Journal of Environmental and Public Health*.
- Harbourne, R. T., Lobo, M. A., Karst, G. M., & Galloway, J. C. (2013). Sit happens: Does sitting development perturb reaching development, or vice versa? *Infant Behavior and Development*, *36*(3), 438-450.
- He, M., Walle, E. A., & Campos, J. J. (2015). A cross-national investigation of the relationship between infant walking and language development. *Infancy*, *20*(3), 283-305.

- Heathcock, J. C., & Galloway, J. C. (2009). Exploring objects with feet advances movement in infants born preterm: A randomized controlled trial. *Physical Therapy*, *89*(10), 1027-1038.
- Hewitt, L., Kerr, E., Stanley, R. M., & Okely, A. D. (2020). Tummy time and infant health outcomes: A systematic review. *Pediatrics*, *145*(6).
- Hnatiuk, J., Ridgers, N. D., Salmon, J., Campbell, K., McCallum, Z., & Hesketh, K. (2012). Physical activity levels and patterns of 19-month-old children. *Medicine and Science in Sports and Exercise*, *44*(9), 1715-1720.
- Hoffmann, M. (2017). "The role of self-touch experience in the formation of the self," in *Proceedings of The Development of the Self Workshop at IEEE ICDL-EpiRob 2017*, Lisbon.
- Jantz, J. W., Blosser, C. D., & Fruechting, L. A. (1997). A motor milestone change noted with a change in sleep position. *Archives of Pediatrics & Adolescent Medicine*, *151*(6), 565-568.
- Jeannerod, M. (1996). Reaching and grasping: Parallel specification of visuomotor channels. In H. Heuer and S. W. Keele (Eds.), *Handbook of Perception and Action*, (Vol. 2, pp. 405–460). Cambridge, MA: Academic Press.
- Kalmar, R. (2017). Investigation about crawling ' Haihai ' in Japanese infants. *Japan Journal of Human Growth and Development Research*, *76*, 1–7.
- Karasik, L. B., Adolph, K. E., Tamis-LeMonda, C. S., & Zuckerman, A. L. (2012). Carry on: Spontaneous object carrying in 13-month-old crawling and walking infants. *Developmental Psychology*, *48*(2), 389.
- Karasik, L. B., Tamis-LeMonda, C. S., Adolph, K. E., & Bornstein, M. H. (2015). Places and postures: A cross-cultural comparison of sitting in 5-month-olds. *Journal of Cross-cultural Psychology*, *46*(8), 1023-1038.
- Karasik, L. B., Tamis-LeMonda, C. S., Ossmy, O., & Adolph, K. E. (2018). The ties that bind: Cradling in Tajikistan. *PloS One*, *13*(10), e0204428.
- Kattwinkel, J., Brooks, J., & Myerberg, D. (1992). American Academy of Pediatrics AAP Task Force on infant positioning and SIDS: positioning and SIDS. *Pediatrics*, *89*(6 Pt 1), 1120-6.
- Konicarova, J., Bob, P., & Raboch, J. (2013). Persisting primitive reflexes in medication-naïve girls with attention-deficit and hyperactivity disorder. *Neuropsychiatric Disease and Treatment*, *9*, 1457.
- Kretch, K. S., Franchak, J. M., & Adolph, K. E. (2014). Crawling and walking infants see the world differently. *Child Development*, *85*(4), 1503-1518.
- LeBarton, E. S., & Iverson, J. M. (2013). Fine motor skill predicts expressive language in infant siblings of children with autism. *Developmental Science*, *16*(6), 815-827.
- Ledebt, A. (2000). Changes in arm posture during the early acquisition of walking. *Infant Behavior and Development*, *23*(1), 79-89.
- Libertus, K., & Violi, D. A. (2016). Sit to talk: relation between motor skills and language development in infancy. *Frontiers in Psychology*, *7*, 475.
- Lobo, M. A., & Galloway, J. C. (2013). The onset of reaching significantly impacts how infants explore both objects and their bodies. *Infant Behavior and Development*, *36*(1), 14-24.
- Lobo, M. A., Kokkoni, E., de Campos, A. C., & Galloway, J. C. (2014). Not just playing around: Infants' behaviors with objects reflect ability, constraints, and object properties. *Infant Behavior and Development*, *37*(3), 334-351.
- Lockman, J. J., & Ashmead, D. H. (1983). Asynchronies in the development of manual behavior. *Advances in Infancy Research*.
- Majnemer, A., & Barr, R. G. (2005). Influence of supine sleep positioning on early motor milestone acquisition. *Developmental Medicine & Child Neurology*, *47*(6), 370-376.
- Morgan, C., Fetters, L., Adde, L., Badawi, N., Bancale, A., Boyd, R. N., Chorna, O., Cioni, G., Damiano, D. L., Darrah, J., de Vries, L. S., Dusing, S., Einspieler, C., Eliasson, A., Ferriero, D., Fehlings, D., Forssberg, H., Gordon, A. M., Greaves, S., Guzzetta, A., Hadders-Algra, M., Harbourne, R., Karlsson, P., Krumlinde-Sundholm, L., Latal, B., Loughran-Fowlds, A., Mak, C., Maitre, N., McIntyre, S., Mei, C., Morgan, A., Kakooza-Mwesige, A., Romeo, D. M., Sanchez, K., Spittle, A., Shepherd, R., Thornton, M., Valentine, J., Ward, R., Whittingham, K., Zamany, A. & Novak, I. (2021). Early intervention for children aged 0 to 2 years with or at high risk of cerebral palsy: International clinical practice guideline based on systematic reviews. *JAMA Pediatrics*.
- Newell, K. M., Scully, D. M., McDonald, P. V., & Baillargeon, R. (1989). Task constraints and infant grip configurations. *Developmental Psychobiology*, *22*(8), 817-831.
- Nordtømme, S. 2016. "På vei mot en rom (s) lig pedagogikk: En fortolkende studie av barnslekeerfaringer med rom og materialitet [Towards a spacious pedagogy. An interpretive study of children's play experiences with space and materiality]." PhD diss., Høgskolen i Sørøst-Norge.

- Noritz, G. H., Murphy, N. A., Neuromotor Screening Expert Panel, Murphy, N. A., Hagan Jr, J. F., Lipkin, P. H., Macias, M. M., Navsaria, D. Noritz, G. H., Peacock, G., Rosenbaum, P. L., Saal, H. M., Sarwark, J. F., Swanson, M. E., Wiznitzer, M. & Yeargin-Allsopp, M. (2013). Motor delays: Early identification and evaluation. *Pediatrics, 131*(6), e2016-e2027.
- Oudgenoeg-Paz, O., Atun-Einy, O., & van Schaik, S. D. (2020). Two cultural models on infant motor development: Middle class parents in Israel and the Netherlands. *Frontiers in Psychology, 11*, 119.
- Oudgenoeg-Paz, O., Volman, M. C. J., & Leseman, P. P. (2012). Attainment of sitting and walking predicts development of productive vocabulary between ages 16 and 28 months. *Infant Behavior and Development, 35*(4), 733-736.
- Patrick, S. K., Noah, J. A., & Yang, J. F. (2012). Developmental constraints of quadrupedal coordination across crawling styles in human infants. *Journal of Neurophysiology, 107*(11), 3050-3061.
- Pecuch, A., Gieysztor, E., Wolańska, E., Telenga, M., & Paprocka-Borowicz, M. (2021). Primitive reflex activity in relation to motor skills in healthy preschool children. *Brain Sciences, 11*(8), 967.
- Peden, M. E., Jones, R., Costa, S., Ellis, Y., & Okely, A. D. (2017). Relationship between children's physical activity, sedentary behavior, and childcare environments: A cross sectional study. *Preventive Medicine Reports, 6*, 171-176.
- Piaget, J. (1952). *The origins of intelligence in children*. New York, NY: Basic Books.
- Ridgers, N. D., Stratton, G., Fairclough, S. J., & Twisk, J. W. (2007). Long-term effects of a playground markings and physical structures on children's recess physical activity levels. *Preventive Medicine, 44*(5), 393-397.
- Rocha, N. A. C. F., & Tudella, E. (2008). The influence of lying positions and postural control on hand–mouth and hand–hand behaviors in 0–4-month-old infants. *Infant Behavior and Development, 31*(1), 107-114.
- Rochat, P. (1989). Object manipulation and exploration in 2-to 5-month-old infants. *Developmental Psychology, 25*(6), 871.
- Rochat, P., and Bullinger, A. (1994). Posture and functional action in infancy. In A. Vyt, H. Bloch, & M. H. Bornstein (Eds.), *Early Child Development in the French Tradition: Contributions from Current Research* (pp. 15–34). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Rochat, P., & Goubet, N. (1995). Development of sitting and reaching in 5-to 6-month-old infants. *Infant Behavior and Development, 18*(1), 53-68.
- Rochat, P., & Hespos, S. J. (1997). Differential rooting response by neonates: Evidence for an early sense of self. *Infant and Child Development, 6*(3-4), 105-112.
- Ruff, H. A. (1984). Infants' manipulative exploration of objects: Effects of age and object characteristics. *Developmental Psychology, 20*(1), 9.
- Salls, J. S., Silverman, L. N., & Gatty, C. M. (2002). The relationship of infant sleep and play positioning to motor milestone achievement. *American Journal of Occupational Therapy, 56*(5), 577-580.
- Sando, O. J. (2019). The physical indoor environment in ECEC settings: children’s well-being and physical activity. *European Early Childhood Education Research Journal, 27*(4), 506-519.
- Schneider, J. L., & Iverson, J. M. (2021). Cascades in action: How the transition to walking shapes caregiver communication during everyday interactions. *Developmental Psychology.*
- Schott, J. M., & Rossor, M. N. (2003). The grasp and other primitive reflexes. *Journal of Neurology, Neurosurgery & Psychiatry, 74*(5), 558-560.
- Sgandurra, G., Cecchi, F., Serio, S. M., Del Maestro, M., Laschi, C., Dario, P., & Cioni, G. (2012). Longitudinal study of unimanual actions and grasping forces during infancy. *Infant Behavior and Development, 35*(2), 205-214.
- Shapira, Y., & Harel, S. (1983). Standardization of the Denver developmental screening test for Israeli children. *Israel Journal of Medical Sciences, 19*(3), 246-251.
- Sherer, D. M. (1993). Fetal grasping at 16 weeks' gestation. *Journal of Ultrasound in Medicine, 12*(6), 316-316.
- Shida-Tokeshi, J., Lane, C. J., Trujillo-Priego, I. A., Deng, W., Vanderbilt, D. L., Loeb, G. E., & Smith, B. A. (2018). Relationships between full-day arm movement characteristics and developmental status in infants with typical development as they learn to reach: An observational study. *Gates Open Research, 2*.
- Shumway-Cook, A., & Woollacott, M. H. (2003). Controle motor: Teoria e aplicações práticas. *Manole*.
- Soska, K. C., & Adolph, K. E. (2014). Postural position constrains multimodal object exploration in infants. *Infancy, 19*(2), 138-161.
- Soska, K. C., Adolph, K. E., & Johnson, S. P. (2010). Systems in development: motor skill acquisition facilitates three-dimensional object completion. *Developmental Psychology, 46*(1), 129.
- Steenis, L. J., Verhoeven, M., Hessen, D. J., & Van Baar, A. L. (2015). Performance of Dutch children on the Bayley III: A comparison study of US and Dutch norms. *PloS One, 10*(8), e0132871.

- Super, C. M., & Harkness, S. (1986). The developmental niche: A conceptualization at the interface of child and culture. *International Journal of Behavioral Development*, *9*(4), 545-569.
- Tandon, P., Hassairi, N., Soderberg, J., & Joseph, G. (2018). The relationship of gross motor and physical activity environments in child care settings with early learning outcomes. *Early Child Development and Care*.
- Tandon, P. S., Saelens, B. E., & Christakis, D. A. (2015). Active play opportunities at child care. *Pediatrics*, *135*(6), e1425-e1431.
- Tardos, A. (2010). Introducing the Piklerian developmental approach. *The Signal Newsletter of the World Association for Infant Mental Health*, *18*(3-4), 1-4.
- Thomas, B. L., Karl, J. M., & Whishaw, I. Q. (2015). Independent development of the reach and the grasp in spontaneous self-touching by human infants in the first 6 months. *Frontiers in Psychology*, *5*, 1526.
- Thurman, S. L., & Corbetta, D. (2019). Changes in posture and interactive behaviors as infants progress from sitting to walking: A longitudinal study. *Frontiers in Psychology*, *10*, 822.
- Tremblay, M. S., Chaput, J. P., Adamo, K. B., Aubert, S., Barnes, J. D., Choquette, L., Duggan, M., Faulkner, G., Goldfield, G. S., Gray, C. E., Gruber, R., Janson, K., Janssen, I., Janssen, X., Garcia, A. J., Kuzik, N.,, LeBlanc, C., MacLean, J. Okely, A. D., Poitras, V. J., Rayner, M., Reilly, J. J., Sampson, M., Spence, J. C., Timmons, B. W. & Carson, V. (2017). Canadian 24-hour movement guidelines for the early years (0–4 years): an integration of physical activity, sedentary behaviour, and sleep. *BMC Public Health*, *17*(5), 1-32.
- Uzark, K., Smith, C., Yu, S., Lowery, R., Tapley, C., Romano, J. C., & Butcher, J. (2021). Evaluation of a “tummy time” intervention to improve motor skills in infants after cardiac surgery. *Cardiology in the Young*, 1-6.
- van der Fits, I. B., Flikweert, E. R., Stremmelaar, E. F., Martijn, A., & Hadders-Algra, M. (1999). Development of postural adjustments during reaching in preterm infants. *Pediatric Research*, *46*(1), 1-7.
- Vanderloo, L. M., & Tucker, P. (2015). An objective assessment of toddlers’ physical activity and sedentary levels: a cross-sectional study. *BMC Public Health*, *15*(1), 1-10.
- van Schaik, S. D., Oudgenoeg-Paz, O., & Atun-Einy, O. (2018). Cross-cultural differences in parental beliefs about infant motor development: A quantitative and qualitative report of middle-class Israeli and Dutch parents. *Developmental Psychology*, *54*(6), 999.
- Van Sleuwen, B. E., Engelberts, A. C., Boere-Boonekamp, M. M., Kuis, W., Schulpen, T. W., & L'Hoir, M. P. (2007). Swaddling: a systematic review. *Pediatrics*, *120*(4), e1097-e1106.
- van Vlimmeren, L. A., Engelbert, R. H., Pelsma, M., Groenewoud, H. M., Boere-Boonekamp, M. M., & Nijhuis-van der Sanden, M. W. (2017). The course of skull deformation from birth to 5 years of age: a prospective cohort study. *European Journal of Pediatrics*, *176*(1), 11-21.
- Viholainen, H., Ahonen, T., Cantell, M., Tolvanen, A., & Lyytinen, H. (2006). The early motor milestones in infancy and later motor skills in toddlers: a structural equation model of motor development. *Physical & Occupational Therapy in Pediatrics*, *26*(1-2), 91-113.
- von Hofsten, C. (1991). Structuring of early reaching movements: A longitudinal study. *Journal of Motor Behavior*, *23*(4), 280-292.
- Walle, E. A., & Campos, J. J. (2014). Infant language development is related to the acquisition of walking. *Developmental Psychology*, *50*(2), 336.
- Wallon, H. (1941). *L’évolution psychologique de l’enfant*. Paris: Armand Colin.
- Wang, M. V., Lekhal, R., Aarø, L. E., & Schjølberg, S. (2014). Co-occurring development of early childhood communication and motor skills: Results from a population-based longitudinal study. *Child: Care, Health and Development*, *40*(1), 77-84.
- Wentz, E. E. (2017). Importance of initiating a “tummy time” intervention early in infants with Down syndrome. *Pediatric Physical Therapy*, *29*(1), 68-75.
- West, K. L., & Iverson, J. M. (2021). Communication changes when infants begin to walk. *Developmental Science*, *e13102*.
- WHO Multicentre Growth Reference Study Group, and de Onis, M. (2006). WHO motor development study: Windows of achievement for six gross motor development milestones. *Acta Paediatrica 95*, 86–95.
- Wijtzes, A. I., Kooijman, M. N., Kiefte-de Jong, J. C., De Vries, S. I., Henrichs, J., Jansen, W., ... & Raat, H. (2013). Correlates of physical activity in 2-year-old toddlers: the generation R study. *The Journal of Pediatrics*, *163*(3), 791-799.
- Zafeiriou, D. I. (2004). Primitive reflexes and postural reactions in the neurodevelopmental examination. *Pediatric Neurology*, *31*(1), 1-8.
- Zeng, N., Ayyub, M., Sun, H., Wen, X., Xiang, P., & Gao, Z. (2017). Effects of physical activity on motor skills and cognitive development in early childhood: a systematic review. *BioMed Research International*, 2017.

- Zhang, Z., Kuzik, N., Adamo, K. B., Ogden, N., Goldfield, G. S., Okely, A. D., Crozier, M., Hunter, S., Predy, M. & Carson, V. (2021). Associations between the child care environment and children's in-care physical activity and sedentary time. *Health Education & Behavior, 48*(1), 42-53.

CHAPTER OVERVIEW

7: Sensory and Perceptual Development

7.1: Introduction

Introduction to Sensory and Perceptual Development

Sensory and perceptual development is a crucial aspect of development that often gets overlooked. Our sensory system begins to form in utero and continues to develop through adulthood. It is important to note that genetic, environmental, and stress factors can affect the sensory system. We have the eyes (sight), ears (sound), nose (smell), tongue (taste), touch (skin), and two other less well-known but equally important ones, vestibular (inner ear) and proprioceptive (large muscle groups).

7.2: What is Perception?

Perception

Perception refers to the process of taking in, organizing, and interpreting sensory information. Perception is multimodal, with multiple sensory inputs contributing to motor responses (Bertenthal, 1996). An infant's turning his head in response to the visual and auditory cues of the sight of a face and the sound of a voice exemplifies this type of perception, "the fact that the senses provide overlapping information . . . is a cornerstone of perceptual development" (Bahrick, Lickliter, & Flom 2004).[1]

As infants develop increasing motor competence, they use perceptual information to decide which motor actions to take (Adolph & Joh, 2007). For example, they may adjust their crawling or walking in response to the rigidity, slipperiness, or slant of surfaces (Adolph, 1997). Motor movements, including movements of the eyes, arms, legs, and hands, provide most of the perceptual information infants receive (Adolph and Berger 2006). Young children's bodies undergo remarkable changes in the early childhood years. In describing this development, Adolph and Avolio (2000, p.1148) state, "Newborns are extremely top-heavy with large heads and torsos and short, weak legs. As infants grow, their body fat and muscle mass redistribute.[1]

In contrast to newborns, toddlers' bodies have a more cylindrical shape, and they have a larger ratio of muscle mass to body fat, especially in the legs." These changes in weight, size, percentage of body fat, and muscle strength provide perceptual/motor challenges to infants as they practice a variety of actions (Adolph & Berger, 2006). This dramatic physical development occurs within the broad context of overall growth. As infants master each challenge, their perceptual and motor behavior reflects their social environment.[1]

The extent and variety of infant perceptual and motor behavior are remarkable. Infants and toddlers spend a significant part of their days engaged in motor behavior of one type or another. By three and a half months of age, infants have made between three and six million eye movements during their waking hours (Haith, Hazen, & Goodman, 1988). Infants who crawl and walk have spent roughly half of their waking hours involved in motor behavior, approximately five to six hours per day (Adolph & Joh, 2007, p.11). Daily infants who are walking ". . . take more than 9,000 steps and travel the distance of more than 29 football fields. They travel over nearly a dozen different indoor and outdoor surfaces varying in friction, rigidity, and texture. They visit nearly every room in their homes, and they engage in balance and locomotion in the context of varied activities" (Adolph & Berger, 2006, p. 181).

Early research in motor development involved detailed observational studies that documented the progression of infant motor skills and presented an understanding of infant motor behavior as a sequence of universal, biologically programmed steps (Adolph & Berger, 2006; Bertenthal & Boker, 1997; Bushnell & Boudreau, 1993; Pick, 1989). In comparison, current research in motor development often emphasizes action in the context of behavior and development in the perceptual, cognitive, and social domains (Pick, 1989). In particular, contemporary accounts of infant motor development address (1) the strong relationship between perception and action (Bertenthal 1996; Gibson 1988; Thelen 1995), (2) the relationship between actions and the environment (Gibson 1988; Thelen 1995), and (3) the importance of motives in motor behavior, notably social and explorative motives (von Hofsten 2007). How these developing behaviors and abilities play a role in the social/emotional aspects of the child's life and functioning, such as forming early relationships and building an understanding of others, is noteworthy.[1]

The current view suggests that thinking about perceptual/motor development includes infants and toddlers with disabilities or other special needs. Children whose disabilities affect their perceptual or motor development still want to explore and interact with the people and environment around them. Although the perceptual and motor development of children with disabilities or other special needs may follow a pathway that differs from typical developmental trajectories, sensitive and responsive caregivers can provide alternative ways in which to engage children's drive to explore, building on their interests and strengths and supporting their overall physical and psychological health.[1]

For years, researchers, educators, and early childhood professionals have emphasized the interrelatedness of the developmental domains. Current research supports an even greater understanding of the relatedness and dependence of factors, domains, and processes in development (Diamond 2007). The developmental domains are linked with factors such as culture, social relationships, experience, physical health, mental health, and brain functioning (Diamond 2007). In the case of perceptual and motor behavior, Diamond (2007) has observed that perception, motor behavior, and cognition occur in the context of culture, emotion, social relationships, and experience, which influences physical and mental health and overall health brain functioning. Bertenthal (1996) has proposed that perception and motor action are interrelated rather than autonomous processes. They may be best viewed as different components of a system. Common behaviors such as reaching and turning the head for visual tracking illustrate the interrelatedness of infant development's motor, perceptual, cognitive, and social-emotional domains. Even as very

young infants, children are highly motivated to explore, gain information, attend, and engage in their physical and social environments (Gibson 1987). As Gibson (1988, pg. 5) explains, We don't simply see, we look. "Research by Berthier (1996, 811) indicates that "infant reaching is not simply a neural program that is triggered by the presence of a goal object, but that infants match the kinematics of their reaches to the task and their goals."

Perception and motor action play a key role in children's experiences and psychological processes (Thelen 1995). They also contribute to human psychological development since, ultimately, "behavior is movement" (Adolph and Berger 2005,p 223), and psychology can be defined as the study of human behavior. It has been proposed that infants' use of social information to guide their motor behavior in physically challenging or unfamiliar situations provides an excellent means to study infant social cognition (Tamis-LeMonda and Adolph 2005).[1]

---

[1] California Department of Education (CDE Press). *Perceptual and Motor Development* . Is used with permission.

7.3: Sensory Development

Overview of Sensory Development

As infants and children grow, their senses play a vital role in encouraging and stimulating the mind and in helping them observe their surroundings. Two terms are essential to understand when learning about the senses. The first is **sensation**, or the interaction of information with the sensory receptors. The second is **perception** or the process of interpreting what is sensed. Someone can sense something without perceiving it. Gradually, infants become more adept at perceiving with their senses, making them more aware of their environment and presenting more affordances or opportunities to interact with objects.[1]

Vision

What can young infants see, hear, and smell? Newborn infants' sensory abilities are significant, but their senses are not yet fully developed. Many of a newborn's innate preferences facilitate interaction with caregivers and other humans. The womb is a dark environment void of visual stimulation. Consequently, vision is the most poorly developed sense at birth. Newborns typically cannot see further than 8 to 16 inches away from their faces, have difficulty keeping a moving object within their gaze, and can detect contrast more than color differences. If you have ever seen a newborn struggle to see, you can appreciate the cognitive efforts being made to take in visual stimulation and build those neural pathways between the eye and the brain.

Although vision is their least developed sense, newborns already prefer faces. When you glance at a person, where do you look? Chances are you look into their eyes. If so, why? It is probably because there is more information there than in other parts of the face. Newborns do not scan objects this way; rather, they tend to look at the chin or another less detailed part of the face. However, by 2 or 3 months, they will seek more detail when visually exploring an object and begin showing preferences for unusual images over familiar ones, for patterns over solids, faces over patterns, and three-dimensional objects over flat images. Newborns have difficulty distinguishing between colors, but within a few months, are able to distinguish between colors as well as adults. Infants can also sense depth as binocular vision develops at about 2 months. By 6 months, the infant can perceive depth in pictures (Sen, Yonas, & Knill, 2001). Infants who have experience crawling and exploring will pay greater attention to visual cues of depth and modify their actions accordingly (Berk, 2007).[1]

Hearing

The infant's sense of hearing is very keen at birth. The ability to hear is evidenced as soon as the 5th month of prenatal development. An infant can distinguish between very similar sounds as early as one month after birth and can differentiate between a familiar and non-familiar voice even earlier. Babies who are just a few days old prefer human voices, they will listen to voices longer than sounds that do not involve speech (Vouloumanos & Werker, 2004), and they seem to prefer their mother's voice over a stranger's voice (Mills & Melhuish, 1974). In an interesting experiment, 3-week-old babies were given pacifiers that played a recording of the infant's mother's voice and of a stranger's voice. When the infants heard their mother's voice, they sucked more strongly at the pacifier (Mills & Melhuish, 1974). Some of this ability will be lost by 7 or 8 months as a child becomes familiar with the sounds of a particular language and less sensitive to sounds that are part of an unfamiliar language.[1]

Pain and Touch

Immediately after birth, a newborn is sensitive to touch and temperature and is also sensitive to pain, responding with crying and cardiovascular responses. Newborns who are **circumcised** (the surgical removal of the foreskin of the penis) without anesthesia experience pain, as demonstrated by increased blood pressure, increased heart rate, decreased oxygen in the blood, and a surge of stress hormones (United States National Library of Medicine, 2016). According to the American Academy of Pediatrics (AAP), there are medical benefits and risks to circumcision. They do not recommend routine circumcision; however, they stated that because of the possible benefits (including prevention of urinary tract infections, penile cancer, and some STDs), parents should have the option to circumcise their sons if they want to (AAP, 2012)**[1]**

The sense of touch is acute in infants and is essential to a baby's growth of physical abilities, language and cognitive skills, and socio-emotional competency. Touch impacts not only short-term development during infancy and early childhood but also has long-term effects, suggesting the power of positive, gentle touch from birth. Through touch, infants learn about their world, bond with their caregivers, and communicate their needs and wants. Research emphasizes the great benefits of touch for premature babies, but the presence of such contact has been shown to benefit all children (Stack, D. M. (2010). In an extreme example, some children in Romania were reared in orphanages in which a single care worker may have had as many as 10 infants to care for at one

time. These infants were not often helped or given toys with which to play. As a result, many of them were developmentally delayed (Nelson, Fox, & Zeanah, 2014). [1]

Taste and Smell

Not only are infants sensitive to touch, but newborns can also distinguish between sour, bitter, sweet, and salty flavors and show a preference for sweet flavors. They can distinguish between their mother's scent and that of others and prefer the smell of their mothers. A newborn placed on the mother's chest will inch up to the mother's breast, as it is a potent source of the maternal odor. Even on the first day of life, infants orient to their mother's odor and are soothed when crying by their mother's odor (Sullivan et al., 2011).[1]

Other Senses

[1] Psyc 200 Lifespan Psychology. **Authored by**: Laura Overstreet. ***CC BY: Attribution***

[2] The Brain in the First Two Years. **Provided by**: Lumen Learning, Lifespan Development ***CC BY: Attribution***

7.4: Perceptual Development

Introduction to Perceptual Development

Infants' perceptual skills are at work during every waking moment. For example, those skills can be observed when an infant gazes into a caregiver's eyes or distinguishes between familiar and unfamiliar people. Infants use perception to distinguish environment features, such as height, depth, and color. "The human infant is recognized today as 'perceptually competent'; determining just how the senses function in infancy helps to specify the perceptual world of babies" (Bornstein 2005, p 284). Infants explore objects differently depending upon object features such as weight, texture, sound, or rigidity (Palmer 1989). Parents and professionals may have observed young children exploring a slope, such as a slide, by touching it with their hands or feet before deciding whether to slide down it. Research by Adolph, Eppler, and Gibson (1993) suggests that learning plays a part in young children's decision-making in physically risky situations, such as navigating slopes, and that exploratory behavior may be a means to this learning. Perception is also strongly related to the social-emotional domain, such as when young children perceive the differences between various facial expressions and come to understand what they may mean.[1]

[1] California Department of Education (CDE Press). *Perceptual and Motor Development* . Is used with permission.

7.5: Perception and Action

Cycle of Perception and Action

A diagram with an arrow pointing both ways best describes the relationship between perception and action. Perception selects targets for action and helps us correct errors as we execute actions. Broadly speaking, there are 2 kinds of actions: navigation (moving around our environment) and reaching/grabbing.[1]

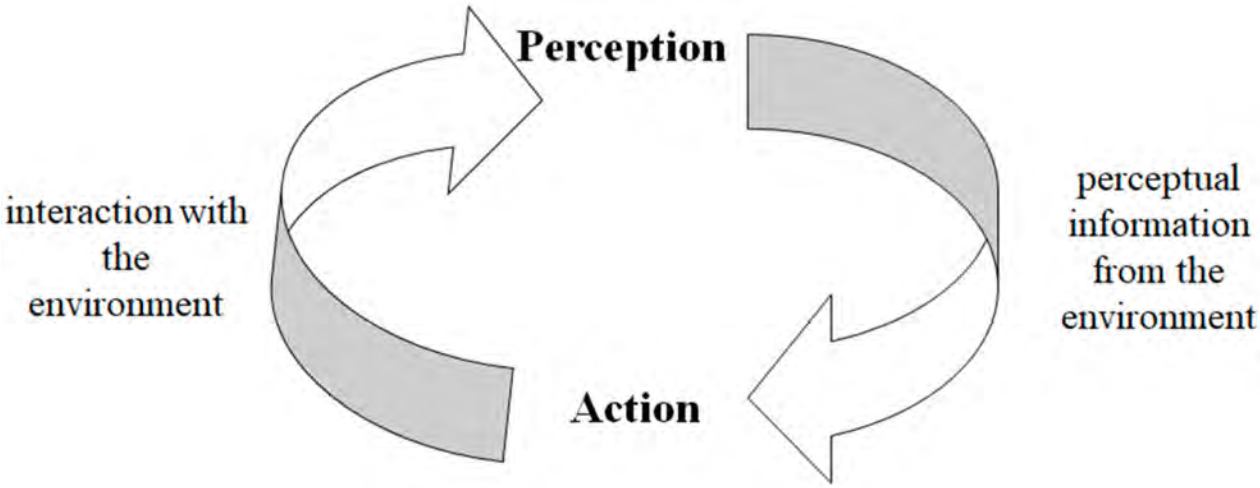


Figure 7.5.1: shows the relationship between perception and action, described as a cycle or arrows pointing back and forth. An example of this cycle is when you reach out for a bottle sitting on a slanted surface: Banks et al (2000) showed that your sense of touch updates your visual estimates of the surface slang.). ([1])

7.6: Studying Sensory Development

The Study of Sensory Development

There continues to be ongoing discussion and debate as to whether the development of multisensory processes is innate (though undoubtedly also tuned by environmental experiences) or instead develops after the child has several months of experiences with the sensory world (Dionne-Dostie et al. 2015). While objective and quantitative studies in very young children are challenging, a study by (Lewkowicz and Turkewitz 1980) measured 3–4 week-old infants' heart rates. It showed that these children could associate light and sound intensities. More recent results have shown that newborn infants can match numerosity across the senses (Izard et al. 2009) and that 4-month-old infants are sensitive to the spatial congruence of auditory-tactile events (Thomas et al. 2018). However, one constraint of most studies on infants and young children is that they are typically based on child-appropriate behavioral measures, such as preferential looking. Consequently, they provide limited insights into the putative neurobiological mechanisms and maturation of multisensory processes.[1]

[1] Maitre, N.L., Key, A.P., Slaughter, J.C. *et al.* Neonatal Multisensory Processing in Preterm and Term Infants Predicts Sensory Reactivity and Internalizing Tendencies in Early Childhood. *CC BY*

7.7: Sensory Processing Differences

Understanding Sensory Processing Differences

Sensory processing and integration are complex neurodevelopmental functions that allow children to regulate, perceive, discriminate, and use sensory input experienced from the environment and their bodies to respond, learn, and adapt daily effectively. Sensory processing disorder (SPD) has been described as a distinct neurodevelopmental disorder in the literature (Schoen et al., 2009; Jorquera-Cabrera et al., 2017; Crasta et al., 2020). It now has been recognized in the most recent version of the diagnostic classification of mental and developmental disorders of infancy and early childhood-revised (DC: 0–5, zero to three). Sensory processing abilities develop naturally and play essential roles in child learning, behavior and emotional regulation, motor development, and task performance. Sensory processing disorder has been defined as the brain's inability to organize sensory input for appropriate use. As stated in the DC: 0–5, zero to three-manual, SPD is diagnosed based on difficulties in detecting, modulating, interpreting, or organizing sensory stimuli to the extent that these deficits impair daily functioning and participation. However, the question of whether deficits in sensory processing represent the symptoms of another disorder, such as autism spectrum disorder (ASD), developmental coordination disorder (DCD), or SPD is its distinct condition remains (Borkowska and Sklodowska, 2017).[1]

The American Academy of Pediatrics [AAP], 2012 recommended that SPD generally should not be diagnosed citing that there is no universally accepted framework for the SPD diagnosis. Although sensory processing problems were recognized as important to identify and address, the AAP stated that there lacked evidence to solidly demonstrate that children presenting with sensory-based problems have an actual "disorder" of the brain's sensory pathways. They concluded sensory processing deficits were likely associated with other developmental and behavioral disorders. This view, however, does not account for children who present with sensory processing deficits affecting their daily life who do not meet the diagnostic criteria for any other disorder[1].

Experts in the field characterized tSPD as having three main types: [1]

- **sensory modulation disorder (SMD):** Sensory modulation refers to the ability to notice and react to, regulate, adapt to, and grade responses that are appropriate to the sensory situations experienced in daily life.
- **Sensory discrimination disorder (SDD);** Sensory discrimination disorder refers to problems with accurately perceiving and interpreting sensory information coming in or experienced from one or more of the sensory systems (Miller et al., 2007; Lane and Reynolds, 2020; Parham and Mailloux, 2020). Discrimination abilities allow for recognizing qualitative and quantitative sensory features and differences among various objects and experiences processed through the sensory systems. People with this type can register sensory stimuli. However, appreciating or detecting the qualities of a given stimulus is a challenge and can occur with one or more sensory systems.
- **Sensory-based motor disorder (SBMD),** is further divided into subtypes (Miller et al., 2007).
    - **Sensory over-responsivity (SOR):** Atypical behaviors associated with SOR are characterized by intense, exaggerated responses to sensory events that most children do not perceive as negative or obnoxious, often resulting in withdrawal and avoidance behavior.
    - **Sensory under-responsivity (SUR):** Atypical behaviors with SUR include muted or slowed responses to sensory experiences, often with an apparent lack of awareness, lethargy and/or indifference, or diminished responsivity.
    - **Sensory craving (SC);** is sometimes referred to as sensory seeking. Atypical behavior associated with SC includes a need for more intense sensory input than what one would typically want, or that would naturally occur, often manifesting as inappropriate, disruptive, disorganized and/or risky behavior (Miller et al., 2007, 2017; James et al., 2011; Schoen et al., 2014).

Prevalence estimates of iSPD range from 5 to 16% of children in the general population, while 60–90% of children with coexisting neurodevelopmental conditions such as autism spectrum disorder (ASD) have been estimated to have sensory problems (Ahn et al., 2004; Ben-Sasson et al., 2009; James et al., 2011; Galiana-Simal et al., 2020; Jussila et al., 2020). Mulligan et al. (2019) reported that 20% of the children in their sample had a co-occurring disorder while the remaining 80% had not been diagnosed with another neurodevelopmental disorder. [1]

Unfortunately, there are a limited number of diagnostic assessment tools available to evaluate the sensory processing abilities of children, and no tool is available for explicitly identifying and measuring the SPD types as described by Miller et al. (2007).[1]

Research evidence is building regarding how sensory processing deficits manifest within various populations and how iSPD may be differentiated among children with other neurodevelopmental conditions. As high as 90% of children with ASD have sensory

processing difficulties, with the most common pattern of SPD being the SOR modulation subtype (Schoen et al., 2009; Tavassoli et al., 2014; Tomchek et al., 2014; Little et al., 2018). Children with ASD were more under-reactive to auditory stimuli but over-reactive to taste and smell.

Sensory under-responsivity has been associated with depressive symptoms and internalizing behaviors, while externalizing behaviors have been more related to sensory craving, and over-reactivity. Studies demonstrating how the symptoms of children with iSPD differ from those seen in children with other neurodevelopmental conditions, including ADHD and ASD are particularly relevant for supporting SPD as its own diagnostic entity. Miller et al. (2012) compared clinical assessment findings among samples of neurotypicals, children with ADHD, those with SMD, and those with dual diagnoses. All clinical groups had significantly more sensory, attention, activity, impulsivity, and emotional difficulties than typical children. [1]

---

[1] Mulligan S, Douglas S and Armstrong C (2021) Characteristics of Idiopathic Sensory Processing Disorder in Young Children **CC BY**

7.8: Conclusion

Conclusion of Sensory and Perceptual Development

Sensory and perceptual development is intriguing and something that infant/toddler caregivers need to understand and incorporate in their caregiving practices. Development of the sensory system begins in utero and doesn't end. Infant and toddler curriculum should include multiple sensory experience options throughout the day every day. The importance of sensory and perceptual development should be expounded on often to families and caregivers, as it lays a foundation for life, beginning at the very beginning.

7.9: References

References of Sensory and Perceptual Development

- Adolph, K. E., and A. S. Joh. 2007. “Motor Development: How Infants Get Into the Act,” in Introduction to Infant Development (Second edition). Edited by A. Slater and M. Lewis. New York: Oxford University Press.
- Adolph, K. E. 1997. “Learning in the Development of Infant Locomotion,” Monographs of the Society for Research in Child Development, Vol. 62, No. 3, Serial No. 251
- Adolph, K. E., and S. E. Berger. 2005. “Physical and Motor Development,” in Developmental Science: An Advanced Textbook (Fifth edition). Edited by M. H. Bornstein and M. E. Lamb. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Adolph, K. E., and S. E. Berger. 2006. “Motor Development,” in Handbook of Child Psychology: Volume 2: Cognition, Perception, and Language (Sixth edition). Series Editors: W. Damon and R. Lerner. Volume Editors: D. Kuhn and others. New York: John Wiley and Sons.
- Adolph, K. E., and A. M. Avolio. 2000. “Walking Infants Adapt Locomotion to Changing Body Dimensions,” *Journal of Experimental Psychology: Human Perception and Performance*, Vol. 26, No. 3, 1148–66.
- Ahn, R. R., Miller, L. J., Milberger, S., and McIntosh, D. N. (2004). Prevalence of parents’ perceptions of sensory processing disorders among kindergarten children. *Am. J. Occup. Ther.* 58, 287–293. doi: 10.5014/ajot.58.3.287
- American Academy of Pediatrics [AAP] (2012). Policy statement: sensory integration therapies for children with developmental and behavioral disorders. *Pediatrics* 129, 1186–1189. doi: 10.1542/peds.2012-0876
- Bahrick, L. E.; R. Lickliter; and R. Flom. 2004. “Intersensory Redundancy Guides the Development of Selective Attention, Perception, and Cognition in Infancy,” *Current Directions in Psychological Science*, Vol. 13, No. 3, 99–102.
- Berk, L. (2007). *Development Through the Lifespan* (4th ed.) (pp 137). Pearson Education. ↵
- Ben-Sasson, A., Carter, A. S., and Briggs-Gowan, M. J. (2009). Sensory over-responsivity in elementary school: prevalence and social-emotional correlates. *J. Child Psychol.* 37, 705–716. doi: 10.1007/s10802-008-9295-8
- Bertenthal, B. I., and S. M. Boker. 1997. “New Paradigms and New Issues: A Comment on Emerging Themes in the Study of Motor Development,” *Monographs of the Society for Research in Child Development*, Vol. 62, No. 3, 141–51.
- Bertenthal, B. I. 1996. “Origins and Early Development of Perception, Action and Representation,” *Annual Review of Psychology*, Vol. 47, 431–59.
- Borkowska, A. R., and Sklodowska, M. C. (2017). Sensory processing disorders: diagnostic and therapeutic controversies. *Curr. Issues Pers. Psychol.* 5, 196–205. doi: 10.5114/cipp.2017.70140
- California Department of Education (CDE Press). *Perceptual and Motor Development* . Is used with permission.
- Circumcision Policy Statement. *Pediatrics*. Retrieved from **https://pediatrics.aappublications.org/content/130/3/585** ↵
- Crasta, J. E., Salzinger, E., Lin, M. H., Gavin, W. J., and Davies, P. L. (2020). Sensory processing and attention profiles among children with sensory processing disorders and autism spectrum disorders. *Front. Integr. Neurosci*. 14:22. doi: 10.3389/fnint.2020.00022
- Diamond, A. 2007. “Interrelated and Interdependent,” *Developmental Science*, Vol. 10, No. 1, 152–58.
- Dionne-Dostie E, Paquette N, Lassonde M, Gallagher A (2015) Multisensory integration and child neurodevelopment. Brain Sci 5:32–57. https://doi.org/10.3390/brainsci5010032
- Galiana-Simal, A., Vela-Romero, M., Romero-Vela, V., Oliver-Tercero, N., García-Olmo, V., Benito-Castellanos, P. J., et al. (2020). Sensory processing disorder: key points of a frequent alteration in neurodevelopmental disorders. *Cogent. Med.* 7:1. doi: 10.1080/2331205X.2020.1736829
- Gibson, E. J. 1988. “Exploratory Behavior in the Development of Perceiving, Acting and the Acquiring of Knowledge,” *Annual Review of Psychology*, Vol. 39, No. 1, 1–41.
-
- Hamill, J., Lim, J., & van Emmerik, R. (2020). Locomotor Coordination, Visual Perception and Head Stability during Running. *Brain Sciences*, *10*(3), 174. MDPI AG. Retrieved from http://dx.doi.org/10.3390/brainsci10030174 his is an open access article distributed under the **Creative Commons Attribution License** which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited
- Izard V, Sann C, Spelke ES, Streri A (2009) Newborn infants perceive abstract numbers. Proc Natl Acad Sci USA 106:10382–10385. https://doi.org/10.1073/pnas.0812142106
- James, K., Miller, L. J., Schaaf, R., Nielsen, D. M., and Schoen, S. A. (2011). Phenotypes within sensory modulation dysfunction. *Compr. Psychiary.* 52, 715–724. doi: 10.1016/j.comppsych.2010.11.010

- Jussila, K., Junttila, M., Kielinen, M., Ebeling, H., Joskitt, L., Moilanen, I., et al. (2020). Sensory abnormality and quantitative autism traits in children with and without Autism spectrum disorder in an epidemiological population. *J. Autism Dev. Disord.* 50, 180–188. doi: 10.1007/s10803-019-04237-0
- James, K., Miller, L. J., Schaaf, R., Nielsen, D. M., and Schoen, S. A. (2011). Phenotypes within sensory modulation dysfunction. *Compr. Psychiary.* 52, 715–724. doi: 10.1016/j.comppsych.2010.11.010
- Jorquera-Cabrera, S., Romero-Ayuso, D., Rodriguez-Gil, G., and Triviño-Juárez, J. M. (2017). Assessment of sensory processing characteristics in children between 3 and 11 years old: a systematic review. *Front. Pediatr.* 5:57. doi: 10.3389/fped.2017.00057
- Little, L. M., Dean, E., Tomchek, S., and Dunn, W. (2018). Sensory processing patterns in autism, attention deficit hyperactivity disorder, and typical development. *Phys. Occup. Ther. Pediatr.* 38, 243–254. doi: 10.1080/01942638.2017.1390809
- Lane, S., and Reynolds, S. (2020). "Sensory discrimination function and disorders," in *Sensory Integration Theory and Practice*, 3rd Edn, eds A. Bundy and S. Lane (Philadelphia,PA: F.A. Davis), 181–205.
- Lewkowicz DJ, Turkewitz G (1980) Cross-modal equivalence in early infancy: auditory-visual intensity matching. Dev Psychol 16:597–607. https://doi.org/10.1037/0012-1649.16.6.597
- Miller, L. J., Anzalone, M., Lane, S., Cermak, S., and Osten, E. (2007). Concept evolution in sensory integration: a proposed nosology for diagnosis. *Am. J. Occup. Ther.* 61, 135–140. doi: 10.5014/ajot.61.2.135
- Miller, L. J., Nielson, D. M., and Schoen, S. A. (2012). Attention deficit hyperactivity disorder: a comparison of behavior and physiology. *Res. Dev. Disabil.* 33, 804–818. doi: 10.1016/j.ridd.2011.12.005
- Mulligan, S., Schoen, S., Miller, L., Valdez, A., Wiggins, A., Hartford, B., et al. (2019). Initial studies of validity of the sensory processing 3-dimensions scale. *Phys. Occup. Ther. Pediatr.* 39, 94–106. doi: 10.1080/01942638.2018.1434717
- Mulligan S, Douglas S and Armstrong C (2021) Characteristics of Idiopathic Sensory Processing Disorder in Young Children. *Front. Integr. Neurosci.* 15:647928. doi: 10.3389/fnint.2021.647928 **Creative Commons Attribution License (CC BY)**
- Maitre, N.L., Key, A.P., Slaughter, J.C. *et al.* Neonatal Multisensory Processing in Preterm and Term Infants Predicts Sensory Reactivity and Internalizing Tendencies in Early Childhood. *Brain Topogr* **33,** 586–599 (2020). https://doi.org/10.1007/s10548-020-00791-4
- Nelson, C. A., Fox, N. A., and Zeanah, C. H. (2014). Romania's abandoned children: Deprivation, brain development, and the struggle for recovery. Cambridge, MA, and London, England: Harvard University Press. ↵
- Parham, D., and Mailloux, Z. (2020). "Sensory integration," in *Case Smith's Occupational Therapy for Children and Adolescents*, 8th Edn, eds J. Clifford O'Brian and H. Kuhaneck's (St. Louis, MO: Elsevier Inc.), 516–549.
- Psyc 200 Lifespan Psychology. **Authored by**: Laura Overstreet. **Located at**: **http://opencourselibrary.org/econ-201/**. **License**: ***CC BY: Attribution***
- Schoen, S. A., Miller, L. J., Brett-Green, B. A., and Nielsen, D. M. (2009). Physiological and behavioral differences in sensory processing: a comparison of children with Autism spectrum disorder and sensory modulation disorder. *Front. Integr. Neurosci* 3:29. doi: 10.3389/neuro.07.029.2009/full
-
- Stack, D. M. (2010). Touch and Physical Contact during Infancy: Discovering the Richness of the Forgotten Sense. The Wiley-Blackwell Handbook of Infant Development, 532-567 ↵
- Sullivan, R., Perry, R., Sloan, A., Kleinhaus, K., & Burtchen, N. (2011). Infant bonding and attachment to the caregiver: insights from basic and clinical science. Clinics in perinatology, 38(4), 643–655. doi:10.1016/j.clp.2011.08.011 ↵
- Tamis-LeMonda, C. S., and K. E. Adolph. 2005. "Social Cognition in Infant Motor Action," in The Development of Social Cognition and Communication. Edited by B. Homer and C. S. Tamis-LeMonda. Mahwah, NJ: Lawrence Erlbaum Associates.
- Thelen, E. 1995. "Motor Development: A New Synthesis," *American Psychologist*, Vol. 50, No. 2, 79–95.
- The Brain in the First Two Years. **Provided by**: Lumen Learning, Lifespan Development. **Located at**: **https://courses.lumenlearning.com/lifespandevelopment2/chapter/physical-development/**. **License**: ***CC BY: Attribution***
- Tavassoli, T., Brandes-Aitken, A., Chu, R., Porter, L., Schoen, S., Miller, L. J., et al. (2019). Sensory over-responsivity: parent report, direct assessment measures, and neural architecture. *Mol. Autism* 10:4. doi: 10.1186/s13229-019-0255-7
- Thomas RL, Misra R, Akkunt E, Ho C, Spence C, Bremner AJ (2018) Sensitivity to auditory-tactile colocation in early infancy. Dev Sci. https://doi.org/10.1111/desc.12597
- Tomchek, S. D., Huebner, R. A., and Dunn, W. (2014). Patterns of sensory processing in children with an autism spectrum disorder. *Res. Autism Spectr. Disord.* 8, 1214–1224. doi: 10.1016/j.rasd.2014.06.006
- von Hofsten, C. 2007. "Action in Development," *Developmental Science*, Vol. 10, No. 1, 54–60.

CHAPTER OVERVIEW

8: Overview of Cognitive Development

8.1: Introduction

Introduction to Cognitive Development

Imagine all of your thoughts as if they were physical entities, swirling around inside your mind. How is it possible that your brain is able to move from one thought to the next in an orderly fashion? Our brains are always active as they endlessly perceive, process, plan, organize, and remember. Upon waking each morning, you begin thinking—contemplating the tasks that you must complete that day. In what order should you run your errands? Should you go to the bank, the cleaners, or the grocery store first? Can you get these things done before you head to class or will they need to wait until school is done? These thoughts are one example of cognition at work. Simply put, cognition is thinking, and it encompasses the processes associated with perception, knowledge, problem solving, judgment, language, and memory. In this section we will learn about how cognition develops in infancy and toddlerhood. [1]

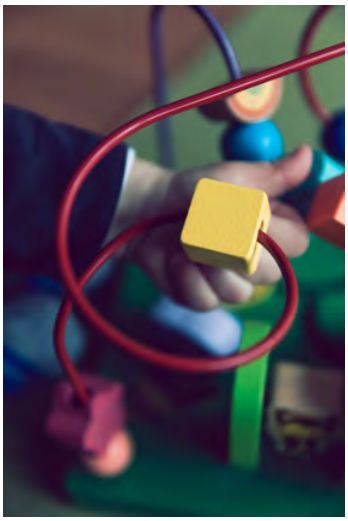


Figure 8.1.1: Child pausing to examine a yellow block. ([2])

[1] Spielman et al., (2020). Psychology. *OpenStax*. Licensed under CC by 4.0

[2] Image from Markus Spiske on Unsplash

8.2: Studying Cognition- Jean Piaget

Jean Piaget

The scientific study of cognitive development in young children traces its roots back to the 20th century to Jean Piaget, a pioneer in the field of child development (Piaget, 1954, 1983). Piaget described children as active learners who, through continuous interactions with their environments, construct a complex understanding of the physical world around them. From infancy to adolescence, children progress through four cognitive stages: (1) the sensorimotor stage from birth to 2 years (when cognitive functioning is based primarily on motor reflexes and perceptions); (2) the preoperational stage from 2 to 7 years (when symbolic thought and language become prevalent, but reasoning is illogical by adult standards); (3) the concrete operational stage from 7 to 12 years (when logical reasoning abilities emerge but are limited to concrete objects and events); and (4) the formal operational stage at around 12 years (when thinking about abstract, hypothetical, and contrary-to-fact ideas becomes possible). The sensorimotor stage can further be divided into six substages. The sensorimotor substages divide the first two years of life into phases. Each substage builds upon the previous stage as the child's cognition develops. During the first two years, Piaget stressed the central role sensory and motor abilities have on supporting early cognition. According to Piaget, infant and toddler cognitive development is primarily driven by motor and sensory interactions with the environment. [1]

While Piaget's theory of cognitive development continues to be foundational in understanding infant and toddler cognition, Piaget's theory has many limitations. For example, research has revealed that infants have internal mechanisms of learning, not just motor and sensory abilities, that drive cognitive development such as the automatic number system and statistical learning (Saffran & Kirkham, 2018; Wang & Feigenson, 2021). Some researchers believe infants are born with core knowledge – innate systems that help infants learn about the physical and social world around them (Spelke & Kinzler, 2007; Stahl & Feigenson, 2019). Another limitation to his theory is that Piaget underestimated the cognitive abilities of infants and toddlers. As an example, Piaget (1954) suggested that object permanence did not begin to develop until 8 to 12 months of age, as indicated by younger infants' failures to search for hidden objects, but research has since discovered object permanence develops much earlier, around three to six months of age (Baillargeon, 1987; Bremner, Slater & Johnson, 2015). [1]

[1] Houdé & Borst (2014). Measuring inhibitory control in children and adults: brain imaging and mental chronometry. *Frontiers in Psychology, 5*, 616. CC by 4.0

8.3: How is Infant and Toddler Cognition Studied?

Studying Cognition

Infants' emerging understanding of the physical and social world is commonly investigated by using violation-of-expectation experiments. In violation-of-expectation experiments, unexpected events that violate physical or social rules lead to different responses in infants' gaze behavior (Baillargeon, 2004), pupil dilation (Jackson & Sirois, 2009), and brain responses (Köster, Langeloh, & Hoehl, 2019). For example, infants detect impossible physical events, such as a ball rolling through a wall (Spelke et al., 1992), changes in numbers, such as when the number of toys changes (Simon, Hespos, & Rochat, 1995), or irrational human actions, such as a pretzel that is put toward the ear instead of the mouth (Reid et al., 2009). Interesting research on the development of moral cognition used the violation-of-expectation paradigm and a cookie scenario, presented in Figure 8.3.1, to study the possibility that young infants might expect resources to be divided equally between similar recipients (Dawkins, Sloane & Baillargeon, 2019). Infants as young as four months of age expected an experimenter to divide two cookies equally between two similar animated puppets, and they detected a violation (measured by longer looking time) when the researcher divided them unequally instead.[1] [2]

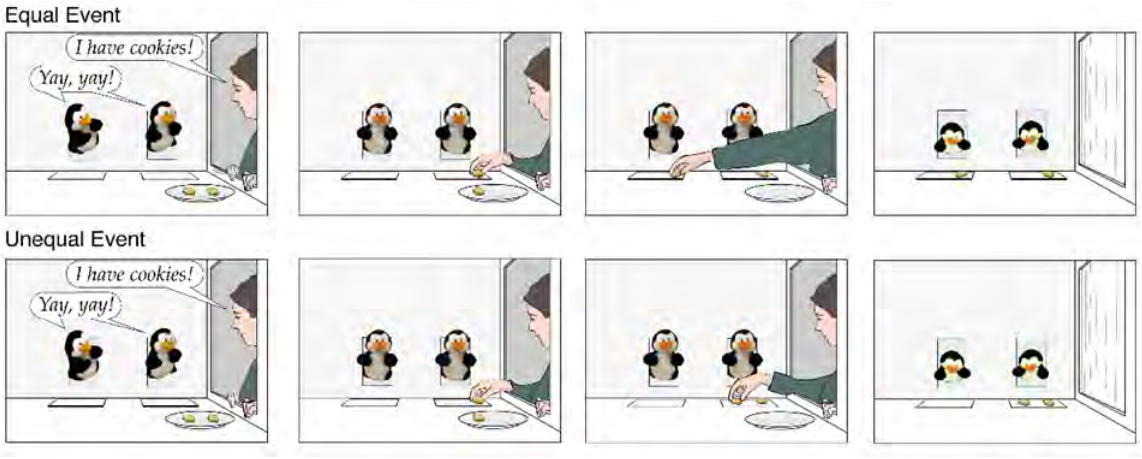


Figure 8.3.1: Example of how an experiment on moral cognition used violation-of-expectation. ([3])

A second common method to study cognition in infants and toddlers is called habituation. Many prominent studies of infant cognition over the past two decades have relied on the fact that infants habituate to repeated stimuli – i.e. that their looking times tend to decline upon repeated stimulus presentation (Aslin, 2007; Oakes, 2010). Habituation is one of the earliest cognitive processes to emerge in development (Colombo & Mitchell, 2009) and reflects a basic form of learning: once a stimulus is fully encoded in the mind, the infant habituates to it and demonstrates decreased attention to the stimulus. Researchers have found that the duration of time to habituate in infancy accounts for up to 30 percent of the variance in cognitive ability at older ages (Bornstein & Sigman, 1986; Colombo, 1993; Miller et al., 1980). This indicates that habituation provides important insight into early cognition as it relates to the development of more complex cognitive abilities later in childhood.[4]

To illustrate how habituation is used to research cognition, one study explored the visual habituation of objects in hearing and deaf non-signing infants and toddlers (Monroy et al., 2019). The children were shown one of the objects in Figure 8.3.2 until they habituated to it (three consecutive trials in which the mean looking time to the stimulus was less than or equal to 50% of the mean looking time during the first three habituation trials). After habituation, the infant was then presented with randomized trials containing both a new object (not shown in the habituation phase) and the familiar object (shown in the habituation phase). Findings revealed that deaf infants were slower to habituate to and demonstrated a lower look-away rate than hearing infants. Evidence from prior studies suggests that the 'look-away' rate—brief eye gaze shifts away from the target stimulus during habituation—reflects processing efficiency and attentional control (Bahrick et al., 2016). One explanation for these results is that deaf infants' cognitive development may be protracted because of delayed language development (these deaf infants already had or were waiting to receive a cochlear implant and all of them had limited access to a fully-accessible language, like sign language).[4]

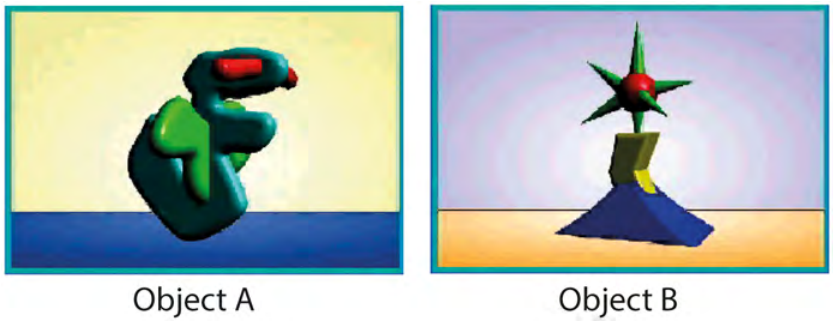


Figure 8.3.2: Examples of objects used in an infant habituation experiment. ([5])

[1] Köster et al., (2020). Making sense of the world: infant learning from a predictive processing perspective. *Perspectives on Psychological Science, 15*(3), 562-571. CC by 4.0

[2] Buyukozer et al., (2019). Do infants in the first year of life expect equal resource allocations? *Frontiers in Psychology, 10*, 116. CC by 4.0

[3] Image from Buyukozer et al., (2019). Do infants in the first year of life expect equal resource allocations? *Frontiers in Psychology, 10*, 116. CC by 4.0

[4] Monroy et al., (2019). Visual habituation in deaf and hearing infants. *PloS One, 14*(2), e0209265. CC by 4.0

[5] Image from Monroy et al., (2019). Visual habituation in deaf and hearing infants. *PloS One, 14*(2), e0209265. CC by 4.0

8.4: Cognitive Milestones, 2-36 months

Milestones of Cognitive Development

Infants and toddlers are constantly learning about the world as they experience it and actively engage with it during the first three years of life. Milestones represent what most children can do by specific ages; however, it is important to remember that children do not achieve these milestones at the same exact ages--milestones only represent the average age at when they are achieved. If a child has not achieved specific milestones by a specific age, it does not necessarily suggest a delay or disability; however, there are specific ages where if certain milestones are not achieved, caregivers should encourage the child's parents to communicate with their family pediatrician. Here is a table of some of the cognitive milestones infants and toddlers typically develop.

What most children can do at each age

Age	What Most Children Can Do By Each Age [1]
2 months	● Pay attention to faces ● Begin to follow things with their eyes and recognize people at a distance ● Begin to act bored (cry, act fussy) if activity doesn't change
4 months	● Let you know if they are happy or sad ● Respond to affection ● Reach for a toy with one hand ● Use their hands and eyes together, such as seeing a toy and reaching for it ● Follow moving things with their eyes from side to side ● Watch people's faces closely ● Recognize familiar people and things at a distance
6 months	● Look around at things nearby ● Bring things to their mouth ● Show curiosity about things and try to get things that are out of reach ● Begin to pass things from one hand to the other
9 months	● Watch the path of something as it falls ● Look for things they see you hide ● Play peek-a-boo ● Put things in their mouth ● Move things smoothly from one hand to the other ● Pick up things like cereal o's between thumb and index finger
12 months	● Explore things in different ways, like shaking, banging and throwing ● Find hidden things easily ● Look at the right picture or thing when it's named ● Copy gestures ● Start to use things correctly; for example, drink from a cup, brush hair with a brush ● Bang two things together ● Put things in a container and take things out of a container ● Let things go without help ● Poke with index (pointer) finger ● Follow simple directions like "pick up the toy"
18 months	● Know what ordinary things are for; for example, telephone, brush, and spoon ● Point to get the attention of others ● Show interest in a doll or stuffed animal by pretending to feed them ● Point to one body part ● Scribble on their own ● Can follow 1-step verbal commands without any gestures; for example, sits when you say "sit down"

Age	What Most Children Can Do By Each Age [1]
24 months	● Find things even when hidden under two or three covers ● Begin to sort shapes and colors ● Complete sentences and rhymes in familiar books ● Play simple make-believe games ● Build towers of 4 or more blocks ● Might use one hand more than the other ● Follow two-step instructions such as “Pick up your shoes and put them in the closet.” ● Name items in a picture book such as a cat, bird, or dog
36 months	● Can work toys with buttons, levers, and moving parts ● Play make-believe with dolls, animals, and people ● Do puzzles with 3 or 4 pieces ● Understand what “two” means ● Copy a circle with a pencil or crayon ● Turn book pages one at a time ● Build towers of more than 6 blocks ● Screw and unscrew jar lids or turn door handles

[1] CDC’s Developmental Milestones by the Centers for Disease Control and Prevention is in the public domain.

8.5: Cognitive Development Concerns

Concerns

The above chart represents averages of when infants and toddlers achieve various cognitive milestones. What about children who do not achieve these milestones by the ages listed? While children can indeed develop different abilities at different times, too great a delay in acquiring specific milestones can be a concern. The information in Figure# is from the Center for Disease Control and Prevention (CDC). The chart adopts a proactive stance--we should take action early when developmental concerns arise rather than the perspective of waiting to see if a child "catches up". Again, while children do develop at individual paces, being proactive during these critical early years is essential. The chart below lists milestones that, if children are not achieving by specific ages, caregivers should encourage parents to communicate with their family's pediatrician. Most caregivers are not professionally trained to officially assess the developmental abilities of children; however, caregivers have the ability to track developmental progress and are often the first to notice developmental concerns.

When to encourage parents to communicate with a pediatrician

Age	Encourage parents to communicate with their family's pediatrician if: [1]
By 4 months	● Child doesn't watch things as they move ● Child doesn't smile at people
By 6 months	● Child doesn't try to get things that are in reach ● Child shows no affection for caregivers ● Child has difficulty getting things to mouth ● Child doesn't respond to sounds around him ● Child doesn't laugh or make squealing sounds
By 9 months	● Child doesn't play any games involving back-and-forth play ● Child doesn't respond to own name ● Child doesn't seem to recognize familiar people ● Child doesn't look where you point ● Child doesn't transfer toys from one hand to the other
By 12 months	● Child doesn't search for things that she sees you hide ● Child doesn't say single words like "mama" or "dada" ● Child doesn't learn gestures like waving or shaking head ● Child doesn't point to things ● Child loses skills he once had
By 18 months	● Child doesn't point to show things to others ● Child doesn't know what familiar things are for ● Child doesn't copy others ● Child doesn't gain new words ● Child doesn't have at least 6 words ● Child doesn't notice or mind when a caregiver leaves or returns ● Child loses skills he once had
By 24 months	● Child doesn't use 2-word phrases (for example, "drink milk") ● Child doesn't know what to do with common things, like a brush, phone, fork, spoon ● Child doesn't copy actions and words ● Child doesn't follow simple instructions ● Child loses skills she once had
By 36 months	● Child drools or has very unclear speech ● Child can't work simple toys (such as peg boards, simple puzzles, turning handle) ● Child doesn't speak in sentences ● Child doesn't understand simple instructions ● Child doesn't play pretend or make-believe ● Child doesn't want to play with other children or with toys ● Child doesn't make eye contact ● Child loses skills he once had

[1] CDC's Developmental Milestones by the Centers for Disease Control and Prevention is in the public domain

8.6: Cognitive Processes

Processes of Cognition

Imagine being an infant, what would learning about the world be like? From the sounds, sights and smells, there would be a lot of new things to try to make sense of! Indeed, the potential information available in the environment is both voluminous and complex. This led William James to coin his famous phrase about “the blooming, buzzing confusion” that confronts the newborn (James, 1890). Contrary to what James thought, infants show remarkable feats of learning as they make sense of the world, beginning in the last trimester of fetal life and accelerating through infancy and toddlerhood. But how is it that infants are able to learn in such complex environments? Let’s next discuss various cognitive processes during infancy and toddlerhood. [1]

[1] Kidd et al., (2012). The Goldilocks effect: Human infants allocate attention to visual sequences that are neither too simple nor too complex. *PloS One*, *7*(5), e36399. CC by 4.0

8.6.1: Imitation

Infant Imitation

Imitation of others' behavior is considered a central means of learning, specifically for social cognition and the learning of cultural norms (Goertz et al., 2011; Kugiumutzakis & Trevarthen, 2015; Meltzoff & Marshall, 2018). Imitation has been defined in numerous ways, emphasizing the matching of either the form of movements, the outcomes, or the intentions of an action. The often cited findings from Meltzoff and Moore (1977; 1983), that newborns imitate adult facial expressions, has been called into question. Recent research has been unable to replicate their findings and has pointed out critical weaknesses and limitations in those early newborn imitation studies (Kennedy-Costantini et al., 2017; Oostenbroek et al., 2016; Oostenbroek et al., 2018; Slaughter, 2021).[1]

Figure 8.6.1.1: Infant imitating an adult sticking their tongue out. ([2])

While newborn imitation continues to be debated, it is clear that imitation plays a role in learning for older infants and toddlers. It has been found that 12 to 18 month-olds learn one to two novel actions every day, merely by observing others around them (Barr & Hayne, 2003). Rather than imitating everything and everyone, however, infants tend to be selective in their imitative behavior, a tendency that is present beginning around 12 months of age (Schwier et al., 2006; Zmyj, Daum & Aschersleben, 2009). For example, in one study researchers presented a novel head action to two groups of 14-month-olds whereby the model illuminated a light-box with her forehead by sitting in a chair and leaning forward until her head pressed on the light-box (Gergely, Bekkering & Király, 2002). While one group of infants observed the unusual head action with the model freely resting her hands next to the light box (hands-free condition), the other group observed a demonstration of the identical head action, but the model had her hands occupied by holding a blanket wrapped around her torso (hands-occupied condition). Figure 8.6.1.2 illustrates the two conditions. The majority (69%) of infants in the hands-free condition imitated this novel action of using their forehead to turn on the light-box, whereas only 21% of infants did so in the hands-occupied condition. The authors argued the results suggest that infants inferred that the model must have had good reasons to freely choose to perform the unusual action in the hands-free condition, whereas the model would have used her hands in the hands-occupied condition if she was not using her hands to hold the blanket. As a result, while imitation can be a great way to learn, the imitation process for infants and toddlers is complex as they consider various factors that may influence what actions of adults are rational or logical before imitating.[3] [4]

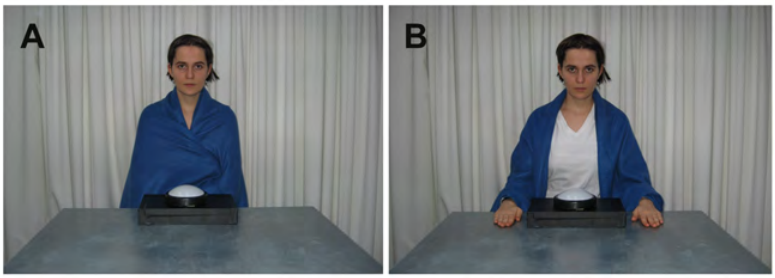


Figure 8.6.1.2: Images of the two conditions in the light-box experiment. (C[5])

As imitation is one way infants and toddlers learn about the world, caregivers can support cognitive development through imitation by including infants and toddlers in everyday care routines and by demonstrating more complex actions during play and social interactions. Care routines (e.g., diapering, meal time, etc.,) can sometimes become more like adult-driven chores if caregivers quickly rush through with the goal of completion. However, care routines often involve complex actions that can be rich learning opportunities for young children to watch, imitate and learn from. For example, the care routine of meal time involves motor movements to support pouring, scooping, holding, passing, etc., and also involves the learning of social patterns such as waiting, turn taking, manners etc.,. These motor actions and social patterns may be challenging for young toddlers, but are important as they practice these skills and are able to participate more in the meal time routine. Instead of preparing individual plates ahead of time and out of the sight of the children, plates can be prepared and shared in their presence. A family-style meal presentation where food and drinks are served at the table with toddlers, allows for them to be able to watch, imitate and learn from the meal time routine. Additionally, during play and social interactions, caregivers who are engaged with infants and toddlers and demonstrate different ways to use and play with materials encourage infants and toddlers to imitate similar actions as they learn about how the world works.

[1] Paukner et al., (2017). Testing the arousal hypothesis of neonatal imitation in infant rhesus macaques. *PLoS One*, *12*(6), e0178864. CC by 4.0

[2] Image by HeatherDawnKemp on Pixabay.

[3] Gellén & Buttelmann (2017). Fourteen-month-olds adapt their imitative behavior in light of a model's constraints. *Child Development Research*. CC by 4.0

[4] Beisert et al., (2012). Rethinking 'rational imitation in 14-month-old infants: A perceptual distraction approach. *PloS One*, *7*(3), e32563. CC by 4.0

[5] Image from Beisert et al., (2012). Rethinking 'rational imitation in 14-month-old infants: A perceptual distraction approach. *PloS One*, *7*(3), e32563. CC by 4.0

8.6.2: Categorization

Concept of Categorization

Infants and toddlers are constantly experiencing new and recurring objects and events. The ability to form categories is a core cognitive ability that helps organize these experiences. Without categorization, we would treat every entity we encounter (e.g., every golden retriever) as unique. Identifying a category to which an object or entity belongs (e.g., a dog, a retriever) permits us to make inferences that go beyond our immediate experience with that entity (e.g., retrievers bark, have sharp teeth, etc.). Categorization, therefore, is a fundamental cognitive process, and one that is especially important for infants and toddlers who encounter new objects, entities, and events every day.[1] [2]

Figure 8.6.2.1: Infant with different categories of objects. ([3])

A considerable body of research reveals that in the first months of life, infants can already successfully and spontaneously form object categories of animals, vehicles, and geometric shapes (Balaban & Waxman, 1997; Novack et al., 2021; Quinn, Eimas & Tarr, 2001). For example, Figure 8.6.2.2 shows a sample of stimuli used in a categorization experiment with 3 to 4 month old infants (Ferry, Hespos & Waxman, 2010). In the familiarization phase, infants were shown various types of dinosaurs, varying in color. In the test phase, infants saw two objects in the same color, one dinosaur (familized object) and one non-dinosaur object not shown in the familiarization phase (novel object). To measure categorization, infants' looking time at the objects in the test phase was measured. The results demonstrate that already by 3 to 4 months of age, infants are cognitively forming categories of objects they encounter.[1] [2]

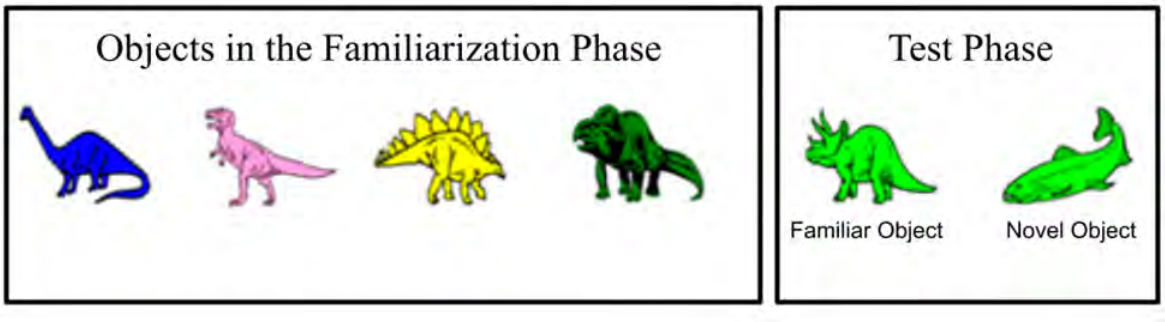


Figure 8.6.2.2: Example stimuli from infant categorization research. ([4])

By 12 months, however, infants reach a turning point where what matters is not whether infants are listening to language in general, but more precisely, what is being said about specific objects. By 12 months, infants track not only which objects and which words are presented, but also how the words and objects are paired together (Waxman & Braun, 2005). Specifically, when infants hear the same label with each object, the labels highlight commonalities between them and thus facilitate their categorization, whereas when infants hear a distinct label for each object, the labels highlight their differences and thus facilitate their individuation (Dewar & Xu, 2007; Xu, Cote & Baker, 2005).[5]

The research on categorization suggests that young infants begin categorizing objects by 3 to 4 months of age and that language promotes categorization. Therefore caregivers can support categorization through learning experiences and language use. With learning experiences, caregivers can provide play objects and manipulatives where similarities and differences can be easily

identified through color, size, texture and shape. Objects within and across categorical boundaries are also important. For example, objects of one type of animal such as fish can be provided alongside another type of animal, such as birds. This can help children identify commonalities within the category of fish and differences across the categories of fish and birds. To promote categorization with language, caregivers can be purposeful with the language they use by labeling objects within and across categories and highlighting similarities and differences between objects. Figure 8.6.2.3 shows a toddler holding three leaves. Each leaf is a different color, size and shape. As a caregiver, what words or phrases could you use to support a toddler's categorization process when playing with these leaves?

Figure 8.6.2.3: Categorization of Leaves. ([6])

[1] Althaus et al., (2020). Infant categorization as a dynamic process linked to memory. *Royal Society Open Science*, *7*(10), 200328. CC by 4.0

[2] Kadlaskar et al., (2020). Does human touch facilitate object categorization in 6-to-9-month-old infants? *Brain Sciences*, *10*(12), 940. CC by 4.0

[3] Image from Shirota Yuri on Unsplash

[4] Image adapted from Kadlaskar et al., (2020). Does Human Touch Facilitate Object Categorization in 6-to-9-Month-Old Infants? *Brain Sciences*, *10*(12), 940. CC by 4.0

[5] Ferguson et al., (2015). The precision of 12-month-old infants' link between language and categorization predicts vocabulary size at 12 and 18 months. *Frontiers in Psychology*, *6*, 1319. CC by 4.0

[6] Image from Markus Spiske on Unsplash

8.6.3: Numerical Cognition

Understanding Numbers

Evidence suggests that there is an innate, non-symbolic sense of quantity that gives rise to our basic numerical intuitions. The Approximate Number System (ANS) allows humans and non-human animals to estimate quantities without explicitly counting. For example, if you look at the two images in Figure 8.6.3.1, which image has more dots than the other? Can you figure it out by simply looking at the two images--without counting any of the dots? While this example is slightly challenging because the number of dots in the two images is similar, in experiments like this, using dots, infants have the innate ability to distinguish between various quantities.[1]

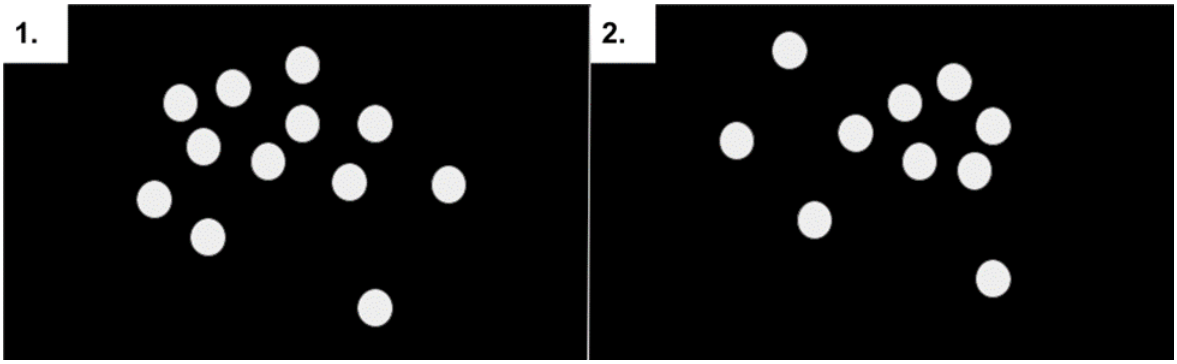


Figure 8.6.3.1: The Approximate Number System Test. ([2])

The ANS is present at birth as newborns are able to discriminate object sets if the ratio is at least 1:3 (e.g., arrays of 4 vs.12 dots) (Izard et al., 2009). The ability to discriminate between displays of large numbers, known as number acuity (efficiency), improves throughout childhood (Halberda & Feigenson, 2008) with dramatic changes in number acuity observed within the first year of life. In a visual only comparison, four month olds can discriminate between a 1:4 ratio but not a change to a 1:3 ratio; however, if audio and visual information are both provided, four month olds can discriminate between a 1:3 ratio, but not a change to a 1:2 ratio (Wang & Feigenson, 2021). Six-month-old infants can reliably discriminate between sets with a ratio of 1:2 (e.g., arrays of 8 vs.16 dots) but cannot discriminate between sets with a 2:3 ratio (e.g., arrays of 8 vs.12 dots) (Feigenson, 2011; Xu & Spelke, 2000). By about 9 to 10 months of age, infants are able to discriminate 2:3 ratios (e.g., arrays of 8 vs. 12 dots) but fail with 4:5 ratios (e.g., arrays of 8 vs.10 dots) (Lipton & Spelke, 2003; Xu & Arriaga, 2007; Xu & Spelke, 2000).[3]

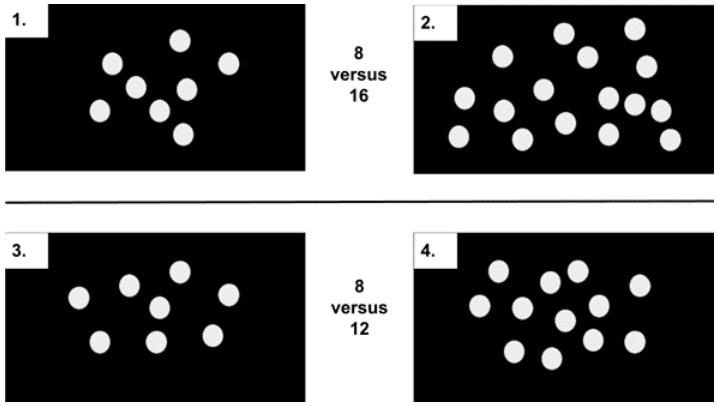


Figure 8.6.3.2: Number acuity: 6 month olds can discriminate between sets with a ratio of 1:2 (e.g., arrays of 8 vs.16 dots) but cannot discriminate between sets with a 2:3 ratio (e.g., arrays of 8 vs.12 dots). ([4])

Number acuity in infancy is related to later mathematical performance throughout childhood, adolescence and the adult years (Halberda et al., 2008; Mazzocco, Feigenson & Halberda, 2011; Libertus, Feigenson & Halberda, 2013; Starr, Libertus & Brannon, 2013). To illustrate, one study (Starr, Libertus & Brannon, 2013) placed two monitors in front of six month olds. One monitor always displayed the same number of dots (although the dots changed, varying in placement array) and the other monitor changed between various numbers of dots and placement array. Some infants spent more time looking at the monitor that displayed the changing numbers of dots than other infants. The researchers then followed the same children into preschool where they measured

various math abilities. Results showed that the infants who spent more time looking at the monitor that displayed the changing numbers of dots had greater mathematical skills as preschoolers.

While early number acuity may be inborn, other numerical abilities are not and develop overtime. Children come to understand the meaning of exact number words very slowly (Wynn, 1990, 1992). English-speaking children first learn the meaning of the word "one" around two-and-a-half years of age but lack knowledge of numbers larger than one. About four to five months after learning the meaning of "one," children understand the word "two" but not larger numbers, such as "three" or "four." It takes several more months for children to display knowledge of the word "three." Not until children are three or four years of age do they fully grasp the cardinality principle—that each number word refers only to an exact set of that quantity with the last number in the count list referring to the total number of items in the set (Carey, 2009). [5]

Figure 8.6.3.3: Toddler using an abacus ([6])

Before infants and toddlers may fully understand the meaning of specific number words, they show an early sensitivity to counting. Eighteen-month-old infants showed a preference for correctly ordered counting sequences; that is, although they were unable to recite the count list themselves, they recognized and preferred to listen to the correct order of the number words (Ip et al., 2018). Similarly, 14 to 18 month-old infants appear to be able to use their ability to recognize the count list to help them overcome typical memory limits (Wang & Feigenson, 2019). Infants generally display working memory capacity limits of three items and fail to remember the number of hidden items when it exceeds this limit (Feigenson & Carey, 2003). However, when objects are counted before being hidden, infants are able to overcome this memory limit (Wang & Feigenson, 2019). Thus, even though toddlers may not grasp the full meaning of number words, they may still be aware of the numerical nature of these words and may be able to use counting knowledge despite lacking precise representations of the quantities.

Figure 8.6.3.4: CNumbered stepping stones. ([7])

Although research suggests ANS to be innate, ANS is only an early foundation to support mathematical development. As mathematical knowledge continues to develop, caregivers play a critical role in supporting it. Infants and toddlers build early foundations for math during play and daily care routines. Young children naturally explore math concepts as they play, and caregivers support their math knowledge and vocabulary with the language they use. Caregivers can use math talk during care routines by discussing spatial concepts like, "I'm going to pick you *up*" or they can compare the size of their shoes as they get ready to go outside, "Your shoes are *smaller* than my shoes." Caregivers can use math language during mealtimes: "How many

blueberries do you have left? Do you need more?" The more math language children hear each day, the greater the growth of their math knowledge. [8]

Additionally, infants and toddlers need time and space to play in open-ended ways with varied materials to boost their emerging math skills. Caregivers can introduce math concepts like size and shape, and spatial words like in, between, and under during any type of play or routine. Create and look for patterns in the environment and point them out to children. Find patterns in your clothing or around the environment like stripes on a rug and point them out to children while using math language to describe the patterns. Indoor and outdoor environments present unlimited ways that we can discuss math. When working with infants and toddlers, purposefully look around the environment and at the materials being used for math concepts you can discuss. [8]

---

[1] Ma et al., (2021). Approximate number sense in students with severe hearing loss: A modality-neutral cognitive ability. *Frontiers in Human Neuroscience*, *15*, 296. CC by 4.0

[2] Image by Todd LaMarr. CC by 4.0

[3] Zorzi & Testolin (2018). An emergentist perspective on the origin of number sense. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *373*(1740), 20170043. CC by 4.0

[4] Image by Todd LaMarr is licensed under CC by 4.0.

[5] Silver et al., (2021). Measuring Emerging Number Knowledge in Toddlers. *Frontiers in Psychology*, 3057. CC by 4.0

[6] Image from luis arias on Unsplash

[7] Image from Eric Tompkins on Unsplash

[8] "Supporting Math Skills in Infants and Toddlers" from Head Start's Early Childhood Learning and Knowledge Center is in the public domain.

8.6.4: Executive Functions

Purpose of Executive Functions

Executive functions are a complex set of cognitive abilities, which enable us to coordinate mental processes, manipulate information, solve new problems, sequence information, inhibit non-useful responses and generate new strategies to accomplish goals in a flexible way (Diamond, 2012; Henry, Messer, & Nash, 2012; Miyake & Friedman, 2012). Most executive function research focuses on three core areas: inhibition; working memory and cognitive flexibility, which some suggest underpin other more complex executive functions such as planning, problem solving, reasoning, etc., (Friedman & Miyake, 2017). [1]

Executive functions play an important role in the everyday life of infants and toddlers, allowing them to focus attention on specific tasks, to engage in successful problem solving, and to plan for their next action. Executive functions begin to emerge early in infancy, with basic skills needed for executive functions emerging before three years of age, and more specific skills developing in early childhood (Garon, Bryson & Smith, 2008). It has been suggested that each component of executive function develops at its own rate across childhood and adolescence, reaching maturity at different ages (Diamond, 2013). The gradual acquisition of executive functions relate to the development of the prefrontal cortex and other brain areas from infancy to adulthood (Fiske & Holmboe, 2019; Thompson, 2016; Tsujimoto, 2008). [2] [3]

Figure 8.6.4.1 depicts the growth of executive function abilities in infants and toddlers from 9 to 30 months of age (Hendry & Holmboe, 2021). This data highlights two important findings. First, executive function abilities improve with age, a consistent finding across studies (Hendry et al., 2016; Putnam et al., 2006). As Figure 8.6.4.1 shows, there is a steady increase in executive function skill across the first thirty months. Second, there are early individual differences already evident by the end of the first year. This means that at any given age, some infants and toddlers have greater executive function abilities than others. Understanding early differences could be important as preschool and kindergarten children's performance on executive function tests is correlated with academic achievement (for both mathematical and literacy assessments) in the U.S., South Korea, Taiwan, and China (McClelland et al., 2014; Ponitz et al., 2009; Wanless et al., 2011). [4]

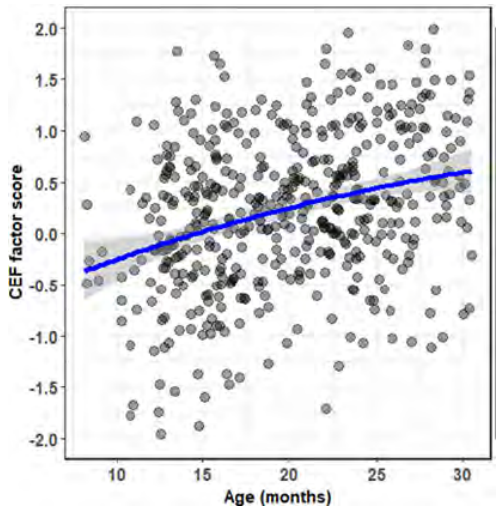


Figure 8.6.4.1: Cognitive Executive Function (CEF) scores by age. (C[1])

Next, let's look at the three core areas of executive function, inhibition, working memory and cognitive flexibility, more in depth.

Inhibition

Inhibition, or inhibitory control, is a child's ability to stop a dominant response and demonstrate more adaptive and/or socially acceptable behavior (Diamond, Kirkham, & Amso, 2002; Rennie, Bull, & Diamond, 2004). Inhibition is important in the successful execution of tasks by providing the child with the flexibility and freedom to choose and control their actions (Dowsett & Livesey, 2000), for instance, by waiting for one's turn, sharing or cleaning up toys before playing somewhere else. [6]

The developmental trajectory of inhibition begins towards the end of the first year of life (Diamond, 2002, Diamond et al., 2007, Garon et al., 2008, Wolfe & Bell, 2007) with research suggesting that some early forms of inhibitory and attentional control emerge already at around 6 months of age (Courage, Reynolds, & Richards, 2006; Holmboe, Bonneville-Roussy, et al., 2018). Inhibition

skills develop rapidly between the ages of 22 and 33 months (Carlson, 2005; Kochanska, Murray, & Harlan, 2000), and the proportion of time children can successfully wait improves significantly between the ages of 30 and 42 months (Caughy, Mills, Owen, & Hurst, 2013). Following this, inhibition shows a rapid improvement during the toddler and preschool years (Friedman et al., 2011, Garon et al., 2008, Garon et al., 2014, Holmboe, Larkman, et al., 2018, Simpson & Riggs, 2005), increasing at a more steady pace throughout middle childhood (Best & Miller, 2010, Best et al., 2009), before eventually reaching adult levels in early adolescence (van den Wildenberg & van der Molen, 2004, Williams et al., 1999). [6] [7]

As infants and toddlers grow, caregiver–child interactions have an important impact on the development of children's inhibition skills. Well-organized infant and toddler classroom environments and caregivers' use of clear, proactive strategies in supporting behavior create predictability within the classroom that further enables the child to gain a sense of control and exhibit appropriate behavior while inhibiting more inappropriate behaviors (Salminen et al., 2021). Children's ability to show better inhibition control in classrooms also relates to the caregivers' sensitivity and responsiveness towards children's needs and developing skills. Children's feelings of frustration can be reduced by creating a safe and welcoming environment, showing interest in supporting infants' and toddlers' autonomy, understanding their way of seeing the world, and supporting their willingness to attend to learning activities in a personally meaningful way (Hamre & Pianta, 2005; Ladd, Birch, & Buhs, 1999). These caregiver practices of sensitivity and responsiveness may further indicate to children that their own actions and decisions matter, hence sending out stronger signals of how to behave in an acceptable way. [6]

The concept of caregiver mind-mindedness is related to (but distinct from) that of sensitivity, but is also related to the development of inhibition. Mind-mindedness refers to a caregiver's proclivity to treat an infant as an "individual with a mind rather than merely as a [child] with needs that must be satisfied" (Meins, Fernyhough, Fradley & Tuckey, 2001). For example, if, during a game of peek-a-boo, the infant signals that they are overstimulated (e.g., by turning away from the caregiver, tuning out, frantic movements, etc.), the caregiver's appropriate understanding of the behavioral signal in terms of the child's internal states (e.g., feeling overwhelmed) is critical in guiding the caregiver's reaction. When the caregiver accurately understands the signal, they are more likely to show an attuned response: pause the game, enabling the infant's autonomic system to recover from the heightened arousal. Conversely, when the caregiver does not have a mind-minded perspective, they may not see or may misinterpret the infant's signal and are more likely to continue the peekaboo game. The infant then does not experience recovery from heightened physiological arousal in a way that is matched to his or her current state of being. [8] [9] [10]

One way to know a caregiver's level of mind-mindedness is to measure the proportion of attuned comments in which a caregiver refers to a child's desires, cognitions and emotions (Meins, Fernyhough, Fradley & Tuckey, 2001). Despite only about 10% of caregiver verbal comments being mind-mindedness comments that accurately reflect the child's internal state (Helmerhorst, Colonnesi & Fukkink, 2019), caregiver mind-mindedness of infants at nine months of age predicts children's developing inhibitory control at 2 and 3 years of age (Cheng, Lu, Archer & Wang, 2018). There are cultural differences in the level of mind-mindedness of caregivers. Mind-mindedness was lower in Chinese and Hong Kong caregivers compared to caregivers in the U.K. and Canada (Bernier, Carlson & Whipple, 2010; Hughes, Devine & Wang, 2017). [8] [9]

Working Memory

Working memory refers to a child's ability to hold information in memory long enough to successfully complete a task, for instance, remembering simple instructions and then performing accordingly (Adams, Bourke, & Willis, 1999). For a toddler, this can be seen in completing a task with two parts (e.g., "take your paintbrush to the sink and wash your hands") or remembering simple rules in a game or in play. The basic components of working memory start to develop across the child's first year of life, while more complex working memory abilities, such as updating or manipulating representations develop during toddlerhood and throughout the preschool period (Alloway, Gathercole, Willis, & Adams, 2004; Gathercole, 1998; Pelphrey & Reznick, 2002). [6]

Cognitive Flexibility

Cognitive flexibility, the ability to shift between different tasks or goals, is considered a key aspect of executive functions, allowing individuals to regulate their thoughts and actions adaptively Jurado & Rosselli, 2007; Miyake et al., 2000). Cognitive flexibility is sometimes also referred to by shifting, attention switching, or task switching, and includes both the ability to disengage from irrelevant information in a previous task and to focus on relevant information in a forthcoming task (Monsell, 2003). Thus, cognitive flexibility enables one to think divergently, change perspective and adapt to a continuously changing environment. [11]

There is sparse research on the development of cognitive flexibility in infants and toddlers, as most research finds even 3 year olds struggle on tasks of cognitive flexibility. The Dimensional Change Card Sorting (DCCS) task is widely used to measure the cognitive flexibility of children. The DCCS task asks children to sort cards (e.g., a red rabbit and a blue boat) with one of the two

target cards (e.g., a red boat and a blue rabbit) according to one rule (e.g., by color), and then after several successful trials, switch to another rule (e.g., by shape). Previous findings using the DCCS task indicated that most 3-year olds had difficulty switching between the dimensions, but by age 4, most children could successfully switch to the new rule (Perner & Lang, 2002; Zelazo, Frye & Rapus, 1996). Cognitive flexibility matures along a steep slope during early childhood (Diamond, 2006; Garon et al., 2008) and this is thought to be driven by neurodevelopmental changes in the prefrontal cortex (Diamond, 2002; Ezekiel et al., 2013). [12]

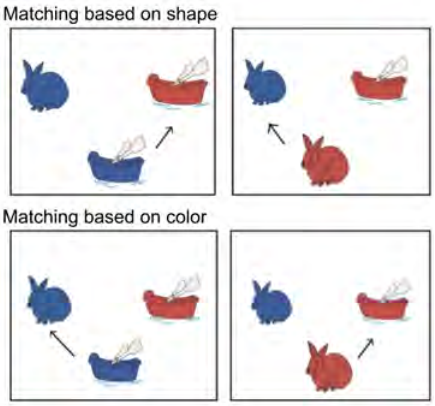


Figure 8.6.4.2: Examples from a Dimensional Change Card Sorting (DCCS) task. ([12])

There are important cultural differences in early executive function skills. Findings from cross-cultural investigations suggest that children from Eastern cultures (e.g., Chinese) typically perform better on executive function tasks than their Western counterparts (Sabbagh et al., 2006; Oh & Lewis, 2008; Lewis et al., 2009; Lan et al., 2011; Grabell et al., 2015). Different explanations have been proposed. While children from Eastern cultures are expected to have mastery of impulse control around 2 years of age, children from Western cultures are not expected to be able to do so until the preschool years (Chen et al., 1998). This could create opportunities for Chinese children to be taught the importance of self-control (Ellefson et al., 2017) and start practicing executive function skills at an earlier age than their U.S. counterparts (Sabbagh et al., 2006). In a collectivist culture like China, children practice and learn how to behave in society through adult modeling of the “acceptable” behaviors (Jian, 2009). On the other hand, individual choices and negotiation are valued elements in caregiving practices in individualistic cultures (Greenfield et al., 2006). According to Lan and colleagues (2011), the difference of educational styles between countries (e.g., China and the U.S.) is the major reason for the variation in executive function skills. While being able to control one's behavior, attention and concentration are a central element of Chinese education, self-expression and decision-making freedom are more of the focus in U.S. education (Song & Jinyu, 2016). [13]

The overall behaviors and practices of infant and toddler caregivers have a significant role in the development of executive functions (Bernier, Carlson & Whipple, 2010; Fay-Stammbach, Hawes & Meredith, 2014). Stephanie Carlson (2003) argued that caregiving contributes to the development of executive function through three primary aspects of interaction (scaffolding behavior, stimulation, and sensitivity) and that each has different effects on executive function.

Scaffolding refers to how caregivers verbally and non-verbally guide and instruct children during challenging tasks (Lewis & Carpendale, 2009), support children’s autonomous exploration, and encourage children to make decisions autonomously to solve problems (Matte-Gagn & Bernier, 2011). For example, a caregiver might provide gentle guidance to a child frustrated by an ever-collapsing block tower by placing the larger blocks at the base. The strategies provided by caregivers tell children not only what to do, but also ways to think, guiding improvements in cognitive control, inhibition and the ability to think flexibly during problem-solving.

Sensitivity represents a caregiver’s ability to perceive and accurately interpret the signals shown explicitly or implicitly in an infant’s behavior, and to then respond appropriately (Pederson et al., 1990). Children who experience their environments as predictable and consistent are inclined to achieve higher-level self-regulation in their early lives and are more motivated to gain cognitive control (Carlson, 2003). For example, caregiver-toddler interactions that are warm and responsive predict longitudinal effortful control performance and delay of gratification (inhibition) ability (Kochanska et al., 2000; Sethi et al., 2000).

Stimulation covers the wide range of interactions between caregivers and children, such as the creation of environments for cognitive skill development through activities like reading (Bradley et al., 2011) and playing together (Rome-Flanders, Cronk & Gourde, 1995). Caregiver language has specifically been found to play a critical role in children’s later executive processing

(Daneri et al., 2019; Landry et al., 2002). For example, caregiver verbal scaffolding during problem-solving tasks shows both concurrent and longitudinal associations with executive function in early childhood (Bernier et al., 2010; Hammond et al., 2012; Hughes & Ensor, 2009). This research emphasizes the importance of developmentally-appropriate activities that also challenge infants and toddlers accompanied by sensitive scaffolding by caregivers. [14] [15]

---

[1] Mason et al., (2021). Executive function training for Deaf children: Impact of a music intervention. *Journal of Deaf Studies and Deaf Education*, *26*(4), 490-500. CC by 4.0

[2] Ferguson et al., (2021). The developmental trajectories of executive function from adolescence to old age. *Scientific Reports*, *11*(1), 1-17. CC by 4.0

[3] Keil et al., (2021). Family environment and development in children adopted from institutionalized care. *Pediatric Research*, 1-9. CC by 4.0

[4] Legare et al., (2018). Cultural variation in cognitive flexibility reveals diversity in the development of executive functions. *Scientific Reports*, *8*(1), 1-14. CC by 4.0

[5] Hendry & Holmboe (2021). Development and validation of the early executive functions questionnaire: A carer-administered measure of executive functions suitable for 9-to 30-month-olds. *Infancy*. CC by 4.0

[6] Salminen et al., (2021). Teacher–child interaction quality and children's self-regulation in toddler classrooms in Finland and Portugal. *Infant and Child Development*, e2222. CC by 4.0 NC

[7] Fiske & Holmboe (2019). Neural substrates of early executive function development. *Developmental Review, 52*, 42-62. CC by 4.0

[8] Colonnesi, et al., (2021). Mind-mindedness in out-of-home Care for Children: Implications for caregivers and child. *Current Psychology*, 1-13. CC by 4.0

[9] Longobardi et al., (2021). Maternal mind-mindedness and communicative functions in free-play and mealtime contexts: Stability, continuity and relations with child language at 16 months. *Journal of Child Language*, 1-26. CC by 4.0

[10] Zeegers et al., (2018). Mothers' and fathers' mind-mindedness influences physiological emotion regulation of infants across the first year of life. *Developmental Science*, *21*(6), e12689. CC by 4.0

[11] Buttelmann & Karbach (2017). Development and plasticity of cognitive flexibility in early and middle childhood. *Frontiers in Psychology, 8*, 1040. CC by 4.0

[12] Yi et al., (2012). Visual scanning patterns during the dimensional change card sorting task in children with autism spectrum disorder. *Autism Research and Treatment*. CC by 3.0

[13] Metaferia et al., (2021). Parents' views on play and the goal of early childhood education in relation to children's home activity and executive functions: A cross-cultural investigation. *Frontiers in Psychology, 12*. CC by 4.0

[14] Cheng et al., (2018). Quality of maternal parenting of 9-month-old infants predicts executive function performance at 2 and 3 years of age. *Frontiers in Psychology, 8*, 2293. CC by 4.0

[15] Devine et al., (2016). Executive function mediates the relations between parental behaviors and children's early academic ability. *Frontiers in Psychology, 7*, 1902.

8.6.5: Self-Regulation

Development of Self-Regulation

Infants have the ability to express themselves through vocalizations, facial expressions and movements of their body. For example, upon hearing a loud unexpected sound, an infant may close their eyes, tense their body and cry to express their internal state. However, while they can express themselves, infants have limited capacity for self-regulation. Self-regulation is the ability to control behavior and responses in adaptive ways across a variety of dimensions, including attention, emotion, behavior, and cognition (Calkins, 2007; Calkins & Fox, 2002). Self-regulation is a cornerstone of healthy development (Robson, Allen & Howard, 2020; Thompson, 2016) and has been linked to the development of language, mathematics, reading, and literacy skills (von Salisch et al., 2015; Bohlman & Downer, 2016; Lin et al., 2016). Consider the strategies you personally use for self-regulation. When you feel scared, anxious, unmotivated or distracted, what strategies have you discovered that help you regulate your internal state?

Figure 8.6.5.1: Caregiver helping a child self-regulate ([1]

During infancy, the early beginning of self-regulation can be seen in infants' responses to input from caregivers and the environment (Samdan et al., 2020). The ongoing development of motor skills, attention, and emotion subsequently influence the development of self-regulation abilities (Calkins, 2007), as infants and toddlers begin to recruit newly developed skills for self-regulating. Whereas a young infant relies upon the caregiver to distract them from an unfavorable experience, an older infant can control their eyes and/or head to purposefully look away and a toddler can use newly developed motor abilities to independently crawl or walk away. [2]

It is important to recognize that processes of self-regulation might differ across cultures (Jaramillo et al., 2017). The strategies an individual uses to modify their internal states and behaviors are immersed in a cultural context that gives priority to prevailing values and outcomes in the socialization process. In this way, caregivers shape an infant's developing self-regulation skills and at the same time communicate culturally-appropriate socioemotional norms and expectations. As an example, two studies (Harwood et al., 1999; Carlson and Harwood, 2003) compared socialization goals and practices of European American and Puerto Rican toddler caregivers. In line with their socialization goals, European American caregivers preferred educational practices that gave children learning opportunities. They structured learning situations indirectly, as they used suggestions and verbal approvals to guide children to act in a certain way, while giving them much room to choose for themselves what to exactly do. Puerto Rican caregivers, instead, tended to use more authority to teach children the ways of acting, according to what they expected. They intervened physically more often (e.g., by physically moving children to do something), used more explicit signals to obtain children's attention, and gave more direct orders than European American caregivers. [3]

Caregivers are instrumental in the development and maintenance of self-regulatory abilities among infants and toddlers. As they develop, infants transition from dependence on caregivers for help in self-regulating to more autonomous self-regulation. Let's return to and provide more information about the scenario of the infant who hears a loud unexpected sound presented at the beginning of this topic. Eli, 3 months old, is a new child in the infant room at a child care center. Ms. Williams, his primary caregiver, learned from his family what techniques work best to calm Eli when he is upset. One day, a loud noise from the street suddenly wakes Eli and he starts to cry. Ms. Williams lifts him from his crib and holds him close, swaying from side to side until he relaxes and returns to sleep. [4] [5]

As infants have limited self-regulation abilities, the role of caregivers is essential. By responding to the infant in a way that meets their needs, the caregiver supports the infant's emerging regulatory abilities. As the example from the scenario highlights, Eli was able to express his internal state, but he depended on his caregiver to help him regulate his internal state. Soothing by holding and

rocking or by reorienting a child's attention is a common practice for regulating distress. The caregiver's regulating actions not only soothe the infant, but also demonstrate to the infant, culturally-appropriate strategies for self-regulation.

[1] Photo from Paul Hanaoka on Unsplash

[2] Schworer et al., (2021). Early regulatory skills and social communication development in infants with Down Syndrome. *Brain Sciences*, *11*(2), 208. CC by 4.0

[3] Jaramillo et al., (2017). Children's self-regulation in cultural contexts: The role of parental socialization theories, goals, and practices. *Frontiers in Psychology*, *8*, 923. CC by 4.0

[4] "Emotional and Behavioral Self-Regulation" by Head Start ECLKC is in the public domain.

[5] Finlay-Jones et al., (2021). Caregiver-mediated interventions to support self-regulation among infants and young children (0–5 years): A protocol for a realist review. *BMJ Open*, *11*(6), e046078. CC by 4.0 NC

8.6.6: Persistence

Development of Persistence

As toddlers continue to grow, their developing abilities will lead them to taking on more challenging tasks such as climbing new obstacles and playing with toys in more complex ways, such as stacking blocks to create tall towers. But when these tasks become challenging, what determines when a toddler will give up or demonstrate persistence? Persistence in childhood has repeatedly been associated with positive outcomes. Persistence at 6 months predicts cognitive development at 14 months (Banerjee & TamisLeMonda, 2007), persistence at 3 years predicts language and math skills in kindergarten (Mokrova et al., 2013), and persistence in childhood predicts later academic achievement (Meier & Albrecht, 2003), success at career work, and healthy relationships, well into adulthood (Duckworth, Peterson, Matthews, & Kelly, 2007; EskreisWinkler, Duckworth, Shulman, & Beal, 2014). [1]

Figure 8.6.6.1: Persisting in a difficult task. ([2])

During challenging tasks, we consider the costs and rewards for continued persistence. Recent work has provided evidence that young children also consider costs and rewards when making decisions. For example, 18-month-olds weigh the expected costs and benefits of their actions when deciding whether to help an adult construct a tower composed of blocks of different weights (Sommerville et al., 2018). When toddlers were presented with a task researchers purposefully created to be impossible to do, increased failure led to decreased effort by toddlers (Radovanovic et al., 2021). Interestingly, toddlers who attempted various strategies during the impossible task persisted for longer in trying to do it. This research emphasizes the importance of developmentally-appropriate activities for infants and toddlers as well as the importance for caregivers to demonstrate different approaches to solve challenges. [1]

One factor that influences even very young children's decisions about when to persist and when to give up is the behavior of the adults in their environment (Kamins & Dweck, 1999; Lucca, Horton & Sommerville, 2019). For example, toddlers tend to make generalizations about when to persist based on adult behavior. When 15-month-olds observed an adult work hard to achieve a particular goal (e.g. trying different strategies, repeating actions), they themselves attempted to activate a novel toy more times than toddlers who observed an adult succeed after little to no effort (Leonard, Lee & Schulz, 2017). Thus, our persistence with challenging tasks as caregivers, are demonstrations for infants and toddlers to learn about persistence themselves. [1]

[1] Rett & Walker (2020). Knowing when to quit: Children consider access to solutions when deciding whether to persist. *Cognitive Science*. CC by 4.0

[1] Photo by Alexander Dummer on Unsplash

8.6.7: Spatial Skills

Development of Spatial Skills

Spatial skills refer to the cognitive processing of spatial information, which “involves shapes, locations, paths, relations among entities and relations between entities and frames of reference” (Newcombe & Shipley, 2015). Spatial abilities are an important part of cognitive development because early spatial skills are associated with map use (Liben et al., 2013), numerical skills (Zhang, 2016; Cornu et al., 2018; Fanari et al., 2019), math reasoning and knowledge (Casey et al., 2015; Rittle-Johnson et al., 2019), early writing skills (Bourke et al., 2014), motor skills (Jansen & Heil, 2010), and executive functions (Lehmann et al., 2014; Frick and Baumeler, 2017). [1]

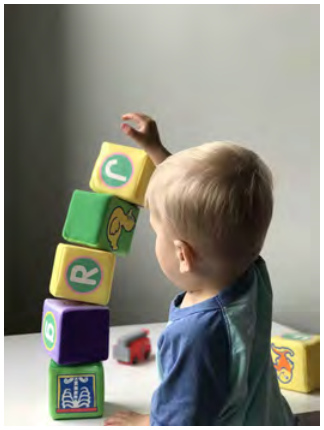


Figure 8.6.7.1: Toddler stacking blocks ([2])

Spatial thinking often involves mental rotation. Mental rotation refers to the ability to imagine how an object that has been seen from one perspective would look if it were rotated in space into a new orientation and viewed from the new perspective. This ability is crucial even for infants because from soon after birth they are confronted with and must cognitively represent moving and rotating objects in their natural environment. Whether a caregiver or a favorite toy, infants must learn how to recognize people and objects when viewed from different orientations. Figure 8.6.7.2 provides an example of a test item frequently used to measure mental rotation. At the top is an image of a “same” stimulus in which the object on the right is the same as the object on the left, just rotated. At the bottom is an image of a “different” stimulus, no matter how the image on the left is rotated, it cannot be represented by the image on the right. [3] [4] [5]

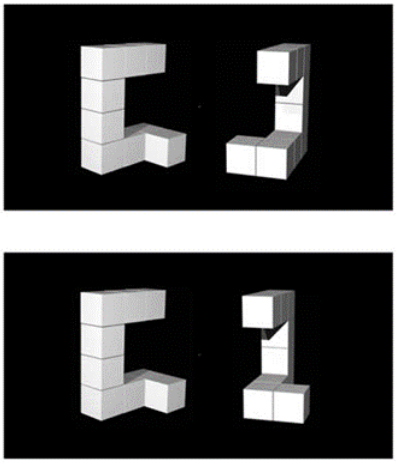


Figure 8.6.7.2: Example of a mental rotation test item. ([6])

Several studies have reported mental rotation abilities in infants as young as 3 to 5 months of age with greater abilities in boys than in girls in early infancy (Constantinescu et al., 2018; Johnson & Moore, 2020; Lauer et al., 2015; Quinn & Liben, 2014). As an example, Moore and Johnson (2008) habituated three month old infants to a video of an object, like in Figure 8.6.7.3 as it rotated around its vertical axis. Then, in test trials, infants saw the same object (just rotated) or a different object (its mirror image). In

Figure 8.6.7.4image A represents the “back side” of the habituation object seen in Figure 8.6.7.4(thus it is the same image, just rotated). In Figure 8.6.7.4image B represents the mirror-image of the object seen in image A. The results of the study revealed that only the boys, not the girls, differentiated between the same and the mirror object. Thus, mental rotation is developed already by three months of age, with a gender difference favoring males in the ability to mentally rotate an object in three-dimensional space. [7]

Figure 8.6.7.3: 3 dimensional geometric object. (Copyright; author via source)

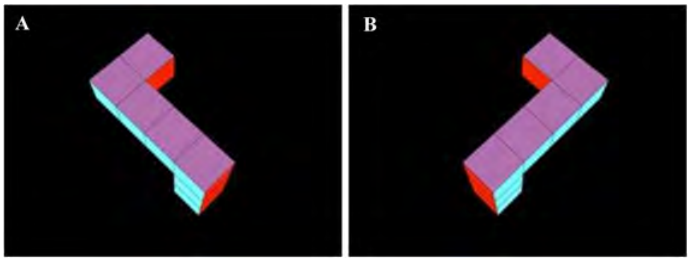


Figure 8.6.7.4: 3 dimensional geometric objects. (Copyright; author via source)

Studies suggest there are various factors that might be important for supporting the early development of mental rotation abilities. Campos et al. (2000) provided evidence that self-produced locomotion, such as crawling, is relevant for infant visual-cognitive ability in general, while other studies have demonstrated a specific association between infant crawling and mental rotation ability (Gerhard-Samunda, Jovanovic & Schwarzer, 2021; Schwarzer et al., 2012). In addition, manual object exploration, such as when infants and toddlers use their hands to manipulate, rotate and transfer objects, might be associated with infant mental rotation ability (Möhring & Frick, 2013; (Soska et al., 2010). These findings demonstrate a relation between mental rotation abilities in infants and toddlers and object and environment exploration. Caregivers can support the development of mental rotation abilities by encouraging infants and toddlers to directly explore objects of various sizes, shapes, colors, etc, with their hands and by supporting the exploration of mobile children. [7]

Figure 8.6.7.5: Toddler exploring objects with her hands. ([8])

[1] Yang et al., (2020). Is early spatial skills training effective? A meta-analysis. *Frontiers in Psychology, 11*, 1938. CC by 4.0

[2] Image from Ryan Fields on Unsplash

[3] Johnson & Moore (2020). Spatial thinking in infancy: Origins and development of mental rotation between 3 and 10 months of age. *Cognitive Research: Principles and Implications*, *5*(1), 1-14. CC by 4.0

[4] Schwarzer et al., (2013). How crawling and manual object exploration are related to the mental rotation abilities of 9-month-old infants. *Frontiers in Psychology, 4*, 97. CC by 4.0

[5] Ganis & Kievit (2015). A new set of three-dimensional shapes for investigating mental rotation processes: Validation data and stimulus set. *Journal of Open Psychology Data*, *3*(1), e3. CC by 3.0

[6] Image from Ganis & Kievit (2015). A new set of three-dimensional shapes for investigating mental rotation processes: Validation data and stimulus set. *Journal of Open Psychology Data*, *3*(1), e3. CC by 3.0

[7] Schwarzer et al., (2013). How crawling and manual object exploration are related to the mental rotation abilities of 9-month-old infants. *Frontiers in Psychology*, *4*, 97. CC by 4.0

[1] Image from Jelleke Vanooteghem on Unsplash

8.6.8: Mindset and Praise

Effect of Praise on Mindset

As a student, what were your favorite and least favorite classes in school? For many people, their least favorite class was math and they might say statements like “I’m just not a math person”. This statement suggests that people are born with specific abilities (like being skilled at math or art, or sports, etc.,). The problem with this statement is that we are not born to be or to not be “math people”. While indeed genetics and environment play a role in developing abilities, so too does the mindset we have.

Mindsets are defined as implicit beliefs individuals hold about basic human abilities and attributes, such as intelligence (Dweck, 2006). They exist on a spectrum from fixed mindsets, which refer to believing that specific human attributes are static and unchangeable, to growth mindsets, which refer to believing that these attributes are malleable and can be shaped and developed with effort. So if we return back to math, someone who says “I’m just not a math person” probably has a fixed mindset because they are suggesting human abilities are unchangeable—you are either born a math person or not. In contrast, someone with a growth mindset can still struggle with math, but believes that their ability in math can be changed—practicing more and finding new strategies can help them improve. [1]

The role of mindsets has been widely investigated in the educational field, especially with older children, as mindsets are related to motivation and behavior, including the way students handle academic setbacks and challenges (Blackwell, Trzesniewski & Dweck, 2007; Aditomo, 2015). People with a fixed mindset are more prone to interpret their setbacks to a lack of inborn ability when compared to people with a growth mindset, who instead attribute setbacks to a lack of effort (Dweck, Chiu & Hong, 1995; Dweck, 2006). Growth mindset has been linked to students’ higher resilience, psychological well being, and school engagement (Yeager et al., 2019; Zeng, Hou & Peng, 2016). [1]

Why do some people have a growth mindset while others have a fixed mindset? What factors contribute to someone developing a specific mindset? As infants and toddlers develop, they frequently reveal new abilities that are exciting for caregivers to witness. Praise is a common response to these new abilities. While praise may seem like a positive response, research has revealed that the effect of praise depends on the type of praise, and that, surprisingly, some types of praise negatively affect the motivation of the person receiving praise. Many studies have found that receiving effort-focused praise positively affected motivation, while receiving ability-focused praise negatively affected motivation (e.g., Brummelman et al., 2014; Mueller & Dweck, 1998). In a landmark study by Mueller and Dweck (1998), fifth-grade children were asked to work on a set of tasks; then, they were praised for their ability (e.g., “You must be smart”), were praised for their effort (e.g., “You must have worked hard”), or received no additional feedback (i.e., the control group). Subsequently, children were given a more difficult set of problems and failed. Compared to children in the control group, children in the effort praise group reported more task enjoyment and performed higher on the subsequent task, while children in the ability praise group reported less task enjoyment and performed lower on the task. [2]

> These effects of ability-focused and effort-focused praise are related to one’s mindset about one’s ability and attributes (e.g., Gunderson et al., 2013; Pomerantz & Kempner, 2013). Children who receive effort-focused praise tend to endorse a growth mindset, and their enjoyment and subsequent task performance are high following failure; in contrast, those who receive ability-focused praise tend to endorse a fixed mindset, and their enjoyment and subsequent task performance are low following failure (Dweck, 2008; Mueller and Dweck, 1998). Effort-focused praise emphasizes the fundamental role of effort for growth/improvement, whereas ability-focused praise implies that individuals’ intelligence is an internal and perhaps fixed/stable trait. [2]

Research with infants and toddlers demonstrates that mindsets about one’s abilities are already forming during the first three years of life and the type of praise received from caregivers is important in shaping a child’s mindset. Eighteen month old toddlers who have caregivers who use more effort-focused praise are more persistent in challenging tasks (Lucca, Horton & Sommerville, 2019). Toddlers who receive more ability-focused praise from their caregivers are more likely to have a growth mindset later in childhood as 7 to 8 year olds (Gunderson et al., 2013) and higher academic achievement in the fourth grade (Gunderson et al., 2018).

As caregivers of infants and toddlers, we not only need to be cognizant of how our praise affects childrens’ developing mindsets, but also the impact our personal mindsets can have. Recent research has focused on caregivers’ mindsets as a key factor that may shape caregiving behaviors and perspectives toward children (Justice et al., 2020). Caregivers’ mindsets refers to the beliefs that caregivers hold regarding whether children’s development is fixed or malleable as well as their belief of the importance of effort for learning (Sisk et al., 2018). [3]

Recently, Rowe and Leech (2018) implemented a random-assignment experiment to examine use of a caregiver mindset intervention to improve caregivers' non-verbal interactions with 10-month-old infants. Caregivers assigned to a training condition participated in training emphasizing the malleability of early language skills and that caregivers can play a key role in facilitating these skills through non-verbal interactions. Compared to caregivers in a control group, the trained caregivers interacted more frequently with their children at 12 months of age, and this effect was particularly strong for caregivers who originally had a fixed mindset. Such research suggests that caregiver mindset may be a key factor for improving children's early experiences and development. To discover what your mindset is, (\PageIndex{1}\) presents a short Mindset assessment. [3]

Example 8.6.8.1 Mindset activity

Directions: Select an answer for each of the eight questions.

1. "No matter how much intelligence you have, you can always change it a good deal"
    1. Disagree a lot
    2. Disagree
    3. Disagree a little
    4. Agree a little
    5. Agree
    6. Agree a lot
2. "You can learn new things, but you cannot really change your basic level of intelligence"
    1. Disagree a lot
    2. Disagree
    3. Disagree a little
    4. Agree a little
    5. Agree
    6. Agree a lot
3. "I like my work best when it makes me think hard"
    1. Disagree a lot
    2. Disagree
    3. Disagree a little
    4. Agree a little
    5. Agree
    6. Agree a lot
4. "I like my work best when I can do it really well without too much trouble"
    1. Disagree a lot
    2. Disagree
    3. Disagree a little
    4. Agree a little
    5. Agree
    6. Agree a lot
5. "I like work that I'll learn from even if I make a lot of mistakes"
    1. Disagree a lot
    2. Disagree
    3. Disagree a little
    4. Agree a little
    5. Agree
    6. Agree a lot
6. "I like my work best when I can do it perfectly without any mistakes"
    1. Disagree a lot
    2. Disagree
    3. Disagree a little

4. Agree a little
5. Agree
6. Agree a lot

7. “When something is hard, it just makes me want to work more on it, not less”
    1. Disagree a lot
    2. Disagree
    3. Disagree a little
    4. Agree a little
    5. Agree
    6. Agree a lot
8. “To tell the truth, when I work hard, it makes me feel as though I’m not very smart”
    1. Disagree a lot
    2. Disagree
    3. Disagree a little
    4. Agree a little
    5. Agree
    6. Agree a lot

Directions: Select an answer for each of the eight questions.

1. “No matter how much intelligence you have, you can always change it a good deal”
    1. Disagree a lot
    2. Disagree
    3. Disagree a little
    4. Agree a little
    5. Agree
    6. Agree a lot
2. “You can learn new things, but you cannot really change your basic level of intelligence”
    1. Disagree a lot
    2. Disagree
    3. Disagree a little
    4. Agree a little
    5. Agree
    6. Agree a lot
3. “I like my work best when it makes me think hard”
    1. Disagree a lot
    2. Disagree
    3. Disagree a little
    4. Agree a little
    5. Agree
    6. Agree a lot
4. “I like my work best when I can do it really well without too much trouble”
    1. Disagree a lot
    2. Disagree
    3. Disagree a little
    4. Agree a little
    5. Agree
    6. Agree a lot
5. “I like work that I’ll learn from even if I make a lot of mistakes”
    1. Disagree a lot

2. Disagree
3. Disagree a little
4. Agree a little
5. Agree
6. Agree a lot

6. “I like my work best when I can do it perfectly without any mistakes”
    1. Disagree a lot
    2. Disagree
    3. Disagree a little
    4. Agree a little
    5. Agree
    6. Agree a lot
7. “When something is hard, it just makes me want to work more on it, not less”
    1. Disagree a lot
    2. Disagree
    3. Disagree a little
    4. Agree a little
    5. Agree
    6. Agree a lot
8. “To tell the truth, when I work hard, it makes me feel as though I’m not very smart”
    1. Disagree a lot
    2. Disagree
    3. Disagree a little
    4. Agree a little
    5. Agree
    6. Agree a lot

Research suggests that mindsets begin developing during infancy and toddlerhood and that caregivers play a pivotal role in which mindset children develop. The type of praise we use is important. Caregivers should be aware of their praise and attempt to use more effort-focused praise in an attempt to help children develop a growth mindset. Using effort-focused praise with infants and toddlers is important as their mindsets are beginning to develop and effort-focused praise during the first three years is related to the development of a growth mindset and educational achievement later in childhood.

[1] Puusepp et al., (2021). Mindsets and neural mechanisms of automatic reactions to negative feedback in mathematics in elementary school students. *Frontiers in Psychology*, 3297. CC by 4.0

[2] Kakinuma et al., (2021). Praise affects the “Praiser”: effects of ability-focused vs. effort-focused praise on motivation. *The Journal of Experimental Education*, 1-22. CC by 4.0

[3] Justice et al., (2020). Parents’ growth mindsets and home-learning activities: A cross-cultural comparison of Danish and U.S. parents. *Frontiers in Psychology, 11*, 1365. CC by 4.0

[4] Burgoyne & Macnamara (2021). Reconsidering the use of the mindset assessment profile in educational contexts. *Journal of Intelligence*, *9*(3), 39. CC by 4.0

8.7: Conclusion

Conclusion of Overview of Cognitive Development

While it was once thought that the experience a young infant likely has when engaging with the world is one of “blooming, buzzing confusion” (James, 1890), research has since revealed that infants are cognitively making sense of the world around them in complex ways. While some cognitive processes seem to be inborn, other cognitive processes unfold throughout the first three years of life. What is clear is that through everyday experiences with supportive caregivers, infants and toddlers are making sense of their world and developing important cognitive skills that they will continue to build on later in childhood.

8.8: References

References for Overview of Cognitive Development

- Aditomo, A. (2015). Students' response to academic setback: "Growth mindset" as a buffer against demotivation. *International Journal of Educational Psychology, 4*(2), 198-222.
- Aslin, R. N. (2007). What's in a look? *Developmental Science, 10*(1), 48-53.
- Baillargeon, R. (1987). Object permanence in 3½-and 4½-month-old infants. *Developmental Psychology, 23*(5), 655.
- Baillargeon, R. (2004). Infants' physical world. *Current Directions in Psychological Science, 13*(3), 89-94.
- Bahrick, L. E., Todd, J. T., Castellanos, I., & Sorondo, B. M. (2016). Enhanced attention to speaking faces versus other event types emerges gradually across infancy. *Developmental Psychology, 52*(11), 1705.
- Balaban, M. T., & Waxman, S. R. (1997). Do words facilitate object categorization in 9-month-old infants? *Journal of Experimental Child Psychology, 64*(1), 3-26.
- Banerjee, P. N., & Tamis-LeMonda, C. S. (2007). Infants' persistence and mothers' teaching as predictors of toddlers' cognitive development. *Infant Behavior and Development, 30*(3), 479-491.
- Barr, R., & Hayne, H. (2003). It's not what you know, it's who you know: Older siblings facilitate imitation during infancy. *International Journal of Early Years Education, 11*(1), 7-21.
- Beilin, H., & Fireman, G. (1999). The foundation of Piaget's theories: Mental and physical action. *Advances in Child Development and Behavior, 27*, 221-246.
- Bernier, A., Carlson, S. M., & Whipple, N. (2010). From external regulation to self-regulation: Early parenting precursors of young children's executive functioning. *Child Development, 81*(1), 326-339.
- Blackwell, L. S., Trzesniewski, K. H., & Dweck, C. S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. *Child Development, 78*(1), 246-263.
- Bohlmann, N. L., & Downer, J. T. (2016). Self-regulation and task engagement as predictors of emergent language and literacy skills. *Early Education and Development, 27*(1), 18-37.
- Bornstein, M. H., & Sigman, M. D. (1986). Continuity in mental development from infancy. *Child Development*, 251-274.
- Bourke, L., Davies, S. J., Sumner, E., & Green, C. (2014). Individual differences in the development of early writing skills: Testing the unique contribution of visuo-spatial working memory. *Reading and Writing, 27(*2), 315-335.
- Bradley, R. H., McKelvey, L. M., & Whiteside-Mansell, L. (2011). Does the quality of stimulation and support in the home environment moderate the effect of early education programs? *Child Development, 82*(6), 2110-2122.
- Bremner, J. G., Slater, A. M., & Johnson, S. P. (2015). Perception of object persistence: The origins of object permanence in infancy. *Child Development Perspectives, 9*(1), 7-13.
- Brummelman, E., Thomaes, S., Overbeek, G., Orobio de Castro, B., Van Den Hout, M. A., & Bushman, B. J. (2014). On feeding those hungry for praise: Person praise backfires in children with low self-esteem. *Journal of Experimental Psychology: General, 143*(1), 9.
- Calkins, S.D. (2007). *The emergence of self-regulation: Biological and behavioral control mechanisms supporting toddler competencies*. In Socioemotional Development in the Toddler Years: Transitions and Transformations; Guilford Press: New York, NY, USA.
- Calkins, S. D., & Fox, N. A. (2002). Self-regulatory processes in early personality development: A multilevel approach to the study of childhood social withdrawal and aggression. *Development and Psychopathology, 14*(3), 477-498.
- Campos, J. J., Anderson, D. I., Barbu-Roth, M. A., Hubbard, E. M., Hertenstein, M. J., & Witherington, D. (2000). Travel broadens the mind. *Infancy, 1*(2), 149-219.
- Carey, S. (2009). Where our number concepts come from. *The Journal of Philosophy, 106*(4), 220.
- Carlson, S. M. (2003). Executive function in context: Development, measurement, theory, and experience. *Monographs of the Society for Research in Child Development, 68*(3), 138-151.
- Carlson, S. M. (2005). Developmentally sensitive measures of executive function in preschool children. *Developmental Neuropsychology, 28*, 595–616.
- Casey, B. M., Pezaris, E., Fineman, B., Pollock, A., Demers, L., & Dearing, E. (2015). A longitudinal analysis of early spatial skills compared to arithmetic and verbal skills as predictors of fifth-grade girls' math reasoning. *Learning and Individual Differences, 40*, 90-100.

- Caughy, M. O. B., Mills, B., Owen, M. T., & Hurst, J. R. (2013). Emergent self-regulation skills among very young ethnic minority children: A confirmatory factor model. *Journal of Experimental Child Psychology, 116*(4), 839–855.
- Chen, X., Hastings, P. D., Rubin, K. H., Chen, H., Cen, G., & Stewart, S. L. (1998). Child-rearing attitudes and behavioral inhibition in Chinese and Canadian toddlers: a cross-cultural study. *Developmental Psychology, 34*(4), 677.
- Cheng, N., Lu, S., Archer, M., & Wang, Z. (2018). Quality of maternal parenting of 9-month-old infants predicts executive function performance at 2 and 3 years of age. *Frontiers in Psychology, 8*, 2293.
- Chua, H. F., Boland, J. E., & Nisbett, R. E. (2005). Cultural variation in eye movements during scene perception. *Proceedings of the National Academy of Sciences, 102*(35), 12629-12633.
- Colombo, J. (1993). *Infant cognition* (Vol. 5). Sage.
- Colombo, J., & Mitchell, D. W. (2009). Infant visual habituation. *Neurobiology of learning and memory, 92*(2), 225-234.
- Constantinescu, M., Moore, D. S., Johnson, S. P., & Hines, M. (2018). Early contributions to infants' mental rotation abilities. *Developmental Science, 21*(4), e12613.
- Cornu, V., Schiltz, C., Martin, R., & Hornung, C. (2018). Visuo-spatial abilities are key for young children's verbal number skills. *Journal of Experimental Child Psychology, 166*, 604-620.
- Côté, S. M., Mongeau, C., Japel, C., Xu, Q., Séguin, J. R., & Tremblay, R. E. (2013). Child care quality and cognitive development: Trajectories leading to better preacademic skills. *Child Development, 84*(2), 752-766.
- Dawkins, M. B., Sloane, S., & Baillargeon, R. (2019). Do infants in the first year of life expect equal resource allocations? *Frontiers in Psychology, 10*, 116.
- Daneri, M. P., Blair, C., Kuhn, L. J., & FLP Key Investigators (2019). Maternal language and child vocabulary mediate relations between socioeconomic status and executive function during early childhood. *Child Development, 90*(6), 2001-2018.
- Dewar, K., & Xu, F. (2007). Do 9-month-old infants expect distinct words to refer to kinds? *Developmental Psychology, 43*(5), 1227.
- Diamond, A. (2012). Activities and programs that improve children's executive functions. *Current Directions in Psychological Science, 21*, 335–341.
- Diamond, A. (2013). Executive functions. *Annual Review of Psychology, 64*, 135-168.
- Diamond, A., Kirkham, N., & Amso, D. (2002). Conditions under which young children can hold two rules in mind and inhibit a prepotent response. *Developmental Psychology, 38*, 352–362.
- Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: perseverance and passion for long-term goals. *Journal of Personality and Social Psychology, 92*(6), 1087.
- Dweck, C. S., Chiu, C. Y., & Hong, Y. Y. (1995). Implicit theories and their role in judgments and reactions: A word from two perspectives. *Psychological Inquiry, 6*(4), 267-285.
- Dweck, C. S. (2006). *Mindset: The new psychology of success*. New York, NY: Random House.
- Dweck, C. S. (2008). Mindsets: How praise is harming youth and what can be done about it. *School Library Media Activities Monthly, 24*(5), 55.
- Ellefson, M. R., Ng, F. F. Y., Wang, Q., & Hughes, C. (2017). Efficiency of executive function: a two-generation cross-cultural comparison of samples from Hong Kong and the United Kingdom. *Psychological Science, 28*(5), 555-566.
- Eskreis-Winkler, L., Duckworth, A. L., Shulman, E. P., & Beal, S. (2014). The grit effect: Predicting retention in the military, the workplace, school and marriage. *Frontiers in Psychology, 5*, 36.
- Fanari, R., Meloni, C., & Massidda, D. (2019). Visual and spatial working memory abilities predict early math skills: a longitudinal study. *Frontiers in Psychology, 10*, 2460.
- Fay-Stammbach, T., Hawes, D. J., & Meredith, P. (2014). Parenting influences on executive function in early childhood: A review. *Child Development Perspectives, 8*(4), 258-264.
- Feigenson, L. (2011). Predicting sights from sounds: 6-month-olds' intermodal numerical abilities. *Journal of Experimental Child Psychology, 110*(3), 347-361.
- Feigenson, L., Libertus, M. E., & Halberda, J. (2013). Links between the intuitive sense of number and formal mathematics ability. *Child Development Perspectives, 7*(2), 74-79.
- Ferry, A. L., Hespos, S. J., & Waxman, S. R. (2010). Categorization in 3-and 4-month-old infants: an advantage of words over tones. *Child Development, 81*(2), 472-479.
- Ferry, A. L., Hespos, S. J., & Waxman, S. R. (2013). Nonhuman primate vocalizations support categorization in very young human infants. *Proceedings of the National Academy of Sciences, 110*(38), 15231-15235.
- Fiske, A., & Holmboe, K. (2019). Neural substrates of early executive function development. *Developmental Review, 52*, 42-62.

- Forget-Dubois, N., Dionne, G., Lemelin, J. P., Pérusse, D., Tremblay, R. E., & Boivin, M. (2009). Early child language mediates the relation between home environment and school readiness. *Child Development*, *80*(3), 736-749.
- Fraley, R. C., Roisman, G. I., & Haltigan, J. D. (2013). The legacy of early experiences in development: formalizing alternative models of how early experiences are carried forward over time. Developmental Psychology, 49(1), 109.
- Friedman, N. P., & Miyake, A. (2017). Unity and diversity of executive functions: Individual differences as a window on cognitive structure. *Cortex*, *86*, 186–204.
- Fulkerson, A. L., & Waxman, S. R. (2007). Words (but not tones) facilitate object categorization: Evidence from 6-and 12-month-olds. *Cognition*, *105*(1), 218-228.
- Garon, N., Bryson, S. E., & Smith, I. M. (2008). Executive function in preschoolers: a review using an integrative framework. *Psychological Bulletin*, *134*(1), 31.
- Gerhard-Samunda, T. M., Jovanovic, B., & Schwarzer, G. (2021). Role of manually-generated visual cues in crawling and non-crawling 9-month-old infants' mental rotation. *Cognitive Development*, *59*, 101053.
- Goertz, C., Lamm, B., Graf, F., Kolling, T., Knopf, M., & Keller, H. (2011). Deferred imitation in 6-month-old German and Cameroonian Nso infants. *Journal of Cognitive Education and Psychology*, *10*(1), 44-55.
- Gergely, G., Bekkering, H., & Király, I. (2002). Rational imitation in preverbal infants. *Nature*, *415*(6873), 755-755.
- Grabell, A. S., Olson, S. L., Miller, A. L., Kessler, D. A., Felt, B., Kaciroti, N., ... & Tardif, T. (2015). The impact of culture on physiological processes of emotion regulation: A comparison of US and Chinese preschoolers. *Developmental Science*, *18*(3), 420-435.
- Gunderson, E. A., Gripshover, S. J., Romero, C., Dweck, C. S., Goldin-Meadow, S., & Levine, S. C. (2013). Parent praise to 1- to 3-year-olds predicts children's motivational frameworks 5 years later. *Child Development*, *84(*5), 1526-1541.
- Gunderson, E. A., Sorhagen, N. S., Gripshover, S. J., Dweck, C. S., Goldin-Meadow, S., & Levine, S. C. (2018). Parent praise to toddlers predicts fourth grade academic achievement via children's incremental mindsets. *Developmental Psychology*, *54*(3), 397.
- Halberda, J., & Feigenson, L. (2008). Developmental change in the acuity of the" Number Sense": The Approximate Number System in 3-, 4-, 5-, and 6-year-olds and adults. *Developmental Psychology*, *44*(5), 1457.
- Hammond, S. I., Müller, U., Carpendale, J. I., Bibok, M. B., & Liebermann-Finestone, D. P. (2012). The effects of parental scaffolding on preschoolers' executive function. *Developmental Psychology*, *48*(1), 271.
- Hamre, B. K., & Pianta, R. C. (2005). Can instructional and emotional support in the first-grade classroom make a difference for children at risk of school failure? *Child Development*, *76*, 949–967.
- Helmerhorst, K. O., Colonnesi, C., & Fukkink, R. G. (2019). Caregiver's mind-mindedness in early center-based childcare. *Early Education and Development*, *30*(7), 854-871.
- Hendry, A., & Holmboe, K. (2021). Development and validation of the Early Executive Functions Questionnaire: A carer-administered measure of executive functions suitable for 9-to 30-month-olds. *Infancy*.
- Hendry, A., Jones, E. J. H., & Charman, T. (2016). Executive function in the first three years of life: Precursors, predictors and patterns. *Developmental Review*, *42*, 1– 33.
- Henry, L. A., Messer, D. J., & Nash, G. (2012). Executive functioning in children with specific language impairment. *Journal of Child Psychology and Psychiatry*, *53*, 37–45.
- Hespos, S. J., & Rochat, P. (1997). Dynamic mental representation in infancy. *Cognition*, *64*(2), 153-188.
- Hughes, C., Devine, R. T., & Wang, Z. (2018). Does parental mind-mindedness account for cross-cultural differences in preschoolers' theory of mind? *Child Development*, *89*(4), 1296-1310.
- Hughes, C. H., & Ensor, R. A. (2009). How do families help or hinder the emergence of early executive function? *New Directions for Child and Adolescent Development*, *2009*(123), 35-50.
- Izard, V., Sann, C., Spelke, E. S., & Streri, A. (2009). Newborn infants perceive abstract numbers. *Proceedings of the National Academy of Sciences*, *106*(25), 10382-10385.
- Jackson, I., & Sirois, S. (2009). Infant cognition: going full factorial with pupil dilation. *Developmental Science*, *12*(4), 670-679.
- James, W. (1890). *The Principles of Psychology*. Cambridge, MA: Harvard University Press.
- Jansen, P., & Heil, M. (2010). The relation between motor development and mental rotation ability in 5-to 6-year-old children. *International Journal of Developmental Science*, *4*(1), 67-75.
- Jaramillo, J. M., Rendón, M. I., Muñoz, L., Weis, M., & Trommsdorff, G. (2017). Children's self-regulation in cultural contexts: The role of parental socialization theories, goals, and practices. *Frontiers in Psychology*, *8*, 923.

- Jian, H. (2009). A Contrastive study of cultural diversity of learning styles between China and the United States. *International Education Studies*, *2*(1), 163-166.
- Johnson, S. P., & Moore, D. S. (2020). Spatial thinking in infancy: Origins and development of mental rotation between 3 and 10 months of age. *Cognitive Research: Principles and Implications*, *5*(1), 1-14.
- Jurado, M. B., & Rosselli, M. (2007). The elusive nature of executive functions: a review of our current understanding. *Neuropsychology Review*, *17*(3), 213-233.
- Justice, L. M., Purtell, K. M., Bleses, D., & Cho, S. (2020). Parents' growth mindsets and home-learning activities: A cross-cultural comparison of Danish and U.S. parents. *Frontiers in Psychology*, *11*, 1365.
- Kamins, M. L., & Dweck, C. S. (1999). Person versus process praise and criticism: implications for contingent self-worth and coping. *Developmental Psychology*, *35*(3), 835.
- Kennedy-Costantini, S., Oostenbroek, J., Suddendorf, T., Nielsen, M., Redshaw, J., Davis, J., ... & Slaughter, V. (2017). There is no compelling evidence that human neonates imitate. *Behavioral and Brain Sciences*, *40*.
- Kochanska, G., Murray, K. T., & Harlan, E. T. (2000). Effortful control in early childhood: Continuity and change, antecedents, and implications for social development. *Developmental Psychology*, *36*, 220–232.
- Köster, M., Langeloh, M., & Hoehl, S. (2019). Visually entrained theta oscillations increase for unexpected events in the infant brain. *Psychological Science*, *30*(11), 1656-1663.
- Kuchirko, Y., & Nayfeld, I. (2020). Language gap: Cultural assumptions and ideologies. In *International approaches to bridging the language gap* (pp. 32-53). IGI Global.
- Kuchirko, Y. A., & Tamis-LeMonda, C. S. (2019). The cultural context of infant development: Variability, specificity, and universality. In *Advances in child development and behavior* (Vol. 57, pp. 27-63). JAI.
- Kugiumutzakis, G., & Trevarthen, C. (2015). Neonatal imitation. *International Encyclopedia of the Social & Behavioral Sciences*, *16*, 481-488.
- Ladd, G. W., Birch, S. H., & Buhs, E. S. (1999). Children's social and scholastic lives in kindergarten: Related spheres of influence? *Child Development*, *70*, 1373–1400.
- Lan, X., Legare, C. H., Ponitz, C. C., Li, S., & Morrison, F. J. (2011). Investigating the links between the subcomponents of executive function and academic achievement: A cross-cultural analysis of Chinese and American preschoolers. *Journal of Experimental Child Psychology*, *108*(3), 677-692.
- Landry, S. H., Miller-Loncar, C. L., Smith, K. E., & Swank, P. R. (2002). The role of early parenting in children's development of executive processes. *Developmental Neuropsychology*, *21*(1), 15-41.
- Lauer, J. E., Udelson, H. B., Jeon, S. O., & Lourenco, S. F. (2015). An early sex difference in the relation between mental rotation and object preference. *Frontiers in Psychology*, *6*, 558.
- Lehmann, J., Quaiser-Pohl, C., & Jansen, P. (2014). Correlation of motor skill, mental rotation, and working memory in 3-to 6-year-old children. *European Journal of Developmental Psychology*, *11*(5), 560-573.
- Leonard, J. A., Lee, Y., & Schulz, L. E. (2017). Infants make more attempts to achieve a goal when they see adults persist. *Science*, *357*(6357), 1290-1294.
- Lewis, C., Koyasu, M., Oh, S., Ogawa, A., Short, B., & Huang, Z. (2009). Culture, executive function, and social understanding. *New Directions for Child and Adolescent Development*, *123*, 69-85.
- Liben, L. S., Myers, L. J., Christensen, A. E., & Bower, C. A. (2013). Environmental-Scale map use in middle childhood: Links to spatial skills, strategies, and gender. *Child Development*, *84*(6), 2047-2063.
- Libertus, M. E., Feigenson, L., & Halberda, J. (2013). Is approximate number precision a stable predictor of math ability?. *Learning and Individual Differences*, *25*, 126-133.
- Lin, B., Coburn, S. S., & Eisenberg, N. (2016). Self-regulation and reading achievement. In *The cognitive development of reading and reading comprehension* (pp. 75-94). Routledge.
- Lipton, J. S., & Spelke, E. S. (2003). Origins of number sense: Large-number discrimination in human infants. *Psychological Science*, *14*(5), 396-401.
- Lucca, K., Horton, R., & Sommerville, J. A. (2019). Keep trying!: Parental language predicts infants' persistence. *Cognition*, *193*, 104025.
- Marchman, V. A., & Fernald, A. (2008). Speed of word recognition and vocabulary knowledge in infancy predict cognitive and language outcomes in later childhood. *Developmental Science*, *11*(3), F9-F16.
- Matte-Gagné, C., & Bernier, A. (2011). Prospective relations between maternal autonomy support and child executive functioning: Investigating the mediating role of child language ability. *Journal of Experimental Child Psychology*, *110*(4), 611-625.

- Mazzocco, M. M., Feigenson, L., & Halberda, J. (2011). Preschoolers' precision of the approximate number system predicts later school mathematics performance. *PLoS One*, *6*(9), e23749.
- McClelland, M. M., Cameron, C. E., Duncan, R., Bowles, R. P., Acock, A. C., Miao, A., & Pratt, M. E. (2014). Predictors of early growth in academic achievement: The head-toes-knees-shoulders task. *Frontiers in Psychology*, *5*, 599.
- McCormick, B. J., Caulfield, L. E., Richard, S. A., Pendergast, L., Seidman, J. C., Maphula, A., Koshy, B., Blacy, L., Roshan, R., Baitun, N., Shrestha, R., Rasheed, M., Svensen, S., Rasmussen, Z., Scharf, R., Haque, S., Oria, R., & Murray-Kolb, L. E. (2020). Early life experiences and trajectories of cognitive development. *Pediatrics*, *146*(3).
- Meier, G., & Albrecht, M. H. (2003). The persistence process: Development of a stage model for goal-directed behavior. *Journal of Leadership & Organizational Studies*, *10*(2), 43-54.
- Meins, E., Fernyhough, C., Fradley, E., & Tuckey, M. (2001). Rethinking maternal sensitivity: Mothers' comments on infants' mental processes predict security of attachment at 12 months. *Journal of Child Psychology and Psychiatry*, *42*(5), 637–648.
- Meltzoff, A. N., & Marshall, P. J. (2018). Human infant imitation as a social survival circuit. *Current Opinion in Behavioral Sciences*, *24*, 130-136.
- Meltzoff, A. N., & Moore, M. K. (1977). Imitation of facial and manual gestures by human neonates. *Science*, *198*(4312), 75-78.
- Meltzoff, A. N., & Moore, M. K. (1983). Newborn infants imitate adult facial gestures. *Child Development*, 702-709.
- Meltzoff, A. N., Murray, L., Simpson, E., Heimann, M., Nagy, E., Nadel, J., Pedersen, E. J., Brooks, R., Messinger, D., De Pascalis, L., Subiaul, F., Paukner, A., & Ferrari, P. F. (2018). Re-examination of Oostenbroek et al.(2016): Evidence for neonatal imitation of tongue protrusion. *Developmental Science*, *21*(4), e12609.
- Miller, D. J., Spiridigliozzi, G., Ryan, E. B., Callan, M. P., & Mclaughlin, J. E. (1980). Habituation and cognitive performance: Relationships between measures at four years of age and earlier assessments. *International Journal of Behavioral Development*, *3*(2), 131-146.
- Miyake, A., & Friedman, N. P. (2012). The nature and organisation of individual differences in executive functions: Four general conclusions. *Current Directions in Psychological Science*, *21*(1), 8–14.
- Miyake, A., Friedman, N. P., Emerson, M. J., Witzki, A. H., Howerter, A., & Wager, T. D. (2000). The unity and diversity of executive functions and their contributions to complex "frontal lobe" tasks: A latent variable analysis. *Cognitive Psychology*, *41*(1), 49-100.
- Möhring, W., & Frick, A. (2013). Touching up mental rotation: Effects of manual experience on 6-month-old infants' mental object rotation. *Child Development*, *84*(5), 1554-1565.
- Mokrova, I. L., O'Brien, M., Calkins, S. D., Leerkes, E. M., & Marcovitch, S. (2013). The role of persistence at preschool age in academic skills at kindergarten. *European Journal of Psychology of Education*, *28*(4), 1495-1503.
- Monroy, C., Shafto, C., Castellanos, I., Bergeson, T., & Houston, D. (2019). Visual habituation in deaf and hearing infants. *PloS One*, *14*(2), e0209265.
- Moore, D. S., & Johnson, S. P. (2011). Mental rotation of dynamic, three-dimensional stimuli by 3-month-old infants. *Infancy*, *16*(4), 435-445.
- Monsell, S. (2003). Task switching. *Trends in Cognitive Sciences*, *7*(3), 134-140.
- Mueller, C. M., & Dweck, C. S. (1998). Praise for intelligence can undermine children's motivation and performance. *Journal of Personality and Social Psychology*, *75*(1), 33.
- Newcombe, N. S., & Frick, A. (2010). Early education for spatial intelligence: Why, what, and how. *Mind, Brain, and Education*, *4*(3), 102-111.
- Newcombe, N. S., and Shipley, T. F. (2015). Thinking about spatial thinking: New typology, new assessments, in *Studying Visual and Spatial Reasoning for Design Creativity*, (New York, NY: Springer), 179–192.
- Nisbett, R. E., Peng, K., Choi, I., & Norenzayan, A. (2001). Culture and systems of thought: holistic versus analytic cognition. *Psychological Review*, *108*(2), 291.
- Novack, M. A., Brentari, D., Goldin-Meadow, S., & Waxman, S. (2021). Sign language, like spoken language, promotes object categorization in young hearing infants. *Cognition*, *215*, 104845.
- Oakes, L. M. (2010). Using habituation of looking time to assess mental processes in infancy. *Journal of Cognition and Development*, *11*(3), 255-268.
- Oh, S., & Lewis, C. (2008). Korean preschoolers' advanced inhibitory control and its relation to other executive skills and mental state understanding. *Child Development*, *79*(1), 80-99.
- Oostenbroek, J., Redshaw, J., Davis, J., Kennedy-Costantini, S., Nielsen, M., Slaughter, V., & Suddendorf, T. (2018). Re-evaluating the neonatal imitation hypothesis. *Developmental Science*, *22*(2), e12720.

- Oostenbroek, J., Suddendorf, T., Nielsen, M., Redshaw, J., Kennedy-Costantini, S., Davis, J., Clark, S., & Slaughter, V. (2016). Comprehensive longitudinal study challenges the existence of neonatal imitation in humans. *Current Biology, 26*(10), 1334-1338.
- Pederson, D. R., Moran, G., Sitko, C., Campbell, K., Ghesquire, K., & Acton, H. (1990). Maternal sensitivity and the security of infant-mother attachment: AQ-sort study. *Child Development, 61*(6), 1974-1983.
- Perner, J., & Lang, B. (2002). What causes 3-year-olds' difficulty on the dimensional change card sorting task? *Infant and Child Development: An International Journal of Research and Practice, 11*(2), 93-105.
- Piaget, J. (1954). *The construction of reality in the child*. New York, Basic Books.
- Pomerantz, E. M., & Kempner, S. G. (2013). Mothers' daily person and process praise: Implications for children's theory of intelligence and motivation. *Developmental Psychology, 49*(11), 2040.
- Ponitz, C. C., McClelland, M. M., Matthews, J. S., & Morrison, F. J. (2009). A structured observation of behavioral self-regulation and its contribution to kindergarten outcomes. *Developmental Psychology, 45*(3), 605.
- Putnam, S. P., Gartstein, M. A., & Rothbart, M. K. (2006). Measurement of fine-grained aspects of toddler temperament: The early childhood behavior questionnaire. *Infant Behavior & Development, 29*(3), 386– 401.
- Quinn, P. C., Eimas, P. D., & Tarr, M. J. (2001). Perceptual categorization of cat and dog silhouettes by 3-to 4-month-old infants. *Journal of Experimental child Psychology, 79*(1), 78-94.
- Quinn, P. C., & Liben, L. S. (2014). A sex difference in mental rotation in infants: Convergent evidence. *Infancy, 19*(1), 103-116.
- Radovanovic, M., Solby, H., Soldovieri, A., & Sommerville, J. (2021, preprint). Try smarter, not harder: Exploration and strategy diversity are related to infant persistence.
- Reid, V. M., Hoehl, S., Grigutsch, M., Groendahl, A., Parise, E., & Striano, T. (2009). The neural correlates of infant and adult goal prediction: evidence for semantic processing systems. *Developmental Psychology, 45*(3), 620.
- Rennie, D. A. C., Bull, R., & Diamond, A. (2004). Executive functioning in preschoolers: Reducing the inhibitory demands of the dimensional change card sort task. *Developmental Neuropsychology, 26*, 423–443.
- Rittle-Johnson, B., Zippert, E. L., & Boice, K. L. (2019). The roles of patterning and spatial skills in early mathematics development. *Early Childhood Research Quarterly, 46*, 166-178.
- Robson, D. A., Allen, M. S., & Howard, S. J. (2020). Self-regulation in childhood as a predictor of future outcomes: A meta-analytic review. *Psychological Bulletin, 146*(4), 324.
- Rochat, P., & Hespos, S. J. (1996). Tracking and anticipation of invisible spatial transformations by 4-to 8-month-old infants. *Cognitive Development, 11*(1), 3-17.
- Rodriguez, E. T., & Tamis-LeMonda, C. S. (2011). Trajectories of the home learning environment across the first 5 years: Associations with children's vocabulary and literacy skills at prekindergarten. *Child Development, 82*(4), 1058-1075.
- Rome-Flanders, T., Cronk, C., & Gourde, C. (1995). Maternal scaffolding in mother-infant games and its relationship to language development: a longitudinal study. *First Language, 15*(45), 339-355.
- Rowe, M. L., & Leech, K. A. (2019). A parent intervention with a growth mindset approach improves children's early gesture and vocabulary development. *Developmental Science, 22*(4), e12792.
- Sabbagh, M. A., Xu, F., Carlson, S. M., Moses, L. J., & Lee, K. (2006). The development of executive functioning and theory of mind: A comparison of Chinese and US preschoolers. *Psychological Science, 17*(1), 74-81.
- Saffran, J. R., & Kirkham, N. Z. (2018). Infant statistical learning. *Annual Review of Psychology, 69*, 181-203.
- Salminen, J., Guedes, C., Lerkkanen, M. K., Pakarinen, E., & Cadima, J. (2021). Teacher–child interaction quality and children's self-regulation in toddler classrooms in Finland and Portugal. *Infant and Child Development*, e2222.
- Samdan, G., Kiel, N., Petermann, F., Rothenfußer, S., Zierul, C., & Reinelt, T. (2020). The relationship between parental behavior and infant regulation: a systematic review. *Developmental Review, 57*, 100923.
- Schwarzer, G., Freitag, C., Buckel, R., & Lofruthe, A. (2013). Crawling is associated with mental rotation ability by 9-month-old infants. *Infancy, 18*(3), 432-441.
- Schwier, C., van Maanen, C., Carpenter, M., Tomasello, M., (2006). Rational Imitation in 12-Month-Old Infants. *Infancy, 10*(3), 303-311.
- Sethi, A., Mischel, W., Aber, J. L., Shoda, Y., & Rodriguez, M. L. (2000). The role of strategic attention deployment in development of self-regulation: Predicting preschoolers' delay of gratification from mother–toddler interactions. *Developmental Psychology, 36*(6), 767.
- Simon, T. J., Hespos, S. J., & Rochat, P. (1995). Do infants understand simple arithmetic? A replication of Wynn (1992). *Cognitive Development, 10*(2), 253-269.

- Sisk, V. F., Burgoyne, A. P., Sun, J., Butler, J. L., & Macnamara, B. N. (2018). To what extent and under which circumstances are growth mind-sets important to academic achievement? Two meta-analyses. *Psychological Science*, *29*(4), 549-571.
- Slaughter, V. (2021). Do Newborns Have the Ability to Imitate?. *Trends in Cognitive Sciences*.
- Sommerville, J. A., Enright, E. A., Horton, R. O., Lucca, K., Sitch, M. J., & Kirchner-Adelhart, S. (2018). Infants' prosocial behavior is governed by cost-benefit analyses. *Cognition*, *177*, 12-20.
- Song, H., & Jinyu, A. (2017). The relationship between executive functions and IQ in Korean children and the comparison with Chinese children. *Applied Neuropsychology: Child*, *6*(2), 158-165.
- Soska, K. C., Adolph, K. E., & Johnson, S. P. (2010). Systems in development: motor skill acquisition facilitates three-dimensional object completion. *Developmental Psychology*, *46*(1), 129.
- Spelke, E. S., Breinlinger, K., Macomber, J., & Jacobson, K. (1992). Origins of knowledge. *Psychological Review*, *99*(4), 605.
- Spelke, E. S., & Kinzler, K. D. (2007). Core knowledge. *Developmental Science*, *10*, 89–96.
- Starr, A., Libertus, M. E., & Brannon, E. M. (2013). Number sense in infancy predicts mathematical abilities in childhood. *Proceedings of the National Academy of Sciences*, *110*(45), 18116-18120.
- Stahl, A. E., & Feigenson, L. (2019). Violations of core knowledge shape early learning. *Topics in Cognitive Science*, *11*(1), 136-153.
- Thompson, R. A. (2016). What more has been learned? The science of early childhood development 15 years after neurons to neighborhoods. *Zero to Three Journal*, *36*(3), 18-24.
- Tsujimoto, S. (2008). The prefrontal cortex: Functional neural development during early childhood. *The Neuroscientist*, *14*(4), 345-358.
- von Salisch, M., Haenel, M., & Denham, S. A. (2015). Self-regulation, language skills, and emotion knowledge in young children from Northern Germany. *Early Education and Development*, *26*(5-6), 792-806.
- Wang, J., & Feigenson, L. (2021). Dynamic changes in numerical acuity in 4-month-old infants. *Infancy*, *26*(1), 47-62.
- Wanless, S. B., McClelland, M. M., Acock, A. C., Ponitz, C. C., Son, S. H., Lan, X., ... & Li, S. (2011). Measuring behavioral regulation in four societies. *Psychological Assessment*, *23*(2), 364.
- Waxman, S. R., & Braun, I. (2005). Consistent (but not variable) names as invitations to form object categories: New evidence from 12-month-old infants. *Cognition*, *95*(3), B59-B68.
- Waxman, S. R., Fu, X., Ferguson, B., Geraghty, K., Leddon, E., Liang, J., & Zhao, M. F. (2016). How early is infants' attention to objects and actions shaped by culture? New evidence from 24-month-olds raised in the US and China. *Frontiers in Psychology*, *7*, 97.
- Woodruff Carr, K., Perszyk, D. R., & Waxman, S. R. (2021). Birdsong fails to support object categorization in human infants. *Plos One*, *16*(3), e0247430.
- Wynn, K. (1990). Children's understanding of counting. *Cognition*, *36*(2), 155-193.
- Wynn, K. (1992). Children's acquisition of the number words and the counting system. *Cognitive Psychology*, *24*(2), 220-251.
- Xu, F., & Arriaga, R. I. (2007). Number discrimination in 10-month-old infants. *British Journal of Developmental Psychology*, *25*(1), 103-108.
- Xu, F., Cote, M., & Baker, A. (2005). Labeling guides object individuation in 12-month-old infants. *Psychological Science*, *16*(5), 372-377.
- Xu, F., & Spelke, E. S. (2000). Large number discrimination in 6-month-old infants. *Cognition*, *74*(1), B1-B11.
- Yeager, D. S., Hanselman, P., Walton, G. M., Murray, J. S., Crosnoe, R., Muller, C., Tipton, C., Schneider, B., Hulleman, C. S., Hinojosa, C. P., Paunesku, D., Romero, C., Flint, K., Roberts, A., Trott, J., Iachan, R., Buontempo, J., Yang, S. M., Carvalho, C. M., Hahn, P. R., Gopalan, M., Mhatre, P., Ferguson, R., Duckworth A. L., & Dweck, C. S. (2019). A national experiment reveals where a growth mindset improves achievement. *Nature*, *573(7774)*, 364-369.
- Zelazo, P. D., Frye, D., & Rapus, T. (1996). An age-related dissociation between knowing rules and using them. *Cognitive Development*, *11*(1), 37-63.
- Zeng, G., Hou, H., & Peng, K. (2016). Effect of growth mindset on school engagement and psychological well-being of Chinese primary and middle school students: The mediating role of resilience. *Frontiers in Psychology*, *7*, 1873.
- Zhang, X. (2016). Linking language, visual-spatial, and executive function skills to number competence in very young Chinese children. *Early Childhood Research Quarterly*, *36*, 178-189.
- Zmyj, N., Daum, M. M., & Aschersleben, G. (2009). The development of rational imitation in 9-and 12-month-old infants. *Infancy*, *14*(1), 131-141.

CHAPTER OVERVIEW

9: Theories of Cognitive development

9.1: Introduction

Introduction to Theories of Cognitive Development

The first three years of a child's life are full of many first-time experiences, from the sensory experiences in early infancy to the various new experiences motor and language abilities afford. Just think about the difference in experience of an infant not yet mobile and an infant who is able to walk around independently! Every experience, whether novel or repeated, supports their emerging cognition. Cognition refers to thinking and memory processes, and cognitive development refers to changes in these processes over time. This section will introduce you to the major theories of cognitive development, with special attention to the theories of Jean Piaget and Lev Vyotsky. [1]

[1] Kelvin Seifert & Rosemary Sutton (2009). "Educational Psychology." CC by 4.0

9.2: Jean Piaget

Overview of Jean Piaget

Figure 9.2.1: Jean Piaget. ([1])

Jean Piaget (1896-1980) was a renowned psychologist of the 20th century and a pioneer in developmental psychology. Piaget did not accept the prevailing theory that knowledge was innate. Instead, he believed a child's knowledge and understanding of the world developed over time, through the child's interactions with the world. By observing that interaction, Piaget was able to perceive how children created schemas (mental ways to organize information) that shaped their perceptions, cognitions, and judgment of the world. Just as almost all babies learn to roll over before they learn to sit up by themselves, Piaget believed that children gain their cognitive ability in a developmental order. These insights—that children at different ages think in fundamentally different ways—led to Piaget's stage theory of cognitive development. As a stage theorist, Piaget believed cognitive change occurred in distinct stages with a fixed-order, rather than continuous development that argued for a more gradual continuous process (see Figure 9.2.2 for an analogy). Despite various limitations, Piaget's theory of cognitive development is one of the most enduring theories in psychology. [2]

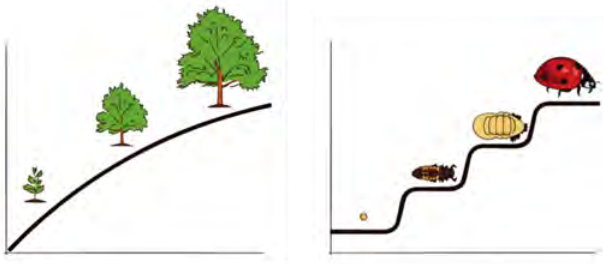


Figure 9.2.2: Continuous and discontinuous development depicted by the analogies of a tree growing versus a ladybug life cycle. ([3])

Piaget believed that children do not just passively learn but actively try to make sense of their worlds. He argued that, as they learn and mature, children develop schemas that help them remember, organize, and respond to information. Furthermore, Piaget thought that when children experience new things, they attempt to reconcile the new knowledge with existing schemas through methods that he called assimilation and accommodation. [4]

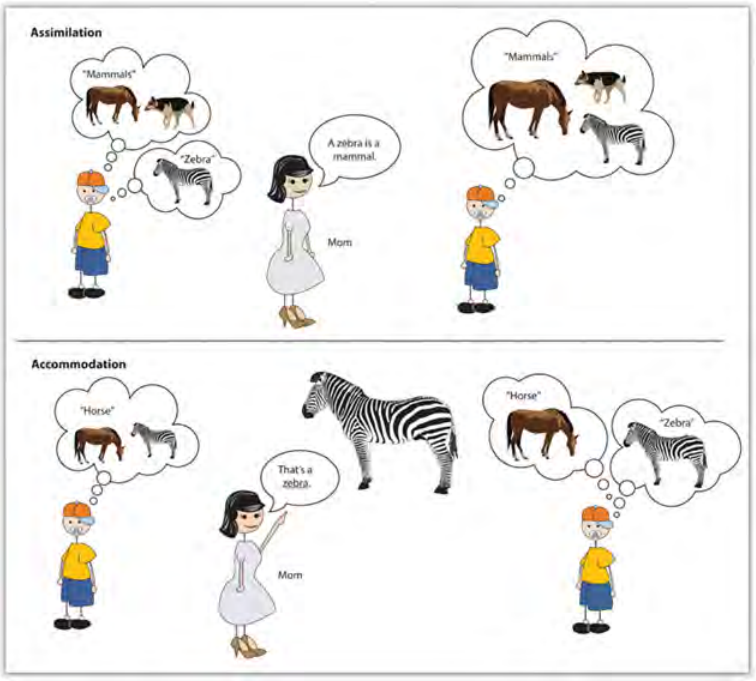


Figure 9.2.3: Assimilation and Accommodation. ([5])

When children apply assimilation, they use already developed schemas to understand new information. If children have learned a schema for horses, then they might call the striped animal they see at the zoo a horse rather than a zebra. In this case, children fit the existing schema (knowledge that defines a horse separate from other animals) to the new experience (a zebra) because zebras fit the basic schema of a horse. Accommodation, on the other hand, involves learning new information, and thus changing/updating the schema. When a mother says, "No, honey, that's a zebra, not a horse," the child may adapt the schema to fit the new experience, learning that there are different types of four-legged animals, only one of which is a horse and that zebras are unique because of their black and white stripes.

Piaget's Stages of Cognitive Development

Over his lifetime, Piaget contributed significantly to the study of cognitive development in children. Piaget's most important contribution to understanding cognitive development, and the fundamental aspect of his theory, was the idea that development occurs in unique and distinct stages, with each stage occurring at a specific time, in a sequential manner, and in a way that allows the child to think about the world using new capacities. Piaget classified children's cognitive development into four sequential stages: (1) The sensorimotor period from birth to 24 months, (2) the pre-operations period between the approximate ages of two and seven years old, (3) the concrete operational period that begins around age seven and continues through about 11 years old, and (4) the formal operations period that begins around age 11 and continues through adolescence.[2]

Piaget's Stages of Cognitive Development

Stage	Approximate age range	Characteristics	Stage attainments
Sensorimotor	Birth to about 2 years	The child experiences the world through the fundamental senses of seeing, hearing, touching, and tasting.	Object permanence
Preoperational	2 to 7 years	Children acquire the ability to internally represent the world through language and mental imagery. They also start to see the world from other people's perspectives.	Theory of mind; rapid increase in language ability
Concrete operational	7 to 11 years	Children become able to think logically. They can perform operations on objects, but only those which are real ("concrete"), not those which are abstract.	Conservation

Stage	Approximate age range	Characteristics	Stage attainments
Formal operational	11 years to adulthood	Adolescents can think systematically, can reason about abstract concepts, and can understand ethics and scientific reasoning.	Abstract logic

Figure 9.2.4: Piaget's Stages of Cognitive Development. ([6])

As this text is about infants and toddlers, we will primarily focus on the first stage, the sensorimotor stage, which includes children between the ages of 0 to 2 years. During the sensorimotor stage, children use their senses and motor capabilities to understand the world. In fact, infants' use of their senses to perceive the world is so central to their understanding that whenever infants do not directly perceive objects, as far as they are concerned, the objects do not exist. Piaget found, for instance, that if he first interested infants in a toy and then covered the toy with a blanket, infants who were younger than 6 months of age would act as if the toy had disappeared completely—they never tried to find it under the blanket but would nevertheless smile and reach for it when the blanket was removed. Piaget found that it was not until about 8 months that the infants realized that the object was merely covered and not gone. Piaget used the term **object permanence** to refer to the child's ability to know that an object exists even when the object cannot be perceived. [4]

Figure 9.2.5: 1. Mother engages infant's attention with the toy. [7]

Figure 9.2.6: 2. Mother hides the toy in one of the bowls, ensuring that infant is watching figure

Figure 9.2.7: 3.Mother covers the bowls and asks, "Where's the toy?" then pushes bowls towards the infant.

Figure 9.2.8: 4. Infant reaches for one of the cloths to uncover the toy

Sensorimotor Substages

The sensorimotor period begins at birth and continues through the child's first two years. It focuses on the development of schemes as infants' sensory and motor systems interact with the world. There are six substages within the sensorimotor period.

Sensorimotor Substages

Sensorimotor Substage	Age

Sensorimotor Substage	Age
Substage 1: Simple Reflexes	Birth to 1 month
Substage 2: Primary Circular Reactions	1 to 4 months
Substage 3: Secondary Circular Reactions	4 to 8 months
Substage 4: Coordination of Circular Reactions	8 to 12 months
Substage 5: Tertiary Circular Reactions	12 to 18 months
Substage 6: Internalization of Schemes and Early Representational Thought	18 months to 2 years

Stage 1 lasts from birth until around 1 month of age. At this first stage, learning by experiencing the world is largely driven by inborn motor and sensory reflexes, like the sucking and palmar reflexes. With the palmar reflex, when something is placed in the palm of an infant, their involuntary reflex is to close their fingers around it and cling on to it. By doing so, the infant is able to experience shape, texture, temperature, weight, etc.,. The palmar reflex typically disappears by six months of age (Anekar & Bordoni, 2020). At this stage, Piaget proposed that learning about the world is not primarily voluntary, instead, infants begin to encounter the world as a result of their inborn reflexes.[2] [8]

Figure 9.2.9:Infant grasping onto an adult's finger. ([1])

Stage 2, which occurs approximately between 1 and 4 months, includes the primary circular reaction in which an infant happens to experience an event and then attempts to repeat the action. The infant begins to discriminate between objects and adjust responses accordingly as reflexes are replaced with voluntary movements. An infant may accidentally engage in a behavior and find it interesting, such as making a vocalization. This interest motivates them to try to do it again and helps the infant learn a new behavior that originally occurred by chance. At first, most actions have to do with the body, but in the months to come, will be directed more toward objects.[2] [8]

Figure 9.2.10: Infant vocalizing. ([10])

Stage 3, which takes place between 4-8 months, involves secondary circular reactions when an infant repeats an action with a specific, desired consequence or to achieve an unrelated consequence. The infant becomes more and more actively engaged in the outside world and takes delight in being able to make things purposely happen on their own. Repeated motion brings particular interest, for example, as the infant is able to bang two things together or when sticking out their tongue leads to their parents laughing.[2] [8]

Figure 9.2.11: Infant sticking out her tongue. ([11])

Stage 4, which occurs approximately between 8 and 12 months, comprises the use of familiar means to obtain ends. It entails deliberate planning of steps to meet a goal or objective. The infant can engage in behaviors that others perform and anticipate upcoming events. Perhaps because of continued maturation of the prefrontal cortex, the infant becomes capable of having a thought and carrying out a planned, goal-directed activity such as seeking a toy that has rolled under the couch. The object continues to exist in the infant's mind even when out of sight and the infant now is capable of making attempts to retrieve it. [2] [8]

Figure 9.2.12: Infant uses a stick to play with a xylophone. ([12])

Stage 5, which takes place between 12 to 18 months of age, is a tertiary circular reaction in which an infant experiments with their environment using the properties of one object to manipulate another object, in other words, using an experimental object, like a stick, to push a ball that then makes a noise. The infant actively engages in more experimentation to learn about the physical world. Gravity is learned by pouring water from a cup or pushing bowls off of table tops. The caregiver tries to help the child by picking it up again and placing it back on the table. And what happens? Another experiment! The child pushes it off the table again causing it to fall and the caregiver to pick it up again! [2]

Figure 9.2.13: Infant playing in a pool of water. ([1])

Stage 6, which occurs approximately between 18 and 24 months, is characterized by insight, wherein the child observes how other people manipulate the environment to reach the desired goal, then the child applies that knowledge to obtain the desired goal. The child is now able to solve problems using mental strategies, to remember something heard days before and repeat it, to engage in pretend play, and to find objects that have been moved even when out of sight. Take for instance, a toddler who is upstairs in a room with the door closed, supposedly taking a nap. The doorknob has a safety device on it that makes it impossible for the child to turn the knob. After trying several times to push the door or turn the doorknob, the child carries out a mental strategy learned from prior experience to get the door opened-knocking on the door! The child is now better equipped with mental strategies for problem-solving. [2]

Figure 9.2.14: Toddler using an abacus. . ([1])

The culmination of stage 6 and the sensorimotor period is the child's understanding of object permanence, that objects have an existence independent of the child's interaction with them. Classic examples of understanding object permanence include a child's realization that when a caregiver leaves a room, the parent continues to exist, or the child's attempt to recover a hidden toy, indicating the child's understanding that the toy still exists outside of view (Beilin & Fireman,1999). [2]

---

[1] Image by Mirjoran is licensed under CC by 2.0.

[2] Scott & Cogburn (2021). Piaget. *StatPearls*. Treasure Island (FL): StatPearls Publishing. CC by 4.0

[3] Image from Siegler (2021). Cognitive development in childhood. In R. Biswas-Diener & E. Diener (Eds), Noba textbook series: Psychology. Champaign, IL: DEF publishers. CC by SA NC 4.0

[4] "Introduction to Psychology" by Walinga & Stangor. CC by NC SA 4.0

[5] Assimiliation and Accomodation in "Introduction to Psychology" by Walinga & Stangor. CC by NC SA 4.0

[6] Piaget's Stages of Cognitive Development. in "Introduction to Psychology" by Walinga & Stangor. CC by NC SA 4.0

[7] Image adapted from Clackson et al., (2019). Do helpful mothers help? Effects of maternal scaffolding and infant engagement on cognitive performance. *Frontiers in Psychology, 10*, 2661. CC by 4.0

[8] "Psyc 200 Lifespan Psychology" by Laura Overstreet. CC by 4.0

[9] Image by Raul Luna is licensed under CC by 2.0.

[10] Image by Jason Sung is licensed under CC by 4.0

[11] Image by Juan Encalada is licensed under CC by 4.0

[12] Image by Jelleke Vanooteghem is licensed under CC by 4.0

[13] Image by Lubomirkin is licensed under CC by 4.0

[14] Image by Jluis arias is licensed under CC by 4.0

9.3: Applying Piaget's Sensorimotor Stage

Sensorimotor Stages

While learning about the sensorimotor stage, did you notice how Piaget used observable behaviors from children to understand and categorize cognitive progression? Children reveal their thinking through their observable behaviors. The key then to understanding a child's cognitive development is that we, as caregivers, need to take the time to carefully observe and document children's behavior. The sensorimotor substages can act like a map to help us understand a child's current cognitive stage and also the next stage(s) they will progress into. Knowing which substage children are in can inform us about the function of their behaviors and provide us insight into possible activities to support their cognitive progression.

For example, in stage 3, infants take delight in being able to make things purposefully happen on their own; therefore, caregivers can consider including play objects that infants can easily manipulate and that have a 'consequence'--an outcome that can be experienced by the child. In comparison, during stage 5, an infant directly experiments with their environment; therefore, caregivers can include various play objects that can be used to engage with the immediate contextual environment. Children in stage 5 love pouring water back and forth between containers of different sizes and shapes. As contexts change (e.g., inside/outside, water play, table activities, etc.,), so too should the experimental play objects to best encourage experimental curiosity. Remember, the first and most important thing we can do as caregivers is purposefully observe children. Observe the children and how they use objects and then reflect on their behaviors to consider additional or alternative objects to support their experimentation.

Preoperational Stage

Although Piaget suggested that only one year of toddlerhood is spent in the preoperational stage, learning about this stage is important because it sheds light on the future trajectory of cognitive growth in toddlers. Furthermore, the fact that Piaget includes the second year of a child's life in the next stage of cognitive development, highlights the important cognitive growth that occurs from 24 to 36 months of age.

At about 2 years of age, and until about 7 years of age, children move into the preoperational stage. During this stage, children begin to use more language and to think more abstractly about objects. The term 'operational' refers to logical manipulation of information, so children at this stage are considered pre-operational because children's logic is based on their own personal knowledge of the world so far, rather than on conventional knowledge. Children also begin to use more conversational language in the preoperational stage, but they cannot understand adult logic or mentally manipulate information. [1] [2]

The preoperational period is defined by semiotic function, or representational thought through signs and symbols. This stage exhibits five characteristic behaviors: imitation, symbolic play, drawing, mental image, and verbal recalling of events. The first behavior, imitation, is when the child models observed behavior even after the disappearance of the thing the child is imitating. For example, the child may mimic a person's dance or how they play with an object, even after the person is no longer present. The next behavior, symbolic play, is a step beyond imitation. This "make-believe" or "play pretend" behavior is characterized by the child's ability to project an idea onto an object, symbolically. "Let's pretend that I am the mama and this is my baby," and the child points to a stuffed animal. In this example, both the child and the stuffed animals are symbols in the game of make-believe. The third identified behavior, drawing, begins early in the preoperational period, and incorporates both play and imitation. Drawing often begins with scribbles and proceeds to graphic imagery with the representation of objects that are present in the child's world. Through drawing, the child may represent family members with stick figures, with the key characteristic being that the child understands that the stick figures are only representations of the family, not the actual family members. Finally, the verbal recalling of events, which is the culmination of semiotic function, is the child's use of language to imitate and reflect upon events that occurred in the child's past. Mastery of semiotic function is important because it indicates that a child can think and assimilate knowledge rather than merely act on objects that are physically present (Marwaha, Goswami & Vashist, 2017). [3]

Limitations of Piaget's Theory

[1] "Introduction to Psychology" by Walinga & Stangor. CC by NC SA 4.0

[2] Lally & Valentine-French (2019). Lifespan Development: A Psychological Perspective. CC by NC SA 4.0

[3] Scott & Cogburn (2021). Piaget. *StatPearls*. Treasure Island (FL): StatPearls Publishing. CC by 4.0

9.4: Vygotsky's Sociocultural Theory of Cognitive Development

Sociocultural Theory

Figure 9.4.1: Lev Vygotsky. ([2])

Zone of Proximal Development:

Vygotsky's best known concept is the Zone of Proximal Development (ZPD). Vygotsky stated that children should be taught in the ZPD, which occurs when they can almost perform a task, but not quite on their own without assistance. With the right kind of teaching, however, they can accomplish it successfully. A good teacher identifies a child's ZPD and helps the child stretch beyond it. Then the teacher gradually withdraws support until the child can then perform the task unaided. This highlights the importance of instructional decisions related to types and quality of interactions in designing effective learning experiences for infants and toddlers. [1] [3]

Researchers have applied the metaphor of scaffolds (the temporary platforms on which construction workers stand) to this way of teaching. Scaffolding is the temporary support that caregivers give a child to do a task. Scaffolding represents the way in which a caregiver guides a child's learning during a goal-oriented task by offering or withdrawing support at different levels depending on the child's individual developmental level and learning needs. Scaffoldings typically include a mutual and dynamic nature of interaction where both the learner and the one providing the scaffold influence each other and adjust their behavior as they collaborate. In an interactive game of peek-a-book, a caregiver can scaffold an infant's attention and understanding of object permanence by changing the length of time they stay hidden and by changing how they reveal themselves (e.g., using their hands or another object to hide behind). Research suggests that even in infancy scaffolding plays an important role in the development of cognitive abilities (Cuevas et al. 2014; Matte-Gagné & Bernier 2011; Neale & Whitebread, 2019). Ideas such as the ZPD and scaffolding bring to light a fundamentally different view of a caregiver who serves more as a facilitator of learning rather than someone providing general knowledge. Likewise, the learner takes on more responsibilities such as determining their learning goals, becoming a resource of knowledge for peers, and actively collaborating in the learning process (Grabinger, Aplin, & Ponnappa-Brenner, 2007). This often contrasts with how many people perceive education--as the teacher being the source of knowledge and the teacher directly giving their knowledge to the children. [1] [4] [3]

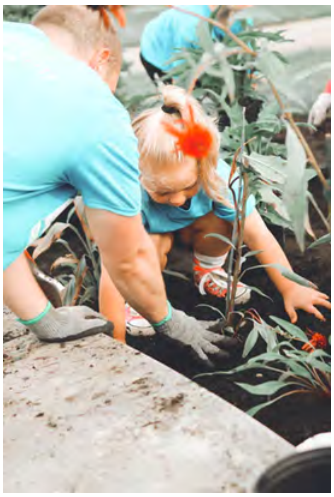


Figure 9.4.2: Caregiver assisting a toddler in the garden. ([5])

For infant and toddler caregivers, every interaction, whether during play or a care routine, is an opportunity to engage with a child inside their ZPD. To begin to engage with an infant or toddler inside their ZPD, we must first purposefully observe them. Beginning with observation is critical because it allows us to first understand what the child is interested in and hypothesize about what their goals may be. Furthermore, observation reveals their current ability or understanding about the activity and objects they are engaged in. Next, we should then reflect upon our observations and consider our role within the child's ZPD. What type and level of assistance can we offer to the child? What is the least amount of assistance we can provide as guidance? While implementing assistance to the child, we should constantly be reflecting upon how our assistance changes their activity and reflect upon our potential new role as their behaviors change.

Figure 9.4.3: Infant and caregiver exploring flowers. ([6])

Contingency is one strategy to use while engaging with a child in their ZPD. Contingency describes the extent to which a caregiver's interaction is dependent upon attributes of the child (for example their age, ability, attention, interest, and whether or not they are struggling with the task at hand). A contingent caregiver response is one which occurs when a child requires help of some kind, as opposed to assistance which appears unnecessary because it occurs when a child is coping adequately. A contingent response will also provide the appropriate level of support to assist the child – not taking over the task completely, and not giving too little assistance to not have any effect. As a result, to respond contingently, a caregiver must be present in the unfolding of an activity and observe the child carefully. [4]

Development and learning originate in social, historical, and cultural interactions.

Vygotsky contended that thinking has social origins. Social interactions play a critical role especially in the development of higher order thinking skills, and cognitive development cannot be fully understood without considering the social and historical context within which it is embedded. He explained, "Every function in the child's cultural development appears twice: first, on the social level, and later, on the individual level; first between people (interpsychological) and then inside the child (intrapsychological)"

(Vygotsky, 1978). It is only through working with others on a variety of tasks that a child adopts socially-shared experiences and acquires useful strategies and knowledge (Scott & Palincsar, 2013). [3]

Barbara Rogoff (1990) refers to this process as guided participation, where a learner actively acquires new culturally valuable skills and capabilities through a meaningful, collaborative activity with an assisting, more experienced other, such as a caregiver. It is critical to notice that these culturally-mediated functions are viewed as being embedded in sociocultural activities rather than being self-contained. Development is a "transformation of participation in a sociocultural activity" not a transmission of discrete cultural knowledge or skills (Matusov, 2015). The processes of guided participation reveal the Vygotskian view of cognitive development "as the transformation of socially-shared activities into internalized processes," or an act of enculturation (John-Steiner & Mahn, 1996). In this way, children cognitively learn about the world by participating in it with others. [3]

Examples of guided participation can be seen when caregivers involve infants and toddlers in everyday routines. In her research with Mayan families in Guatemala, Rogoff et al., (1993) reported mothers guiding their toddlers through the process of making tortillas. Mothers would give the toddlers small balls of dough to practice rolling and flattening. This cultural practice both contributed to the child's cognitive development and their learning of practices important for their culture. As another example, consider a group care setting during meal time where toddlers are seated with a caregiver and the meal is separated into larger bowls on the table where the toddlers are seated. The toddlers are able to participate in the routine by serving themselves using the serving spoons and then feed themselves using the utensils. The first few times this routine is started, the caregiver may do more serving and guiding, but eventually, through practiced participation, toddlers are able to participate more deeply, all the while learning culturally-valuable skills such as turn-taking, conversation around a meal, vocabulary and the motor skills needed to serve and eat.

This Vygotskian notion of social learning stands in contrast to some of Piaget's more popular ideas of cognitive development, which assume that development through certain stages is biologically determined, originates in the individual, and precedes cognitive complexity. This difference in assumptions has significant implications to the design and implementation of learning experiences. If we believe, as Piaget did, that development precedes learning, then we will make sure that new concepts and problems are not introduced until learners have first developed the capabilities to understand them. On the other hand, if we believe as Vygotsky did that learning drives development and that development occurs as we learn a variety of challenging concepts and principles with others, then we will ensure that activities are structured in ways that promote interaction. We will know that it is the process of learning that enables achievement of higher levels of development, which in turn affects a child's "readiness to learn a new concept" (Miller, 2011). [3]

Private Speech

Do you ever talk to yourself? Why? Chances are, this occurs when you are struggling with a problem, trying to remember something, or feel very emotional about a situation. Children talk to themselves too. Piaget interpreted this as Egocentric Speech or a practice engaged in because of a child's inability to see things from another's point of view. Vygotsky, however, believed that children talk to themselves in order to solve problems or clarify thoughts. As children learn to think in words, they do so aloud before eventually closing their lips and engaging in private speech or inner speech. Thinking out loud eventually becomes thought accompanied by internal speech, and talking to oneself becomes a practice only engaged in when we are trying to learn something or remember something. This inner speech is not as elaborate as the speech we use when communicating with others (Vygotsky, 1962). Despite the fact that toddlers are still progressing through the early stages of language acquisition, they nevertheless use private speech. For example, young toddlers, between 14 to 18 months of age, independently use gestures to help think through the use of complex toys and for self-regulation (Basilio & Rodríguez, 2017) and when left alone in their bed at night, toddlers sing to themselves as a way to "practice musical skills, reflect, experiment, self-soothe, and understand their own worlds" (Sole, 2017). [1]

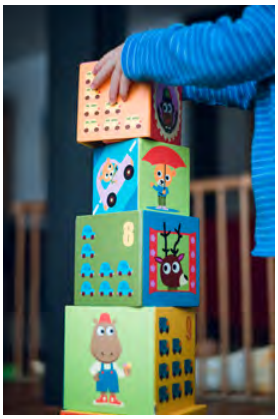


Figure 9.4.4: Toddler constructing block tower. ([7])

Although Piaget's theory of cognitive development receives more attention, sociocultural theory has several widely recognized strengths. First, it emphasizes the broader social, cultural, and historical context of all human activity. It does not view individuals as isolated entities; rather, it provides a richer perspective, focusing on the fluid boundary between self and others. It portrays the dynamics of a child acquiring knowledge and skills from the society and then in turn shaping their own personal environment (Miller, 2011). Second, sociocultural theory is sensitive to individual and cross-cultural diversity. In contrast to the universal aspects of Piaget's theory, sociocultural theory acknowledges both differences in individuals within a culture and differences in individuals across cultures. It recognizes that "different historical and cultural circumstances may encourage different developmental routes to any given developmental endpoint" depending on particular social or physical circumstances and cultural tools available (Miller, 2011). Finally, sociocultural theory greatly contributes to our understanding of cognitive development by integrating the notion of learning and development. The idea of learning driving development rather than being determined by a developmental level or age of the child fundamentally changes our understanding of the learning process and has significant instructional and educational implications for the care and education of infants and toddlers. [3]

Limitations of Vygotsky's Theory

There are critical limitations to the sociocultural perspective. The first limitation is related to Vygotsky's premature death, as many of his ideas remained incomplete. Furthermore, his work was largely unknown until fairly recently due to political reasons and issues with translation. The second major limitation is associated with the vagueness of the ZPD. Individuals may have wide or narrow zones, which may be both desirable and undesirable, depending on the circumstances. Knowing only the width of the zone "does not provide an accurate picture of a child's learning, ability, style of learning, and current level of development compared to other children of the same age and degree of motivation" (Miller, 2011). Additionally, there is little known about whether a child's zone is comparable across different learning domains, with different individuals, and whether the size of the zone changes over time. And importantly, there is not a common metric scale to measure ZPD. [3]

[1] Lally & Valentine-French (2019). Lifespan Development: A Psychological Perspective. CC by NC SA 4.0

[2] Image by josemota is licensed under CC by 2.0. CC BY-NC-SA 2.0

[3] "Sociocultural Perspectives of Learning" by Polly et al., is licensed under CC by 4.0

[4] Neale & Whitebread (2019). Maternal scaffolding during play with 12-to 24-month-old infants: stability over time and relations with emerging effortful control. *Metacognition and Learning*, *14*(3), 265-289. CC by 4.0

[5] Image by Anna Earl is licensed under CC by 4.0

[6] Image by Liana Mikah is licensed under CC by 4.0

[7] Image by Markus Spiske is licensed under CC by 4.0

9.5: Theory of Core Knowledge

Understanding the Theory of Core Knowledge

The theory of core knowledge proposes that infants are born with 'core knowledge systems' that support basic intuitions about the world (Spelke & Kinzler, 2007). Whereas Piaget claimed that children construct knowledge by engaging with the world and Vygotsky claimed children develop cognitively by participating with others in culturally-relevant activities, the theory of core knowledge claims that children are born with basic knowledge. Supporters of this theory suggest that the many studies documenting cognitive abilities in just the first few months of infancy, provide evidence for this theory. For example, Renée Baillargeon's early work discovered that object permanence is developed in infants at a much younger age than Piaget proposed--already by 3 to 4 months of age (Baillargeon, 1987)! The fact that infants have an understanding of object permanence already, in only the first few months of life, suggests that this knowledge might be inborn. [1]

In one experiment on object permanence, young infants were familiarized with a display in which a screen lying flat and facing the infant rotated up and away from the infant 180° in the manner of a drawbridge (Baillargeon, 1987). During the test phase, a new object was then placed at the far edge of the screen, which either did or did not impede the rotating screen (see Figure 9.5.1 for a depiction of the experimental scenarios). In the "impossible" scenario, the screen moved exactly as during familiarization, appearing to rotate right through the object. In the "possible" scenario, the screen rotated only to the point where it would be expected to make contact with the object and then stopped moving. Infants looked longer at the "impossible" scenario than the 'possible' scenario – which was interpreted in terms of a violation of infants' expectations regarding object permanence. In another experiment on object permanence (see Figure 9.5.1 for a visual depiction of the scenarios), 3 to 4 month old infants looked longer at an impossible event (tall carrot moving behind a box with a section cut out near the top of the box that should have shown the green top of the carrot as it moved behind the box) than the possible event (short carrot moving behind a box with a section cut out near the top of the box that should not have shown the green top of the carrot as it moved behind the box) (Baillargeon & DeVos, 1991).

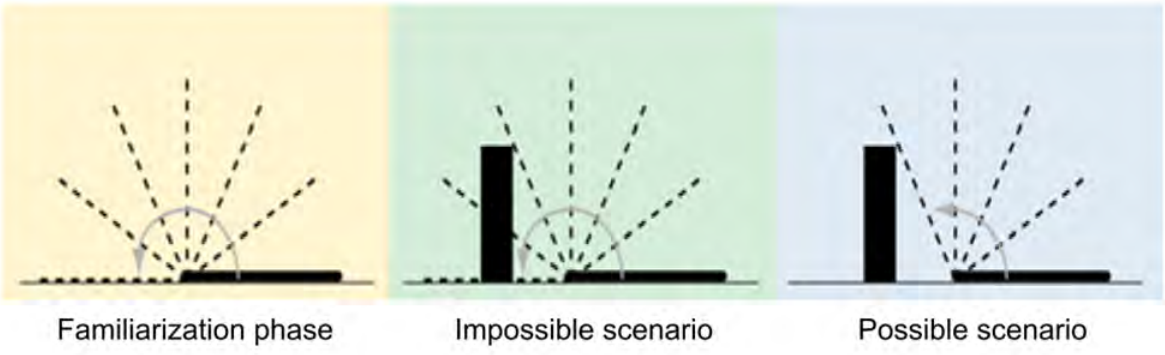


Figure 9.5.1: Depiction of the object permanence stimuli from Baillargeon (1987). Side view of habituation and test displays. In both conditions, infants were habituated to a 180° drawbridge-like motion. The decline and plateau of looking times during habituation are depicted. In the Experimental Condition, infants completed two types of test trials, both of which contained a new object on the far side of the display. The *Impossible Test* involved the same full 180° rotation from habituation, but now the screen surprisingly passed through the box as it completed its rotation (with the box disappearing as it became obscured). The *Possible Test* involved a novel shorter rotation of screen up to the point where it would contact the box, where it stopped; this motion was "possible" in terms of solidity and object permanence, but was more *perceptually novel* than the Impossible Test. infants dishabituated to the Impossible Test but not the Possible Test. However, in the Control Condition no preference was observed. These results were interpreted as reflecting the violation of infants' expectations regarding solidity and/or object permanence.. ([2])

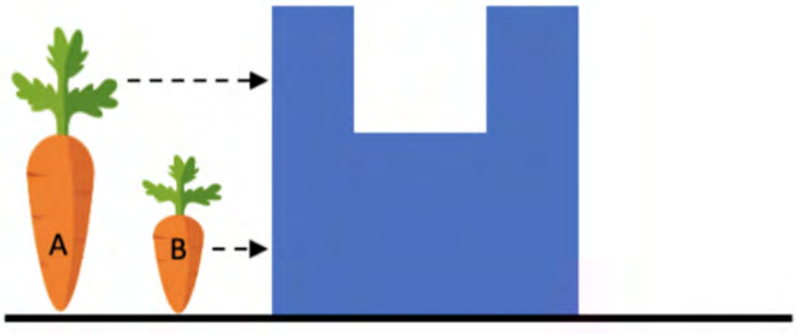


Figure 9.5.1: Depiction of the object permanence stimuli ([3])

Building on Baillargeon's early research, many studies have since continued to document a range of abilities that are collectively described as 'core systems of knowledge' and suggest basic inborn knowledge about the physical world (Hamlin, Wynn & Bloom, 2010; Spelke, 1998; Spelke et al., 1992; Spelke & Kinzler, 2007; Wang & Feigenson, 2021). Unlike Piaget's and Vygotsky's theories, the theory of core knowledge suggests that some aspects of early knowledge do not need to be learned with experience or from more knowledgeable others because children are instead born with this knowledge. [1]

[1] Grace et al., (2021). Implicit Computation and the Origins of Knowledge. Preprint. CC by 4.0

[2] Image adapted from Turk-Browne et al., (2008). Babies and brains: Habituation in infant cognition and functional neuroimaging. *Frontiers in Human Neuroscience*, *2*, 16. CC by 4.0

[3] Image from Grace et al., (2021). Implicit Computation and the Origins of Knowledge. Preprint. CC by 4.0

[4] Grace et al., (2021). Implicit Computation and the Origins of Knowledge. Preprint. CC by 4.0

9.6: Information Processing

Theory of Information Processing

Information processing theory uses the analogy of a computer to consider how the mind works.

It is theorized that cognitive processes work in specific sequences, as does a computer, by receiving input, processing the information, and delivering an output. In this way, the mind functions like a biological computer responsible for processing information from the environment. As children grow, their brains also grow, leading to advances in their ability to cognitively process the information they receive. In contrast with Piaget's theory of cognitive development that proposed development occurs in stages, information processing theory instead emphasizes a continuous pattern of development. [1]

Memory is one cognitive process that is commonly used to explain information processing theory. The idea is that there are specific steps in the memory process, similar to how information storage on a computer can involve multiple distinct steps. Using the Atkinson and Shiffrin Model shown in Figure 9.6.1, memory has three main components in which information can flow in and out of the memory system. The process begins when information from our senses flows into sensory memory. If we pay attention to this information, it then enters short-term memory where, if attention is further maintained toward it, it can continue on to long-term memory. [1]

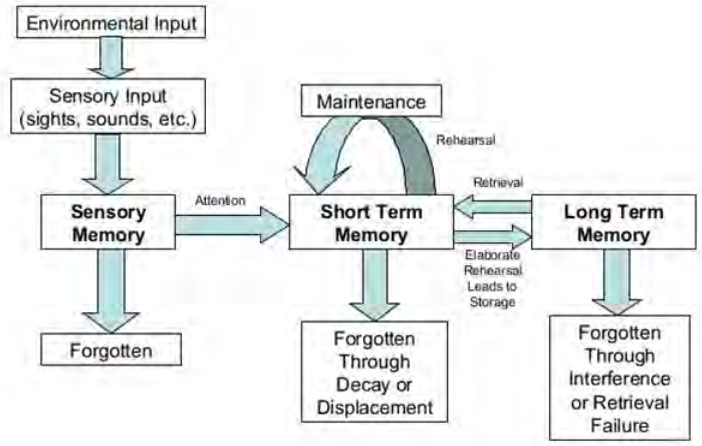


Figure 9.6.1: Environmental input to Sensory input (sights, sounds, etc.) both feeding into Sensory memory, from where it can either be forgotten or into short-term memory. In short-term memory it's either forgotten through decay or displacement of maintenance occurs through rehearsal. A two-way exchange between short-term memory and long term memory occurs. During this exchange elaborate rehearsal leads to storage (short term to long term) or items are retrieved from short term into long term. Once in long term it can be forgotten through interference or retrieval failure. ([2])

Along with suggesting specific steps in cognitive processes, following the analogy of a computer, information processing theory explains growth in cognitive abilities through continuous maturational growth in cognitive systems and the brain. Whereas Piaget proposed stages based on ages to represent important periods of change in cognitive growth, information processing theory instead examines the continuous growth in cognitive processes. Consider the cognitive process of visual working memory, which is a cognitive system that actively holds visual information, such as the color or shape of something, in the mind temporarily for use in ongoing tasks. Research reveals a continuous increase in visual working memory capacity over the first year (Rose et al., 2001; Kaldy and Leslie, 2003, 2005; Oakes et al., 2006, 2017; Kibbe and Leslie, 2011; Kwon et al., 2014; Kaldy et al., 2016) that continues to develop into childhood (Simmering, 2012; Guillory et al., 2018). For example, ten and twelve month-old infants are successful in remembering three objects but are unable to remember more than three objects (Feigenson and Carey, 2003, 2005). Similarly, brain research has found visual working memory activation evident by 4 months of age with continuous developmental change between 4 months and one year of age (Reyes et al., 2020). As an example of how growth in some cognitive systems influence the abilities in other cognitive systems, fourteen month-old infants can use high-level strategies such as chunking to remember more items (Feigenson and Halberda, 2004; Kibbe and Feigenson, 2016). Information processing research continues to document the continuous growth in cognitive processes of infants and toddlers. [3] [4]

[1] Information processing theory from Wikipedia is licensed under CC by SA 4.0

[2] Image from Dkahng is licensed under CC by SA 4.0

[3] Isbell et al., (2015). Visual working memory continues to develop through adolescence. *Frontiers in Psychology*, *6*, 696. CC by 4.0

[4] Guillory & Kaldy (2019). Persistence and Accumulation of Visual Memories for Objects in Scenes in 12-month-old Infants. *Frontiers in Psychology*, *10*, 2454. CC by 4.0

9.7: Conclusion

Conclusion to Theories Cognitive Development

This section presented four theories of cognitive development. The two main cognitive theories of Piaget and Vygotsky were explained, compared and applied to the care and education of infants and toddlers. Both of these theories continue to be highly influential in leading discussions of cognitive development in young children. The theories of core knowledge and information processing were also discussed and related to the theories of Piaget and Vygotsky. Despite the strengths and limitations of each theory, what is clear is that recent research has revealed that infants and toddlers know more about the world than was once thought, and it is through their active engagement with the world and quality interactions with others that is most important for ongoing cognitive development.

9.8: References

References for Theories of Cognitive Development

- Anekar, A. A., & Bordoni, B. (2020). Palmar Grasp Reflex. *StatPearls*. https://www.ncbi.nlm.nih.gov/books/NBK553133/
- Baillargeon, R. (1987). Object permanence in 3 1/2- and 4 1/2-month-old infants. *Developmental Psychology, 23*(5), 655-664.
- Baillargeon, R., & DeVos, J. (1991). Object permanence in young infants: Further evidence. *Child Development, 62*(6), 1227-1246.
- Basilio, M., & Rodríguez, C. (2017). How toddlers think with their hands: Social and private gestures as evidence of cognitive self-regulation in guided play with objects. *Early Child Development and Care, 187*(12), 1971-1986.
- Beilin, H., & Fireman, G. (1999). The foundation of Piaget's theories: mental and physical action. *Advances in Child Development and Behavior, 27*, 221-246.
- Cuevas, K., Deater-Deckard, K., Kim-Spoon, J., Watson, A. J., Morasch, K. C., & Bell, M. A. (2014). What's mom got to do with it? Contributions of maternal executive function and caregiving to the development of executive function across early childhood. *Developmental Science, 17*, 224–238.
- Gopnik, A. (2012). Scientific thinking in young children: Theoretical advances, empirical research, and policy implications. *Science, 337*(6102), 1623-1627.
- Gopnik, A., Meltzoff, A. N., & Kuhl, P. K. (1999). *The scientist in the crib: Minds, brains, and how children learn*. William Morrow & Co.
- Grabinger, S., Aplin, C., & Ponnappa-Brenner, G. (2007). Instructional Design for Sociocultural Learning Environments. *E-Journal of Instructional Science and Technology, 10*(1), n1.
- Hamlin, J., Wynn, K., & Bloom, P. (2010). Three-month-olds show a negativity bias in their social evaluations. *Developmental Science, 13*(6), 923-929.
- James, W. (1890). *The Principles of Psychology*. Cambridge, MA: Harvard University Press.
- John-Steiner, V., & Mahn, H. (1996). Sociocultural approaches to learning and development: A Vygotskian framework. *Educational Psychologist, 31*(3/4), 191-206.
- Marwaha, S., Goswami, M., & Vashist, B. (2017). Prevalence of Principles of Piaget's Theory Among 4-7-year-old Children and their Correlation with IQ. *Journal of Clinical and Diagnostic Research: 11*(8), ZC111.
- Matte-Gagné, C., & Bernier, A. (2011). Prospective relations between maternal autonomy support and child executive functioning: Investigating the mediating role of child language ability. *Journal of Experimental Child Psychology, 110*(4), 611–625.
- Matusov, E. (2015). Vygotsky's theory of human development and new approaches to education.
- Miller, P. (2011). *Theories of developmental psychology* (5th ed.). New York, NY: Worth Publishers.
- Neale, D., & Whitebread, D. (2019). Maternal scaffolding during play with 12-to 24-month-old infants: stability over time and relations with emerging effortful control. *Metacognition and Learning, 14*(3), 265-289.
- Reyes, L. D., Wijeakumar, S., Magnotta, V. A., Forbes, S. H., & Spencer, J. P. (2020). The functional brain networks that underlie visual working memory in the first two years of life. *Neuroimage, 219*, 116971.
- Rogoff, B. (1990). *Apprenticeship in thinking*. New York: Oxford University Press.
- Rogoff, B., Mistry, J., Göncü, A., Mosier, C., Chavajay, P., & Heath, S. B. (1993). Guided participation in cultural activity by toddlers and caregivers. *Monographs of the Society for Research in Child Development*, i-179.
- Scott, S., & Palincsar, A. (2013). *Sociocultural theory*. Retrieved from: http://dr-hatfield.com/theorists/res...ral_theory.pdf
- Sole, M. (2017). Crib song: Insights into functions of toddlers' private spontaneous singing. *Psychology of Music, 45*(2), 172-192.
- Spelke, E. S., & Kinzler, K. D. (2007). Core knowledge. *Developmental Science, 10*(1), 89-96.
- Vasileva, O., & Balyasnikova, N. (2019). (Re) Introducing Vygotsky's thought: from historical overview to contemporary psychology. *Frontiers in Psychology, 10*, 1515.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Wang, J., & Feigenson, L. (2021). Dynamic changes in numerical acuity in 4-month-old infants. *Infancy, 26*(1), 47-62.

CHAPTER OVERVIEW

10: Cognitive Development- Strategies in Group Care

10.1: Introduction

Introduction to Strategies to Support Cognitive Development in Group Care

Cognitive development refers to the increasing efficiency and ability of the mental processes associated with perception, knowledge, problem solving, judgment, language, and memory. When infants and toddlers are actively engaged with the physical and social world, they reveal their developing cognitive abilities. To support their developing cognition, caregivers can create safe and stimulating environments with age appropriate materials that invite engagement and exploration while interacting with them in language-rich ways. This section will present various strategies to create environments and interactions that optimally support the cognitive development of infants and toddlers. [1]

[1] Spielman et al., (2020). Psychology (2nd ed.). OpenStax. Licensed under CC by 4.

10.2: Observing Cognition

Importance of Observation

The best way for caregivers to start to learn about the cognitive abilities of infants and toddlers is simply to observe them because they reveal their ever-evolving understanding of the world through their interactions with objects and people. To illustrate, look at the sequence of photos displayed in Figure 10.2.1 of Nora, a fifteen-month-old toddler from Nigeria. There are a few different objects Nora is playing with. There are rectangle stacking blocks of various colors and sizes and a recycled food container that has a circle cut into the lid. This sequence of six photos represents only a few seconds of her play, but in just these few seconds, we can learn a lot about her cognition. When you look at the photos, what insight do they provide about Nora's developing understanding of how the world works?

Figure 10.2.1: Nora has a yellow block in her left hand and a blue block in her right hand, but is primarily focused on the blue block. In front of her is the cylinder container with a hole in its lid. and various other blocks scattered around the base of the cylinder. With the blue block in her right hand, Nora moves it toward the hole in the cylinder container and drops it onto the container lid. When laid horizontally on top of the container, the blue block is too long to fit through the round hole.

Figure 10.2.2: Nora lifts the blue block up again, angles one end toward the hole, guides the block part way into the hole and releases it as it falls into the container.

Figure 10.2.3:Nora swings her left hand, with the yellow block, toward the hole. In the same continuous movement, as her hand nears the hole entry point, she angles the end of the yellow block toward the hole and guides it directly through the hole.

Figure 10.2.4: Nora picks up another yellow block (from off camera) and focuses her eyes on the hole as she again angles the end of the block toward the hole and drops it into the container.

Figure 10.2.5: she selects an orange block but as she moves it toward the hole, she moves her eye gaze away from the hole and toward the remaining blocks on the floor. As she looks toward the blocks on the floor, her hand guiding the orange block gets stuck on the lid as the angle of the block does not fit into the hole. She then looks toward the container, adjusts the angle of the block and drops it into the hole.

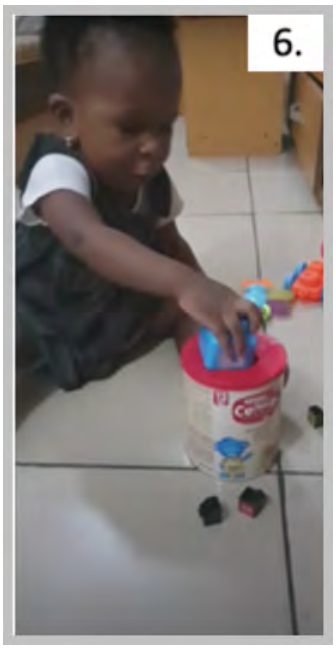


Figure 10.2.6:Nora grabs a large toy object (from off camera) and guides it toward the hole. In the first attempt to fit it into the container, it does not fit. Nora twists her wrist to change the angle and tries again, but it does not fit. [1]

In Figure 10.2.1, Nora has a yellow block in her left hand and a blue block in her right hand, but is primarily focused on the blue block. In front of her is the cylinder container with a hole in its lid. and various other blocks scattered around the base of the cylinder. With the blue block in her right hand, Nora moves it toward the hole in the cylinder container and drops it onto the container lid. When laid horizontally on top of the container, the blue block is too long to fit through the round hole. In Figure 10.2.2, Nora lifts the blue block up again, angles one end toward the hole, guides the block part way into the hole and releases it as it falls into the container. In Figure 10.2.3, Nora swings her left hand, with the yellow block, toward the hole. In the same continuous movement, as her hand nears the hole entry point, she angles the end of the yellow block toward the hole and guides it directly through the hole. In Figure 10.2.4, Nora picks up another yellow block (from off camera) and focuses her eyes on the hole as she again angles the end of the block toward the hole and drops it into the container. In Figure 10.2.5, she selects an orange block but as she moves it toward the hole, she moves her eye gaze away from the hole and toward the remaining blocks on the floor. As she looks toward the blocks on the floor, her hand guiding the orange block gets stuck on the lid as the angle of the block does not fit into the hole. She then looks toward the container, adjusts the angle of the block and drops it into the hole. In Figure 10.2.6, Nora grabs a large toy object (from off camera) and guides it toward the hole. In the first attempt to fit it into the container, it does not fit. Nora twists her wrist to change the angle and tries again, but it does not fit.

These six photos of Nora represent only a few seconds of play, but nevertheless demonstrate important information about infant and toddler cognitive development. First, children are actively making sense of the world around them through interactions with the physical and the social world. Like young scientists, they use their knowledge to make hypotheses, then act upon them, constantly updating their knowledge based on the results. In this way, it is through the interactions with the physical and social worlds that cognition primarily grows; therefore, the quality of the physical and social environments and overall learning experiences of infants and toddlers is of utmost importance for supporting optimal cognitive development. As evidence, let's next consider how the COVID-19 pandemic has demonstrated the significance of early learning experiences for supporting cognitive development in infants and toddlers.

[1] Images adapted from Ashley Siokwu licensed under CC by 3.0

10.3: The COVID-19 Pandemic- Proof of the Importance of Quality Learning Experiences

COVID-19 and Quality Care

COVID-19 (coronavirus disease 2019) is a disease caused by a virus named SARS-CoV-2 and was first discovered in December 2019 in Wuhan, China. The virus spread throughout the world and in the spring of 2020, many schools and childcare centers in the U.S. closed in an effort to reduce its spread and impact.

The COVID-19 pandemic presented a unique opportunity to explore the importance of learning experiences on the cognitive development of infants and toddlers as the childcare arrangements of children changed. Compared to toddlers born before the pandemic, children born during the pandemic showed lower scores in cognition, language and motor abilities as toddlers (Deoni, Beauchemin, Volpe & D'Sa, 2021; Huang et al.m 2021; Shuffrey et al., 2021). The negative cognitive impact was greatest for boys and for children from lower socioeconomic backgrounds. These results suggest the pandemic somehow changed learning experiences enough to make a significant impact on the experiences that support optimal cognitive development. Although there are various potential contributing factors that could be argued to explain these results (e.g., reduced social interaction, increased screen time, increased parental stress, etc.,), one significant contributing factor was the care and educational experiences infants and toddlers received during the pandemic. [1]

Figure 10.3.1: Toddler wearing a mask during the COVID-19 pandemic. ([2])

During the early months of the pandemic childcare arrangements shifted. Some childcare providers closed temporarily and later opened with strict protocols. Many children, instead of attending a group care program, stayed home under the care of parents and extended family. The various experiences infants and toddlers received during the pandemic had an impact on their cognitive development.

One study examined how childcare arrangements during the pandemic impacted cognitive growth in infants and toddlers (Davies et al., 2021). Their data revealed that children who attended infant and toddler group care programs during the pandemic showed greater cognitive growth, regardless of their socioeconomic background. The benefits of attending infant and toddler group care programs for cognitive development, compared to other childcare arrangements such as care from a family member, may be due to group care programs being more likely to implement developmentally appropriate learning materials and adult-child interactions which scaffold learning, and have been shown to promote early cognitive development (Clark et al., 2013; DeJoseph, Sifre, Raver, Blair, & Berry, 2021; Rosen et al., 2020). [3]

Interestingly, compared to children who attended infant and toddler group care programs, informal childcare by family members did not show the same benefits for cognitive growth (Davies et al., 2021). Although the overall evidence is mixed regarding the cognitive benefits of informal childcare (Green, Pearce, Parkes, Robertson, & Katikireddi, 2020; Hansen & Hawkes, 2009; Laing & Bergelson, 2019; Melhuish et al., 2015), the strengths of infant and toddler group care programs, such as caregiver-child interactions, predictable schedules, lower screen use, and caregiver education is likely to be important for supporting cognitive growth (Dowsett, Huston, Imes, & Gennetian, 2008). [3]

Figure 10.3.2: Caregiver wearing a mask while holding an infant. ([4])

The handful of studies that have examined the impact of the COVID-19 pandemic on the cognitive development of infants and toddlers have highlighted the role learning experiences have in supporting cognitive development. In particular, the quality of the care and educational experiences infants and toddlers receive are related to their cognitive growth. These findings further document the significant role infant and toddler caregivers have in creating safe and high quality contexts that contribute to the trajectory of cognitive development in children.

In the next section we will discuss four factors of infant and toddler quality group care that support cognitive development: environments, materials, experiences and interactions.

---

[1] "Basics of COVID-19" from the CDC is in the public domain.

[2] Image from Leo_Fontes on Pixabay.

[3] Davies et al., (2021). Early childhood education and care (ECEC) during COVID-19 boosts growth in language and executive function. *Infant and Child Development*, e2241. CC by 4.0

[4] Image from marcinjozwiak on Pixabay

10.4: Environments that Support Cognitive Development

Cognitive Development and the Environment

Environments are significant in supporting cognitive development because they are both the stimulating backdrop and the active contributor of learning. Therefore, we should change the way we think of environments—we should think of them as learning environments instead of simply physical environments. Learning environments are nurturing spaces that support the development of all young children. They include classrooms, play spaces, areas for caregiving routines, and outdoor areas. Learning environments are well-organized and managed settings. They offer developmentally-appropriate schedules, indoor and outdoor opportunities for choice, play, exploration, and experimentation. Learning environments include age-appropriate equipment and materials They integrate home cultures and are flexible to support the changing ages, interests, and characteristics of a group of children over time.[1]

Figure 10.4.1: Which includes a bench with two storage baskets within. A small size armchair with a pillow and two child size cubbies in the corner. Children's artwork and pictures adorn the wall. ([2])

The educational framework of Reggio Emilia holds the classroom environment to a special status and therefore provides a great perspective to learn about how the environment can support cognitive development. Reggio Emilia was founded by Loris Malaguzzi (1920–1994) to provide provisions for children of the city of Reggio Emilia, Italy, after World War II (Wien, 2008). The Reggio Emilia philosophy perceives physical space as a primary aspect of cognitive development, envisioned as a third teacher (Wien, 2008). What do you think it means to consider the environment as a third teacher? The importance of the environment lies in the belief that children can best create meaning and make sense of their world through environments that support "complex, varied, sustained, and changing relationships between people, the world of experience, ideas and the many ways of expressing ideas." (Cadwell, 1997). While infants and toddlers are active meaning makers, the quality of materials and interactions in their environments influence the quality of meaning that they can make.[3] [4]

Physically, Reggio Emilia classrooms generally incorporate natural light and indoor plants. Classrooms capture the attention of children through the use of mirrors, photographs, and children's work accompanied by transcriptions. Other supportive elements of the environment include ample space for supplies, frequently rearranged to draw attention to their aesthetic features. The Reggio Emilia environment informs and engages the viewer while always making an effort to create opportunities for children to interact.[4]

Figure 10.4.2: A childsize table with a low profile woven basket and small wooden objects within. Two life plans and a large window letting in natural light sit behind the table. ([5])

With this basic understanding of some of the ideas related to how Reggio Emilia regards learning environments, we can now start to consider important factors for creating learning environments in infant and toddler classrooms. Here are some factors, inspired by Reggio Emilia, to consider for the environments of infants and toddlers: [3]

- Create environments that have an open concept, allowing flow between rooms and amongst areas within a classroom. Windows, indoor plants and materials from nature create a feeling of flow between indoor and outdoor spaces.
- Photographs hung on walls should represent the children, their families and individuals of various cultures who are enrolled in the program and that make up the local community.
- Hang child-created artwork around the classroom ensuring they are placed on walls that are located at heights the children can easily visually engage with.
- Label shelves and containers to support early literacy and help make the process of finding and cleaning easier.
- Consider how the type of storage impacts invitation and ease of access. Storing and displaying materials in clear containers and open baskets visually invites children to play with them and provides easy access without challenging lids to open.

Figure 10.4.3: Play materials stored in open baskets on a low shelf. The bottom shelf contains various size wooden rings in a wooden basket. The upper woven basket contains clean wine corks. ([6])

In addition to the overall physical setting of the environment, it is important to consider how materials in the environment are arranged. Reggio Emilia philosophy suggests that children should be allowed to touch, move, listen, see, taste, discover, and explore the world around them in an enriching and supportive environment. Therefore, materials should be developmentally-appropriate, intriguing and easily accessible. Figure 10.4.3 shows two collections of materials stored in baskets on a shelf. How does the storage and arrangement of the materials both invite engagement and allow for ease of access? The materials are stored in

open baskets so their contents are visible and easy to access. The baskets are open, without lids, inviting participation. Additionally, the baskets are placed on a low shelf at the height of children. [3]

[1] "Learning Environments" from Head Start ECLK is in the public domain.

[2] Image by Todd LaMarr is licensed under CC by 4.0

[3] Aljabreen (2020). Montessori, Waldorf, and Reggio Emilia: A comparative analysis of alternative models of early childhood education. *International Journal of Early Childhood*, *52*(3), 337-353.

[4] Reggio Emilia approach from Wikipedia is licensed under CC by SA 3.0

[5] Reggio Inspired toddler classroom by Todd LaMarr is licensed under CC by 4.0

[6] Play Materials by Todd LaMarr is licensed under CC by 4.0

10.5: Materials that Support Cognitive Development

Materials and Cognitive Development

Jean Piaget's theory of cognitive development proposed a pivotal connection between experiences and cognitive development during the sensorimotor stage of infancy and toddlerhood. The sensorimotor period begins at birth and continues through the child's first two years. During this stage, infants and toddlers experience the world through sensation (sensory) and movement (motor). Materials can stimulate both sensory and motor experiences and therefore are an important way to support the cognitive development of infants and toddlers. [1]

To encourage exploration, the selection of materials provided to infants and toddlers should be age-appropriate and based on what caregivers observe them to be interested in. As infants age, their strategies for exploring materials changes. For example, mouthing is a predominant form of exploration at 6 months of age but is exchanged for more refined forms of manual exploration later in infancy (Kaur, Srinivasan & Bhat, 2015). Another example can be seen in the developmental changes in grasping ability. Infants improve their grasping abilities between 6 and 15 months of age (Butterworth, Verweij & Hopkins, 1997). Similarly, 12 to 14 month old infants show appropriate, anticipatory changes in grasp formation based on object shape and size compared to 5 to 6 month old infants (Barrett et al., 2008; Fagard, 2000). Infants with more advanced motor abilities (i.e., those who could crawl, stand, or walk) are more interested in objects with handles (Nelson & Oakes, 2021). Based on this research, caregivers should observe the developmental changes of infants and toddlers, such as exploration and grasping strategies, and provide materials that continue to challenge, intrigue and support their age-appropriate developing abilities. For example, consider the collection of play materials in Figure 10.5.1. How might the different developing grasping abilities of infants and toddlers influence how they are able to hold, manipulate and explore the various materials? [1]

Figure 10.5.1: Various play materials including Various play materials which include wooden cars, small rings and balls, plastic people and golf ball size wiffle balls. ([3]

Along with age-appropriateness, exploratory behaviors are also influenced by material properties including size, shape, texture, and weight of objects (Barrett et al., 2008; Bourgeois et al., 2005; Corbetta & Snapp-Childs, 2009; Libertus et al., 2013; Newell et al., 1989, 1993; van Hof et al., 2002). For example, infants showed greater grasping of smaller objects whereas they looked more at larger objects (Rochat, 1989). In addition, 9 to 12 month old infants explored object properties such as shape, size, and texture by rotating, fingering, and transferring objects, whereas they explored properties such as weight, sound, and rigidity by banging and shaking objects (Ruff, 1984). Infants' grasping patterns depended on object size and structure as smaller objects were grasped with one hand and larger objects were grasped with two hands (Kaur, Srinivasan & Bhat, 2015). Similarly, infants squeezed non-rigid objects more compared to rigid objects (Barrett et al., 2008; Newell et al., 1989, 1993). This research suggests that caregivers should constantly be observing the developing abilities of infants and toddlers and providing age-appropriate materials based on these close observations. [2]

Loose Parts

Loose parts refers to materials that are open-ended and manipulable (Nicholson, 1971). Loose parts are moveable, non-dictated materials that children can use in a variety of ways (Daly & Beloglovsky, 2015; Maxwell, Mitchell, & Evans, 2008). Loose parts are often considered in contrast to pre-designed toys, like most toys sold at stores. For example, a toy airplane, if provided to a

child, will probably be used in a limited number of ways, limited to what the toy is, an airplane. In contrast, materials such as leaves and popsicle sticks affords creative engagement with unlimited ways to interact with the materials. Figure 10.5.2is a picture of a loose parts table with various objects from nature: small pumpkins, leaves, slices of trunk from a small tree, sticks, etc., and tools like tweezers and magnifying glasses, to support further exploration. Take a moment to look over the objects and tools in Figure 10.5.2, then consider these questions: [4]

- What do you imagine toddlers doing while at the table?
- How many different ways of using the materials can you imagine for toddlers?
- How do the carefully selected tools (twissors, magnify glasses) further support exploration than would probably happen if the tools were not present?
- What other tools could be added?
- What cognitive concepts are toddlers experiencing as they engage with the materials?

Figure 10.5.2: Materials from nature. ([5])

When children have exposure to intriguing loose parts, they become curious. Children's curiosity is triggered when they see and experience new things and have unique experiences that may not be otherwise possible in the indoor environment. This sense of curiosity is how children become inspired to engage in new explorations and discoveries (Perry, 2004). Loose parts give children the freedom to develop their play experiences based on their personal ideas and goals, rather than the play being predetermined by the materials or surroundings (Änggård, 2011). This means that the materials do not dictate the type of play children engage in. Children create play episodes based on their past experiences, curiosity, creativity, and new ideas. [4]

Figure 10.5.3: Collections of loose parts. Baskets each full of small wooden objects, old fashion hair rollers, toilet paper rolls, small wooden disks, popsicle sticks, canning jar lids, green bottle caps. ([6])

[1] Scott & Cogburn (2021). Piaget. *StatPearls Publishing*. CC by 4.0

[2] Kaur et al., (2015). Atypical object exploration in infants at-risk for autism during the first year of life. *Frontiers in Psychology, 6*, 798. CC by 4.0

[3] Image by Todd LaMarr is licensed under CC by 4.0

[4] Flannigan & Dietze (2017). Children, outdoor play, and loose parts. *Journal of Childhood Studies*, 53-60. CC by NC 4.0

[5] Image from Susan Lewis-Penix on Unsplash.

[6] Loose parts by Todd LaMarr is licensed under CC by 4.0

10.6: Interactions that Support Cognitive Development

Cognitive Development and Interactions

While materials are indeed important for supporting cognitive development, the interactions we, as caregivers, have with infants and toddlers may be even more important. Toddlers who experience more language from caregivers have greater cognitive abilities later in childhood (Brown, Wang & McLeod, 2022; Marchman & Fernald, 2008). One study examined features of childcare quality for two year olds and their potential association to later cognitive abilities when the same children were four years of age (Côté et al., 2013). Childcare quality was measured using two dimensions. The 'Provision for Learning' dimension measured the availability, accessibility, and diversity of activities available for children. The 'Teaching and Interactions' dimension measured the quality of the interaction and engagement between caregivers and children. Overall, higher levels of quality childcare at age two was associated with stronger cognitive abilities at age four. Of the two dimensions, it was the dimension of 'Teaching and Interactions' that was associated with longitudinal cognitive performance, supporting the role of quality interactions for cognitive growth. Interestingly, the 'Provision of Learning' dimension did not significantly contribute to later cognitive development.

Figure 10.6.1: Infants interacting with a caregiver. ([1])

These results are supported by numerous studies that also have found it is the quality of relationships and the interactions within these relationships during infancy and toddlerhood that are most significant for supporting cognitive development and long-term cognitive growth (Forget-Dubois et al., 2009; Fraley, Roisman, & Haltigan, 2013; Marchman & Fernarld, 2008; McCormick et al., 2020; Rodriguez & Tamis-LeMonda, 2011). In a longitudinal study, Tamis-LeMonda and colleagues (2019) found that the early learning environments of infants and toddlers predicted their later academic skills all the way out into fifth grade. Using the phrase "learning environment" can be slightly misleading as it may lead one to think only about the physical environment and objects/materials. While one dimension of it did focus on stimulating objects/materials, the other two dimensions focused on stimulating engagement and interactions (frequency of engaging children in literacy activities and sensitive and stimulating interactions). The research is clear: access to quality learning materials is important, but it is the quality of the interactions while using these materials that may be the most important.

What is the take away message for infant and toddler caregivers?

- Consider communication to be an integral part of the curriculum.
- If you plan an activity, do not just consider what the child will be doing, but also consider the critical role of the adult and their interactions during the activity.
- Enroll in or provide staff training that demonstrates how to improve interactions with infants and toddlers.
- Implement caregiving policies that support and encourage quality interactions, such as primary care, small groups, continuity of care, individualized care, culturally responsive care, and inclusive care.

[1] Image by ParentiPacek on Pixabay.

10.7: Experiences that support Cognitive Development

Cognitive Development and Experiences

The overall value of high quality experiences infants and toddlers receive during childcare supports their cognitive development. High-quality, center-based childcare during the first three years of life shows benefits for children's cognitive, language, and social development at school entry and beyond, across a range of national contexts (Albers, Riksen-Walraven & de Weerth, 2010; Barnes & Melhuish, 2017; Burchinal et al., 2000; Camilli, Vargas, Ryan, & Barnett, 2010; Drange & Havnes, 2019; Eryigit-Madzwamuse & Barnes, 2014; Hansen & Hawkes, 2009; Melhuish et al., 2015; Melhuish & Gardiner, 2017; National Institute of Child Health and Human Development Early Child Care Research Network, 2000; Ruzek et al., 2014). These effects are particularly pronounced in children from disadvantaged backgrounds (Connell & Prinz, 2002; Felfe, Nollenberger, & Rodríguez-Planas, 2015; Geoffroy et al., 2007, 2010; Larose, Côté, Ouellet-Morin, Maughan, & Barker, 2020; Melhuish, 2004; Melhuish et al., 2015), meaning that investment in early childhood education and care is a powerful way of reducing socioeconomic inequalities (Bustamante et al., 2021; Center on the Developing Child, 2010; Heckman, 2006; Reynolds, 2021). [1]

Figure 10.7.1: Toddler experimenting with water and buckets outside. ([2])

While the benefits of center-based childcare is well documented, the quality of care and education for infants and toddlers is not created equal as numerous studies have documented dramatically different differences in childcare quality (Kuchirko & Nayfeld, 2020; Kuchirko & Tamis-LeMonda, 2019). In a national study of Early Head Start center-based programs for infants and toddlers in the U.S., most classrooms were of midrange quality with higher scores in the area of emotional and behavioral support and lower scores in the area of engaged support for learning (Vogel et al., 2015). The National Institute of Child Health and Human Development (NICHD) Study of Early Child Care is one of the largest research projects on early childcare in the U.S. and has followed over 1,000 children longitudinally to measure the long term impact of experiencing high quality infant and toddler childcare. Children who received higher quality care as infants and toddlers scored higher on cognitive tests across the first three years and all the way through adolescence (Belsky, 2006; NICHD Early Child Care Research Network, 2001; Vandell et al., 2010). Importantly, caregiver language (asking questions, responding to child vocalizations, etc.,) was the strongest predictor of cognitive development. [3]

The research is clear: high quality infant and toddler care is important for supporting cognition, but what does high quality care look like? The overall quality of care and education for infants and toddlers is commonly separated into two components—structural quality and process quality (Beller et al. 1996; Howes & Rubenstein, 1983; Penn, 2011; Phillipsen et al., 1997). Structural quality refers to components such as the physical environment (buildings, space and materials), child–staff ratios, staff education and training, and curriculum (Barros et al., 2016; Slot et al., 2015; OECD, 2006). On the other hand, process quality focuses on the nature of interactions between the children and caregivers, among children, and among adults—teachers, parents, staff, and on the nature of leadership and pedagogy (Barros et al., 2016; Cryer 1999; Goelman et al. 2006; Slot, 2017; Thomason & La Paro, 2009; Vandell and Wolfe 2000). Structural quality is easier to measure although process quality may be more strongly related to greater developmental outcomes. [4]

Figure 10.7.2: Caregiver with older infant sitting in lap. ([5])

There are various tools that can be used to measure structural and process qualities. One commonly used tool is the Infant-Toddler Environmental Rating Scale Revised Edition (ITERS-R; Harms et al. 2006), used to measure the overall quality of classrooms serving children from birth through 30 months of age. The ITERS-R includes 39 items, organized under 7 subscales: Space and Furnishings (5 items); Personal Care Routines for infants and toddlers (6 items); Listening and Talking (3 items); Age Appropriate Activities (10 items); Adult–Child Interaction (4 items); Program Structure (4 items); and Parent and Staff Communication (7 items). [4]

ITERS-R Items and Subscales. [4]

Space and Furnishings

- Indoor space
- Furniture for routine care and play
- Provision for relaxation and comfort
- Room arrangement
- Display for children

Personal Care Routines

- Greeting/departing
- Meals/snacks
- Nap
- Diapering/toileting
- Health practices
- Safety practices

Listening and Talking

- Helping children understand language
- Helping children use language
- Using books

Age Appropriate Activities

- Fine motor
- Active physical play
- Art
- Music and movement
- Blocks
- Dramatic play

- Nature/science
- Promoting acceptance of diversity

Adult–Child Interaction

- Supervision of play and learning
- Peer interaction
- Staff–child interaction
- Discipline

Program Structure

- Schedule
- Free play
- Group play activities

Parent and Staff Communication

- Provisions for parents
- Provisions for personal needs of staff
- Provisions for professional needs of staff
- Staff interaction and cooperation
- Staff continuity
- Supervision and evaluation of staff
- Opportunities for professional growth

Using the ITERS, scores of overall quality range from ‘inadequate’ (score of 1) to ‘excellent’ (score of 7), with a ‘minimum’ (score of 3) and ‘good’ (score of 5) in between. Studies that have used the ITERS to assess quality have found low scores in general. Research in the U.S. has found quality scores of infant and toddler programs to be in the low to medium range (La Paro, Williamson & Hatfield, 2014; Tietze & Cryer, 2004). For example, one study examined the quality of 93 toddler programs across the state of North Carolina and found that 83% of the programs were in the mid-range, with scores between 3 to 5 (La Paro, Williamson & Hatfield, 2014). While childcare centers in the U.S. score higher in overall average quality compared to most other countries, there is more variance in the quality of U.S. programs compared to other countries (Vermeer et al., 2016). Higher than average quality scores have also been found in Australia (Fenech, Sweller & Harrison, 2010).

ITERS scores from around the world are low. Results from studies in the Netherlands found an overall quality score on the ITERS to be at the minimal level, with an average score of 3, and showing a downward trend in quality over time (Helmerhorst et al., 2015; Vermeer et al., 2008). Seventy-five childcare centers in Eastern and Western Germany had an average ITERS score of 3.2 (Tietze & Cryer, 2004). Three studies in Portugal reported poor-quality care and education with scores all under 3 (Barros & Aguiar, 2010; Pessanha et al., 2007; Pinto et al., 2013). Results from a study of 93 centers in Norway found a minimal average quality of 3.9 (Bjørnestad & Os, 2018). In Greece, infant and toddler programs ranged between 2.60 to 5.40 using ITERS (Megalonidou, 2020). In England, 75 childcare centers were assessed and found to have a mean score of 4.2 (Smith et al. 2009). Chile reported an ITERS score between 3 to 4, with public childcare centers (3.08) scoring lower than private centers (3.57) (Cárcamo et al., 2014). Across seventy-nine infant and toddler classrooms from Jinan, in the Shandong province in eastern China, the overall mean score was 3.50 (Hu et al., 2019). Overall quality was low in Ecuador with an average score of 2.08 (Lopez Boo, Dormal & Weber, 2019). [4]

Figure 10.7.3: Toddler experimenting with bubbles. ([6])

What is the take away message for infant and toddler caregivers?

- Quality of learning experiences during the first three years is related to later cognitive abilities.
- Infants and toddlers who attend center-based programs of higher quality have higher cognitive scores later in childhood and adolescence.
- The overall quality of care and education infants and toddlers experience can vary widely.
- While programs in the U.S. tend to receive average quality scores in the midrange and above, U.S. programs have been found to vary greatly in quality.
- While a handful of countries receive quality scores in the midrange and above, many more countries consistently receive scores of low quality, emphasizing the importance of education and training for infant and toddler caregivers and staff.
- Caregivers can use measures of program quality, such as the ITERS-R, to assess the quality of their programs, identify areas of lower performance and strive to improve.
- As process quality may be more strongly related to cognitive development than structural quality, caregivers can seek to actively improve their abilities and strategies for engaging with infants and toddlers, especially in terms of language exposure.

Another tool that can be used to measure the quality of interactions between caregivers and children is the The Classroom Assessment Scoring System (CLASS). The CLASS defines teaching quality through the lens of interactions. It provides the ability to measure and improve the interactions that matter most for student outcomes. Implementing a tool like the CLASS can provide data which can be used to provide professional development and improve overall quality.

---

[1] Davies et al., (2021). Early childhood education and care (ECEC) during COVID-19 boosts growth in language and executive function. *Infant and Child Development, e2241*. CC by 4.0

[2] Image from igrow on Pixabay.

[3] Vogel et al., (2015). Toddlers in Early Head Start: A portrait of 2-year-lds, their families, and the programs serving them. Vol 1: Age 2 report. OPRE report 2015-10. *Administration for Children & Families*. In the public domain.

[4] Megalonidou (2020). The quality of early childhood education and care services in Greece. *International Journal of Child Care and Education Policy*, *14*(1), 1-12. CC by 4.0

[5] Image by ImagesBG on Pixabay.

[6] Image by cherylholt on Pixabay.

10.8: Conclusion

Conclusion of Supporting Cognitive Development in Group Care

Infants and toddlers are active meaning makers, eager to engage with the physical and social world around them. Experiences that are age appropriate and stimulating optimally support their developing cognitive abilities. Caregivers can play a pivotal role in supporting cognitive development by creating quality experiences with materials and through their interactions. This chapter discussed how caregivers can create environments and interactions and use learning materials to create overall high quality experiences for infants and toddlers.

10.9: References

References for Supporting Cognitive Development in Group Care

- Albers, E. M., Riksen-Walraven, J. M., & de Weerth, C. (2010). Developmental stimulation in child care centers contributes to young infants' cognitive development. *Infant Behavior and Development, 33*(4), 401-408.
- Barrett, T. M., Traupman, E., & Needham, A. (2008). Infants' visual anticipation of object structure in grasp planning. *Infant Behavior and Development, 31*(1), 1-9.
- Belsky, J. (2006). Early child care and early child development: Major findings of the NICHD study of early child care. *European Journal of Developmental Psychology, 3*(1), 95-110.
- Bjørnestad, E., & Os, E. (2018). Quality in Norwegian childcare for toddlers using ITERS-R. *European Early Childhood Education Research Journal, 26*(1), 111-127.
- Bourgeois, K. S., Khawar, A. W., Neal, S. A., & Lockman, J. J. (2005). Infant manual exploration of objects, surfaces, and their interrelations. *Infancy, 8*(3), 233-252.
- Brown, M. I., Wang, C., & McLeod, S. (2022). Reading with 1–2 year olds impacts academic achievement at 8–11 years. *Early Childhood Research Quarterly, 58*, 198-207.
- Burchinal, M. R., Roberts, J. E., Riggins, Jr, R., Zeisel, S. A., Neebe, E., & Bryant, D. (2000). Relating quality of center-based child care to early cognitive and language development longitudinally. *Child Development, 71*(2), 339-357.
- Bustamante, A. S., Dearing, E., Zachrisson, H. D., & Vandell, D. L. (2021). Adult outcomes of sustained high-quality early child care and education: Do they vary by family income? *Child Development*.
- Butterworth, G., Verweij, E., & Hopkins, B. (1997). The development of prehension in infants: Halverson revisited. *British Journal of Developmental Psychology, 15*(2), 223-236.
- Cadwell, L. B. (1997). *Bringing Reggio Emilia Home: An Innovative Approach to Early Childhood Education*. Teachers College Press.
- Cárcamo, R. A., Vermeer, H. J., De la Harpe, C., van der Veer, R., & van IJzendoorn, M. H. (2014). The quality of childcare in Chile: Its stability and international ranking. *Child & Youth Care Forum 43*(6).
- Clark, C. A., Sheffield, T. D., Chevalier, N., Nelson, J. M., Wiebe, S. A., & Espy, K. A. (2013). Charting early trajectories of executive control with the shape school. *Developmental Psychology, 49*(8), 1481.
- Corbetta, D., & Snapp-Childs, W. (2009). Seeing and touching: the role of sensory-motor experience on the development of infant reaching. *Infant Behavior and Development, 32*(1), 44-58.
- Davies, C., Hendry, A., Gibson, S. P., Gliga, T., McGillion, M., & Gonzalez-Gomez, N. (2021). Early childhood education and care (ECEC) during COVID-19 boosts growth in language and executive function. *Infant and Child Development, e2241*.
- DeJoseph, M. L., Sifre, R. D., Raver, C. C., Blair, C. B., & Berry, D. (2021). Capturing environmental dimensions of adversity and resources in the context of poverty across infancy through early adolescence: A moderated nonlinear factor model. *Child Development, 92*: e457-e475
- Deoni, S., Beauchemin, J., Volpe, A., & D'Sa, V. (2021). Impact of the COVID-19 pandemic on early child cognitive development: Initial findings in a longitudinal observational study of child health. *Medrxiv*. Available online: https://www.medrxiv.org/content/10.1101/2021.08.10.21261846v1
- Dowsett, C. J., Huston, A. C., Imes, A. E., & Gennetian, L. (2008). Structural and process features in three types of child care for children from high and low income families. *Early Childhood Research Quarterly, 23*(1), 69-93.
- Fagard, J. (2000). Linked proximal and distal changes in the reaching behavior of 5-to 12-month-old human infants grasping objects of different sizes. *Infant Behavior and Development, 23*(3-4), 317-329.
- Fenech, M., Sweller, N., & Harrison, L. (2010). Identifying high-quality centre-based childcare using quantitative data-sets: what the numbers do and don't tell us. *International Journal of Early Years Education, 18*(4), 283-296.
- Flannigan, C., & Dietze, B. (2017). Children, outdoor play, and loose parts. *Journal of Childhood Studies*, 53-60.
- Green, M. J., Pearce, A., Parkes, A., Robertson, E., & Katikireddi, S. V. (2021). Pre-school childcare and inequalities in child development. *SSM-population Health, 14*, 100776.
- Hansen, K., & Hawkes, D. (2009). Early childcare and child development. *Journal of Social Policy, 38*(2), 211-239.
- Helmerhorst, K. O., Riksen-Walraven, J. M. A., Gevers Deynoot-Schaub, M. J., Tavecchio, L. W., & Fukkink, R. G. (2015). Child care quality in the Netherlands over the years: A closer look. *Early Education and Development, 26*(1), 89-105.
- Hu, B. Y., Song, Z., Wang, S., & LoCasale-Crouch, J. (2019). Global quality profiles in Chinese early care classrooms: Evidence from the Shandong Province. *Children and Youth Services Review, 101*, 157-164.

- Huang, P., Zhou, F., Guo, Y., Yuan, S., Lin, S., Lu, J., Shen, S., Guedeney, A., Xia, H. & Qiu, X. (2021). Association between the COVID-19 pandemic and infant neurodevelopment: A comparison before and during COVID-19. *Frontiers in Pediatrics*, 1087.
-
- Kaur, M., Srinivasan, S. M., & Bhat, A. N. (2015). Atypical object exploration in infants at-risk for autism during the first year of life. *Frontiers in Psychology*, *6*, 798.
- Laing, C., & Bergelson, E. (2019). Mothers' work status and 17-month-olds' productive vocabulary. *Infancy*, *24*(1), 101-109.
- La Paro, K. M., Williamson, A. C., & Hatfield, B. (2014). Assessing quality in toddler classrooms using the CLASS-Toddler and the ITERS-R. *Early Education and Development*, *25*(6), 875-893.
- Libertus, K., Gibson, J., Hidayatallah, N. Z., Hirtle, J., Adcock, R. A., & Needham, A. (2013). Size matters: How age and reaching experiences shape infants' preferences for different sized objects. *Infant Behavior and Development*, *36*(2), 189-198.
- Lopez Boo, F., Dormal, M., & Weber, A. (2019). Validity of four measures of child care quality in a national sample of centers in Ecuador. *PloS One*, *14*(2), e0209987.
- Marchman, V. A., & Fernald, A. (2008). Speed of word recognition and vocabulary knowledge in infancy predict cognitive and language outcomes in later childhood. *Developmental Science*, *11*(3), F9-F16.
- Megalonidou, C. (2020). The quality of early childhood education and care services in Greece. *International Journal of Child Care and Education Policy*, *14*(1), 1-12.
- Melhuish, E., Ereky-Stevens, K., Petrogiannis, K., Ariescu, A., Penderi, E., Rentzou, K., Tawell, A., Leseman, P. & Broekhuisen, M. (2015). A review of research on the effects of early childhood education and care (ECEC) on child development. *CARE project; Curriculum Quality Analysis and Impact Review of European Early Childhood Education and Care (ECEC)*.
- Nelson, C. M., & Oakes, L. M. (2021). "May I grab your attention?" An investigation into infants' visual preferences for handled objects using Lookit as an online platform for data collection. *Frontiers in Psychology*, 3866.
- Newell, K. M., McDonald, P. V., & Baillargeon, R. (1993). Body scale and infant grip configurations. *The Journal of the International Society for Developmental Psychobiology*, *26*(4), 195-205.
- Newell, K. M., Scully, D. M., McDonald, P. V., & Baillargeon, R. (1989). Task constraints and infant grip configurations. *The Journal of the International Society for Developmental Psychobiology*, *22*(8), 817-831.
- NICHD Early Child Care Research Network. (2001). Nonmaternal care and family factors in early development: An overview of the NICHD Study of Early Child Care. *Journal of Applied Developmental Psychology*, 22(5), 457-492.
- Reynolds, S. A. (2021). *Center-Based Child Care and Differential Improvements in the Child Development Outcomes of Disadvantaged Children*. In Child & Youth Care Forum. Springer, U.S.
- Rochat, P. (1989). Object manipulation and exploration in 2-to 5-month-old infants. *Developmental Psychology*, *25*(6), 871.
- Rosen, M. L., Hagen, M. P., Lurie, L. A., Miles, Z. E., Sheridan, M. A., Meltzoff, A. N., & McLaughlin, K. A. (2020). Cognitive stimulation as a mechanism linking socioeconomic status with executive function: A longitudinal investigation. *Child Development*, *91*(4), e762-e779.
- Ruff, H. A. (1984). Infants' manipulative exploration of objects: Effects of age and object characteristics. *Developmental Psychology*, *20*(1), 9.
- Ruzek, E., Burchinal, M., Farkas, G., & Duncan, G. J. (2014). The quality of toddler child care and cognitive skills at 24 months: Propensity score analysis results from the ECLS-B. *Early Childhood Research Quarterly*, *29*(1), 12-21.
- Scott, H. K., & Cogburn, M. (2021). *Piaget*. StatPearls Publishing.
- Shuffrey, L. C., Firestein, M. R., Kyle, M., Fields, A., Alcantara, C., Amso, D., ... & Dumitriu, D. (2021). Birth during the COVID-19 pandemic, but not maternal SARS-CoV-2 infection during pregnancy, is associated with lower neurodevelopmental scores at 6-months. *MedRxiv*.
- Smith, R., Purdon, S., Schneider, V., La Valle, I., Wollny, I., Owen, R., et al. (2009). *Early Education pilot for two year old children evaluation.* U.K.: Department for Children, Schools and Families.
- Tietze, W., & Cryer, D. (2004). Comparaisons de qualité de processus observée dans les programmes Allemands et Américains pour des Enfants/Petits Enfants Comparaciones de la calidad de proceso observada en los programas Alemanes y Americanos para infantes/niños pequeños. *International Journal of Early Years Education*, *12*(1), 43-62.
- Vandell, D. L., Belsky, J., Burchinal, M., Steinberg, L., Vandergrift, N., & NICHD Early Child Care Research Network. (2010). Do effects of early child care extend to age 15 years? Results from the NICHD study of early child care and youth development. *Child Development*, *81*(3), 737-756.

- Van Hof, P., Van der Kamp, J., & Savelsbergh, G. J. P. (2002). The relation of unimanual and bimanual reaching to crossing the midline. *Child Development*, *73*(5), 1353-1362.
- Vermeer, H. J., van IJzendoorn, M. H., Cárcamo, R. A., & Harrison, L. J. (2016). Quality of child care using the environment rating scales: A meta-analysis of international studies. *International Journal of Early Childhood*, *48*(1), 33-60.
- Vermeer, H. J., Van IJzendoorn, M. H., De Kruif, R. E., Fukkink, R. G., Tavecchio, L. W., Riksen-Walraven, J. M., & Van Zeijl, J. (2008). Child care in the Netherlands: Trends in quality over the years 1995-2005. *The Journal of Genetic Psychology*, *169*(4), 360-385.
- Vogel, C. A., Caronongan, P., Thomas, J., Bandel, E., Xue, Y., Henke, J., ... & Murphy, L. (2015). Toddlers in early Head Start: A portrait of 2-year-olds, their families, and the programs serving them. Vol. 1: Age 2 Report. OPRE Report 2015-10. *Administration for Children & Families.*
- Wien, C. A. (2008). *Emergent curriculum in the primary classroom: Interpreting the Reggio Emilia approach in schools.* New York: Teachers College Press.

CHAPTER OVERVIEW

11: Overview of Language Development

11.1: Introduction

Introduction to Language Development

There is something truly special about language development. Beyond the amazing feat that infants and toddlers acquire complex language systems rapidly and with relative ease, language changes a child's interactions with the people around them and how they think about their physical surroundings. Language affords the ability for adults and children to share inner thoughts and feelings and discuss past, present, and future events. With language, children transform their thinking about the world around them with new ways to label, organize, categorize and memorize. Furthermore, early language ability in toddlerhood is important not only for later language ability but also for cognitive development in later childhood. This section will provide an overview of communication and language development during the first three years, considering acquisition patterns and the importance of individual differences.

11.2: Communication and Language Milestones in Infancy and Toddlerhood

Milestones

Milestones represent what most children can do by specific ages; however, it is important to remember that children do not achieve these milestones at the same exact ages—milestones only represent the average age at which they are achieved. If a child has not achieved specific milestones by a specific age, it does not necessarily suggest a delay or disability; however, there are specific ages where if certain milestones are not achieved, caregivers should encourage the child's parents to communicate with their family pediatrician. Here is a table of common communication and language milestones for infants and toddlers.

What most children can do by age[1]

Age	What Most Children Can Do By Each Age
2 months	• Coo and make gurgling sounds • Turn their head toward sounds
4 months	• Begin to babble • Babble with expression and copy sounds they hear • Cry in different ways to show hunger, pain, or being tired
6 months	• Respond to sounds by making sounds • String vowels together when babbling ("ah," "eh," "oh") and like taking turns with a caregiver while making sounds • Respond to their own name • Make sounds to show joy and displeasure • Begin to say consonant sounds (jabbering with "m," "b")
9 months	• Understand the meaning of "no" • Make a lot of different sounds like "mamamama" and "bababababa" • Copy the sounds and gestures of others • Use their fingers to point at things
12 months	• Respond to simple spoken requests • Use simple gestures, like shaking their head "no" or waving "bye-bye" • Make sounds with changes in tone (sounds more like speech) • Say "mama" and "dada" and exclamations like "uh-oh!" • Try to say words caregivers say
18 months	• Say several single words • Say "no" and shake their head "no" • Point to show someone what they want
24 months	• Point to things or pictures when they are named • Know names of familiar people and body parts • Say sentences with 2 to 4 words • Follow simple instructions • Repeat words overheard in conversation • Point to things in a book
36 months	• Follow instructions with 2 or 3 steps • Can name most familiar things • Understand words like "in," "on," and "under" • Say their first name, age, and sex • Name a friend • Say words like "I," "me," "we," and "you" and some plurals (cars, dogs, cats) • Talk well enough for strangers to understand them most of the time • Carry on a conversation using 2 to 3 sentences

Communication & Language Concerns

The above chart represents averages of when infants and toddlers achieve various communication and language milestones. What about children who do not achieve these milestones by the ages listed? While children can indeed develop different abilities at different times, too great a delay in acquiring specific milestones can be a concern. The chart below is from the Center for Disease Control and Prevention (CDC). The chart adopts a proactive stance—we should take action early when developmental concerns arise rather than the perspective of waiting to see if a child "catches up". Again, while children do develop at their own pace, being proactive during these critical early years is essential as early recognition of delays and disabilities can lead to early intervention with the potential for greater positive outcomes (Caselli, Pyers & Lieberman, 2021; Fuller et al., 2020; Roberts & Kaiser, 2015). Caregivers should encourage parents to communicate with their family's pediatrician if children are not achieving milestones by the ages listed below. Most caregivers are not professionally trained to officially assess the developmental abilities of children; however, caregivers have the ability to track developmental progress and are often the first to notice developmental concerns.

Language Development Concerns[1]

Age	Encourage parents to communicate with their family's pediatrician if:
By 4 months	• Child doesn't coo or make sounds • Child doesn't smile at people
By 6 months	• Child doesn't make vowel sounds ("ah", "eh", "oh") • Child doesn't respond to sounds around him • Child doesn't laugh or make squealing sounds
By 9 months	• Child doesn't babble ("mama", "baba", "dada") • Child doesn't play any games involving back-and-forth play • Child doesn't respond to their own name • Child doesn't seem to recognize familiar people • Child doesn't look where you point
By 12 months	• Child doesn't say single words like "mama" or "dada" • Child doesn't learn gestures like waving or shaking head • Child doesn't point to things
By 18 months	• Child doesn't copy others • Child doesn't gain new words • Child doesn't have at least 6 words
By 24 months	• Child doesn't use 2-word phrases (for example, "drink milk") • Child doesn't copy actions and words • Child doesn't follow simple instructions
By 36 months	• Child drools or has very unclear speech • Child can't work simple toys (such as peg boards, simple puzzles, turning handle) • Child doesn't speak in sentences • Child doesn't understand simple instructions • Child doesn't play pretend or make-believe • Child doesn't want to play with other children or with toys • Child doesn't make eye contact

[1] CDC's Developmental Milestones by the Centers for Disease Control and Prevention is in the public domain.

11.3: Early Communication with Eye Gaze

The Importance of Eye Gaze

Infants and toddlers learn language best through face-to-face interactions with their caregivers in social contexts, and face-to-face communication is inherently multimodal as it uses more than just speech to communicate (e.g., gestures, facial expressions, eye gaze, etc.,). Eye gaze is, in fact, a central element in human communication. Not only do adults often use social eye gaze when communicating with infants, but infants also show a sensitivity to, and preference for, eye gaze signals early on (Simpson et al., 2020). Newborns look longer at faces with open eyes than faces with closed eyes (Batki et al., 2000). They also prefer faces with direct gaze with which they can engage in mutual eye contact (Farroni, Johnson & Csibra, 2004). Infants begin developing gaze-following abilities between 2 to 4 months, which become fairly stable by 6 to 8 months (D'Entremont et al., 1997; Gredeback et al., 2010). Following gaze cues becomes almost automatic, with adult's gaze direction causing fast visual attention shifts even in infants as young as 3 months of age (Hood et al., 1998).

Figure 11.3.1: Demonstration of Eye Gaze. ([1])

There is a strong association between infants' ability to follow an adult's gaze direction, and their later receptive and expressive vocabulary (Çetinçelik, Rowland & Snijders, 2020). Eye gaze, both in the form of eye contact and gaze following, may direct and help infants in sustaining their attention and thus learn about relevant information in the environment. For example, when an infant follows an adult's gaze to the sky toward an airplane overhead, the sounds produced by the airplane and the language the adult uses while communicating in the moment about the airplane can be more easily linked to the airplane itself. The use of eye gaze cues support infants' learning by highlighting the important information in the environment and channeling their attention to it. [1]

[1] Image by Zach Vessels on Unsplash

[2] Çetinçelik et al., (2020). Do the eyes have it? A systematic review on the role of eye gaze in infant language development. *Frontiers in Psychology, 11*. CC by 4.0

11.4: Stages of Language Acquisition

Language Acquisition

Children will typically go through the four stages of language acquisition.

1. Pre-language stage (3 to 10 months) where a child makes a lot of ‘cooing’ and ‘babbling’;
2. The holophrastic stage (12 to 18 months) where a child starts to comprehend a single unit of utterance like ‘milk’, ‘eat’, ‘dad’, ‘brother’;
3. Two-word stage (18 to 20 months) where a child, through a process of acquiring two nouns or a noun and a verb (noun + verb), begins pairing two words together such as ‘baby chair’, ‘mommy eat’, ‘cat bad’;
4. Telegraphic speech-stage (before 3 years old) defines a stage where a child puts some words together, even if the words are in the incorrect order. It has a similar meaning as a sentence, such as ‘cookie I want’, ‘toy me fall’, but is not a complete sentence. [1]

[1] Fitria & Musthafa (2019). Conversational Interaction to Develop the Two-Word Stage of A Child’s Second Language Acquisition. In *Eleventh Conference on Applied Linguistics*. Atlantis Press. CC by NC 4.0 https://www.atlantis-press.com/proceedings/conaplin-18/125911514

11.5: Infant Vocal Development

Vocal Development

The quality of infants' vocalizations progresses markedly during the first year of life. From birth, infants produce reflexive vocalizations, such as cries, fusses, and vegetative noises (e.g., coughs, burps, sneezes), as well as prespeech (a.k.a. "protophone") vocalizations (Buder, Warlaumont & Oller, 2013; Oller et al., 2009). Protophones are speech-like sounds including both canonical babbling (consisting of canonical syllables such as 'ba' or 'da' and sequences, 'baba' or 'dada' and so on) and non-canonical babbling (e.g. squeals, growls and vowel-like sounds). Infants produce approximately 3,500 protophone vocalizations every day (Oller et al., 2019). Infants begin cooing around two months of age. By three months of age, infants typically demonstrate an expanded range of vocal types, such as raspberries, squeals, growls, full vowels, yells, and whispers (Buder, Warlaumont & Oller, 2013; Oller, 2000). Between four to six months of age, infants begin to produce single syllable babbling sounds (e.g., da, ba) and then combine these syllable sounds (e.g., dadada, bababa) between six-eight months of age.[1] [2]

Figure 11.5.1: Example of vocalization. ([3])

Babbling represents the specific sounds used in the language a child is exposed to. At around 7 months infants typically begin to demonstrate canonical babbling, which contains both consonants and vowels with swift transitions between them. Canonical babbling is considered speech-like and is a foundation for the first words that infants begin producing around the first birthday (Oller, 2000; Stoel-Gammon & Cooper, 1984). Cross-linguistic research shows that monolingual infants between 8 to 12 months of age begin to produce the characteristic intonation (Whalen, Levitt & Wang, 1991), syllable, and word-forms (Levitt & Utman, 1992; Levitt & Wang, 1991; Lleó, Prinz, El Mogharbel & Maldonado, 1996) of the specific language to which they are exposed, whether that be Spanish, Russian, Tagalog, a signed language or Arabic (Petitto & Marentette, 1991; Sundara, Ward, Conboy & Kuhl, 2020). Interestingly, frequency of early infant vocalizations is related to expressive language at twelve months of age (Lyakso, Frolova & Grigorev, 2014; Werwach, Mürbe, Schaadt & Männel, 2021).[1] [4]

While infants' early vocalizations are important, it is the specific combination of infant vocalizations followed up by a caregiver response that is the strongest predictor of language growth (Donnellan et al., 2020). When caregivers respond to infants' vocalization it creates a meaningful dyadic interaction that extends language learning. When caregivers do respond to the speech-like vocalizations from infants, infants are more likely to produce another speech-like vocalization, creating a language-rich interactional loop (Warlaumont, Richards, Gilkerson & Oller, 2014) that is positively related to later vocabulary development (Lopez, Walle, Pretzer & Warlaumont, 2020).

[1] Lopez et al., (2020). Adult responses to infant prelinguistic vocalizations are associated with infant vocabulary: A home observation study. *PloS One*, *15*(11), e0242232.

[2] Oller, et al., (2021). Protophones, the precursors to speech, dominate the human infant vocal landscape. *Philosophical Transactions of the Royal Society B*, *376*(1836), 20200255. CC by 4.0

[3] Image by Jonathan Borba on Unsplash.

[4] Sundara et al., (2020). Exposure to a second language in infancy alters speech production. *Bilingualism: Language and Cognition*, *23*(5), 978-991. CC by 4.0

11.6: Gesture Development

Gesturing

Infants and toddlers use a variety of gestures to communicate. Gestures involve movements of the body, particularly the fingers, hands, and head, that are interpreted as a form of intentional communication (Iverson & Thal, 1998). Children most commonly produce two main types of gestures—deictic and representational (Iverson & Thal, 1998). Deictic gestures, such as pointing, establish reference to indicate or call attention to something and can be used to indicate a wide range of meanings in the immediate environment (Bates, Camaioni, & Volterra, 1975). Infants start to use pointing gestures within the second half of their first year of life and usually before they begin talking. Infants may first use so called whole-hand points, in which the arm and the hand are extended toward a referent, followed by index-finger points, in which the arm and the index finger are clearly extended toward a referent (Lock et al., 1990; Liszkowski & Tomasello, 2011; Lüke et al., 2017). [1] [2]

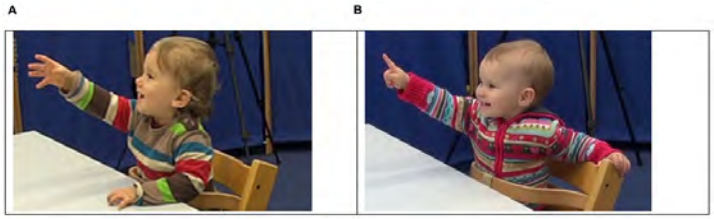


Figure 11.6.1: examples of whole hand pointing and index-finger pointing ([3])

The second main type of gestures, representational gestures, identify a referent and carry fixed semantic meaning. Representational gestures may include (a) culturally defined conventional gestures (e.g., shaking head for ‘‘no,’’ waving for ‘‘bye’’), (b) iconic gestures (e.g., moving arms in the air to represent an airplane flying), or (c) baby signs, which involve hand movements deliberately taught by an adult (e.g., bringing the hands together and tapping the fingertips to indicate ‘‘more’’). Gestures provide infants and toddlers a way to refer to objects and events as they are developing spoken language, and provide caregivers an opportunity to contingently respond to and translate the child’s gesture into words (Dimitrova et al., 2016). These bidirectional influences between caregivers and children help scaffold the development of communication and language (LeBarton & Iverson, 2017). [1]

Although gestures can be a form of preverbal communication, the use of gestures continues to grow throughout toddlerhood, even with the onset and development of children’s expressive language. Figure 11.6.2shows the number of gestures produced by a large group of Hebrew-speaking toddlers. At each month during the second year of life, some toddlers produce very few gestures, while others produce a lot. For example, at nineteen months of age, the median is around forty gestures produced. The median is a midpoint, separating the top higher scores from the bottom lower scores. Therefore, this graph shows the large differences in the number of gestures toddlers produce, as some produced only around 30 gestures at nineteen months while others produced nearly twice as many. [4]

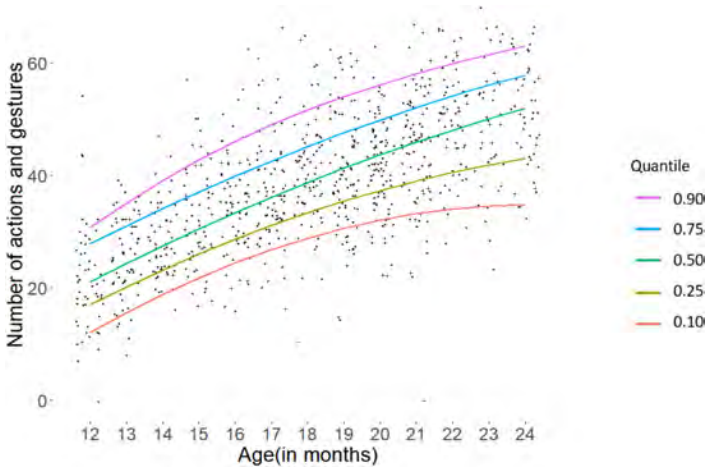


Figure 11.6.2: Number of gestures produced from a sample of 881 native Hebrew-speaking children in the second year of life. The results show that as age increased, the gap grew between toddlers ranked at the lowest and highest quantiles in terms of the number of words produced by each group. The gap between the number of words produced by toddlers in the 0.10 and the 0.90 quantiles at 12 months was 24 words, while the gap between the number of words produced by toddlers in the same quantiles at 24 months was 279 words ([4])

Gesture and Its Relation to Language Acquisition.

Early infant gestures are more than simple motor accomplishments—rather gestures are indicative of a dynamic, social process involving gradual transitions in the way in which infants engage with their physical environment and the people within it. Decades of research have revealed a robust correlation between gesture use and the later development of receptive language (Rowe & Goldin-Meadow, 2009; Rowe, Ozcaliskan, & Goldin-Meadow, 2008; Watt, Wetherby, & Shumway, 2006) and expressive language (Iverson & GoldinMeadow, 2005; Rowe & Goldin-Meadow, 2009). Brooks and Meltzoff (2008) offer a potential explanation for the predictive power of early gestures for later language outcomes. They argue that pointing has a bidirectional function; it aids infants by providing them with a communicative tool, and it makes caregivers more likely to produce the labels that the toddler is pointing at, therefore fostering the infant's linguistic abilities. Furthermore, by gesturing, children can obtain and maintain attention of the adult, thereby establishing new language learning opportunities (Bates et al., 1979;Capone & McGregor, 2004). Pointing at the beginning of the second year is related to the beginning of word comprehension and production, and it plays a key role in coordinating attention to persons, objects, and events with other people and to labels associated with them (Sansavini et al., 2010; Tomasello et al., 2007). Thus, infants who point less frequently may have fewer opportunities to initiate and maintain joint attention with their caregivers and to associate labels with their referents in daily interactions. [5] [1] [6] [7]

Gesture and its Relation to Language Delay.

In addition to gesture being positively correlated with later language abilities, gesture is also indicative of children with developmental delays and disabilities. Reduced gesture use has been reported in toddlers with language delays early in development (Hsu & Iyer, 2016; Iverson et al., 2018; Lüke et al., 2017; Manwaring et al., 2019). Language delay can be identified between 18 and 36 months in young children with limited expressive vocabularies, equivalent to the 10th percentile or below compared to normative values, and who are free from cognitive, neurological, socio-emotional, or sensory disabilities (Rescorla, 2011). Research suggests a lower rate of pointing in toddlerhood may be an early marker of language delay (Lüke et al., 2017; Sansavini et al., 2019). Lower production of communicative gestures between 18 and 28 months of age also distinguishes truly delayed late talkers from "late bloomers" (their language development is initially delayed, but they eventually catch up), highlighting the predictive value of measures of gesture use for later expressive language skills (Thal & Tobias, 1992). Taken together, these findings underscore the relevance of gestures in the second year as a potential index of later language acquisition and delay. [1] [7]

Figure 11.6.3: Toddler producing a gesture. ([8])

Gesture and its Relation to Autism Spectrum Disorder.

Autism spectrum disorder (ASD) is a developmental disability that can cause significant social, communication and behavioral challenges. Gesture deficits have been identified as one of the earliest social communication indicators of ASD (Iverson et al., 2018; Mitchell et al., 2006; Yirmiya & Charman, 2010). Young children with ASD may demonstrate particular difficulty with deictic gestures compared to typically developing toddlers (LeBarton & Iverson, 2016; Manwaring et al., 2018; Özçalişkan, Adamson, & Dimitrova, 2016). Studies of infants at increased genetic risk for ASD (due to having an older sibling diagnosed with ASD) indicate that reduced gesture use is present in infancy (Mitchell et al., 2006) and persists over time (Iverson et al., 2018) in infants later diagnosed with ASD. There is emerging evidence showing that social-communication skills in ASD do not differ significantly from typical development during the first year of life, with identical outcomes for typically-developing and high-risk infants who go on to receive an autism diagnosis (Rogers, 2009; Elsabbagh and Johnson, 2016). This trajectory, nevertheless, begins to diverge soon after, with a steady decline in the growth rates of both gesture and language production (Iverson et al., 2017) and a decline in social engagement in toddlers later diagnosed with ASD.[9] [1] [6]

[1] Manwaring et al., (2019). The gesture–language association over time in toddlers with and without language delays. *Autism & Developmental Language Impairments*, *4*, 2396941519845545. CC by 4.0

[2] Lüke et al., (2020). Integrated communication system: Gesture and language acquisition in typically developing children and children with LD and DLD. *Frontiers in Psychology, 11*, 118. CC by 4.0

[3] Image by Rohlfing et al., (2017). An interactive view on the development of deictic pointing in infancy. *Frontiers in Psychology, 8*, 1319. CC by 4.0

[4] Gendler-Shalev & Dromi (2021). The Hebrew Web Communicative Development Inventory (MB-CDI): Lexical Development Growth Curves. *Journal of Child Language*, 1-17. CC by 4.0

[5] Cameron-Faulkner et al., (2021). A cross-cultural analysis of early prelinguistic gesture development and Its relationship to language development. *Child Development*, *92*(1), 273-290. CC by 4.0

[6] Ramos-Cabo et al., (2019). Gesture and language trajectories in early development: An overview from the autism spectrum disorder perspective. *Frontiers in Psychology, 10*, 1211. CC by 4.0

[7] Sansavini et al., (2019). Low rates of pointing in 18-month-olds at risk for autism spectrum disorder and extremely preterm infants: a common index of language delay? *Frontiers in Psychology, 10*, 2131. CC by 4.0

[8] Image by Humphrey Muleba on Unsplash

[9] "What is Autism Spectrum Disorder?" by the CDC is in the public domain.

11.7: Statistical Learning

What is Statistical Learning?

Before infants can successfully link appropriate sound sequences to their referents, they must determine the set of sounds within a speech stream that correspond to potential words. For example, infants must segment the auditory statement “that is such a cute doggie” into meaningful chunks to accurately link it to its referent (e.g., “doggie”). This ability to segment speech sounds into word-level units, termed “word segmentation,” is a critical part of the word learning process (Saffran & Kirkham, 2018). Successful word segmentation requires exposure to the patterns and probabilities of sound sequences, maintaining phonological working memory and the order of the sequence of phonemes within the stream of speech to track the transitional probability so that one can increasingly identify potential word boundaries. Infants, children, and adults are all skilled at statistical word segmentation, often referred to as “statistical learning skills” (Aslin & Newport, 2012; Aslin, 2014; Saffran & Kirkham, 2018). [1]

Statistical learning is the implicit ability to track regularities in linguistic or other input (e.g., visual or motor) and learn from the distributional information (Saffran, 2001; Lany & Saffran, 2013). The foundational statistical learning experiments in 8-month-old infants demonstrated that young infants could segment speech into potential word units using transitional probabilities or co-occurring probability information between syllables (Saffran, Aslin & Newport, 1996; Aslin, Saffran & Newport, 1998). Researchers have argued that the ability to learn from the patterns of language a child is exposed to plays an important role in language learning (Saffran, 2001, 2003). These studies suggest that during their first year, before children begin to produce words, they start learning the patterns of the language they hear, tracking the sound combinations that correspond to potential words. Furthermore, statistical word segmentation is one of the important aspects of word learning and vocabulary acquisition in toddlers. Eighteen-month-olds’ ability to use statistical information derived from fluent speech to identify words within the stream of speech and then to map the words to meaning predicts vocabulary size at 24-months and vocabulary growth from 18 to 24 months (Ellis, Borovsky, Elman & Evans, 2021). [1]

[1] Ellis et al., (2021). Toddlers’ ability to leverage statistical iInformation to support word learning. *Frontiers in Psychology, 12*, 641. CC by 4.0

11.8: First Words

Word Development

Most infants produce their first word sometime around their first birthday, with over 75% doing so before twelve months of age (Schneider, Yurovsky & Frank, 2015). Despite tremendous individual variation in children's rate of development (Fenson et al., 2007), the first words that they utter are strikingly consistent (Schneider, Yurovsky, & Frank, 2015; Tardif et al., 2008): they tend to talk about important people in their life ("mom," "dad"), social routines ("hi," "uh-oh"), animals ("dog," "duck"), and foods ("milk," "banana"). Even as children learn from their own experiences and according to their own interests (Mayor & Plunkett, 2014; Nelson, 1973), their vocabulary grows rapidly, typically adding more nouns, but also verbs ("go") and other predicates ("hot") to their repertoires. Figure 11.8.1 shows when the proportion of children between 10 to 30 months of age, across various languages, begin producing the word "dog" and "jump" in their native language. The higher the dots on the chart, the higher the proportion of children, at that specific age, are producing the word. What similarities and differences across languages do you notice? Over just their first 3 years, children learn hundreds, even thousands of words (Fenson et al., 1994; Mayor & Plunkett, 2011). [1]

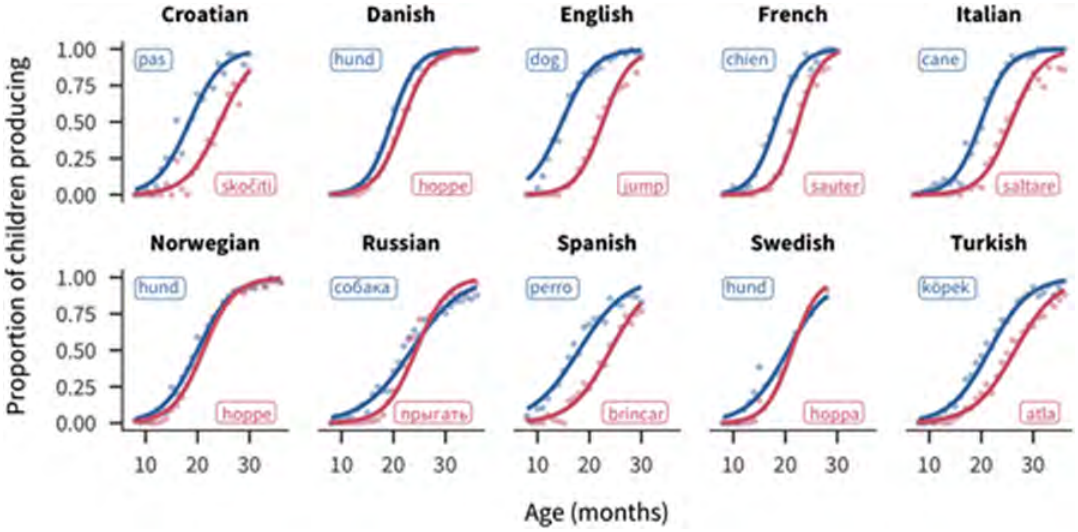


Figure 11.8.1: Production trajectories for the words. (Copyright; author via source)

[1] Braginsky et al., (2019). Consistency and variability in children's word learning across languages. *Open Mind*, *3*, 52-67. CC by 4.0

11.9: Charting language growth in infants and toddlers

Language Growth

Many times the growth of infant and toddler language development is only discussed with isolated stages and distinct milestones. The reality is that in between isolated stages and milestones, language is growing month by month (and even really day by day). In addition to presenting language milestones, it is important to acknowledge the month by month growth in comprehension and production in early language development. To illustrate what language growth looks like month by month over the first three years years, let's examine some data.

When we talk with infants and toddlers, they can understand a lot, despite not yet being able to say much in return. Figure 11.9.1 illustrates the month by month development of language comprehension in children from eight months to eighteen months of age. The 50th percentile lines indicate the median growth over time. The data shows a steep upward trajectory of growth. At 8 months of age, half of the infants did not understand more than 7 words. By twelve months of age the median number of words an infant understood was around 20; however, just a few months later (fifteen months) the number of comprehensible words doubled and by eighteen months of age was around 80 comprehensible words.

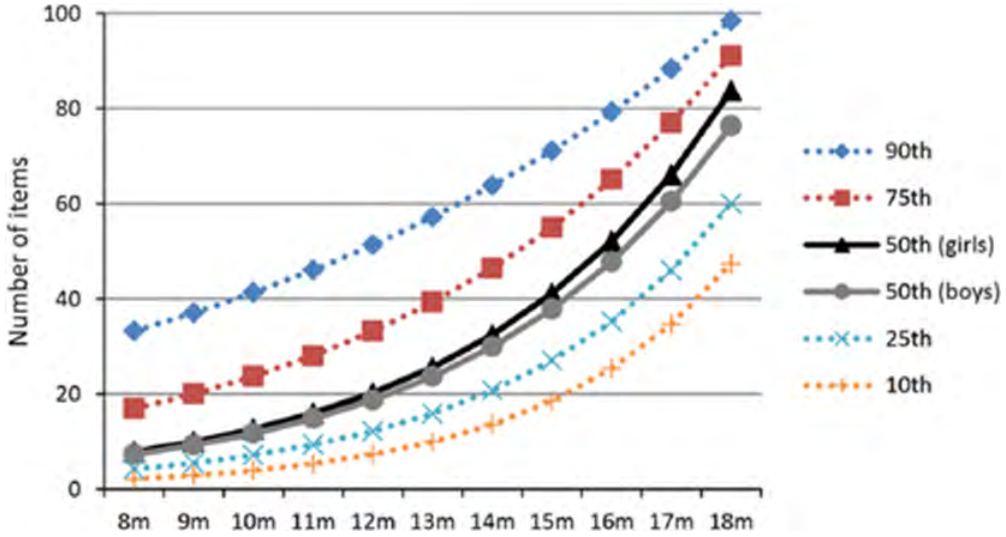


Figure 11.9.1: Words understood as a function of age (months), gender and percentile level. All lines have a steep upward trajectory from 8m to 18m. 10th: 0 to 42, 25th: 8-60, 50th (girls) 9-81, 50th (boys) 9-79, 75th: 18-90, 90th 35-100 ([1]

Figure 11.9.2 illustrates the growth curves for the same children, but this time looking at language production rather than comprehension. Comparing Figure# and Figure# allows us to notice the growth differences between language comprehension and production. The data support the well-established pattern in language acquisition literature that children's receptive vocabulary far exceeds their expressive ability during infancy and toddlerhood.

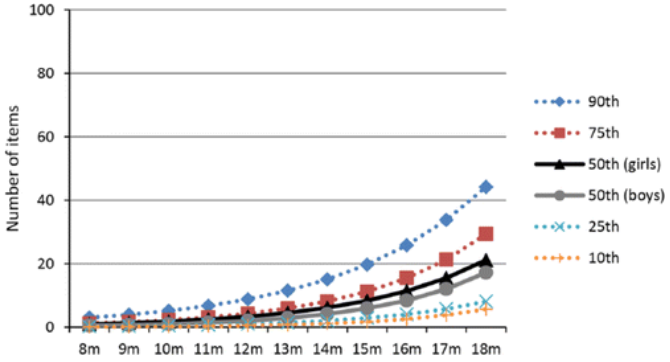


Figure 11.9.2: Words produced as a function of age (months), gender, and percentile level. All lines start at 8m and end at 18m. 10th: remains close to 0 until around 15m ends at 8. 25th remains close to zero until 15m ends at 9. 50th (boys) begins climbing from zero at 14m ends at 20. 50th (girls) begins climbing at 14m, ends at 20. 75th: begins climbing at 14m ends at 14. 90th: begins climbing at 10m ends at 42. ([1]

Figure 11.9.2 shows the language production abilities of children through eighteen months of age, with expressive ability improving from 14 to 18 months. What does language production growth look like in toddlers after 18 months of age? Figure 11.9.3 presents the median growth trend for the language production of 4,867 native English-speaking toddlers between 16-30 months of age in the U.S. Each grey dot represents the expressive vocabulary level of one individual child. The height of a dot represents how many words a child produces at a given age—the higher the dot is on the chart, the more words a child produces. The blue line represents the median growth curve. Notice how steep the blue line is—this illustrates how quickly expressive language abilities grow in toddlers!

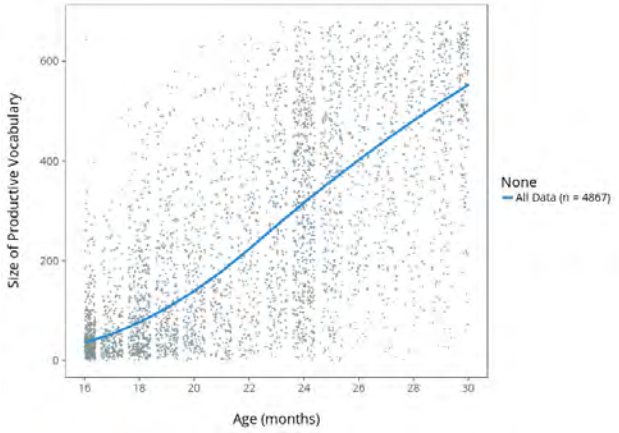


Figure 11.9.3: Productive vocabulary size by child's age. ([2])

Take a moment to analyze the data in Figure 11.9.3. What else do you notice about the data? Did you notice that the data for many children is far above the blue median line and the data for many others is located far beneath it? If so, you noticed the fact that there are early individual differences in language development. Figure 11.9.4 is the same data from Figure 11.9.3, but now five lines are present. These five lines divide the data into five different language growth trajectory curves. Notice how the top red line captures children who, at 16 months, have the highest vocabulary, the steepest growth curve in the chart and continue to have the highest vocabulary through 30 months of age. The opposite is true for the bottom purple line—these children have the lowest vocabulary at 16 months, the least steep growth curve and at 30 months, they continue to have the lowest vocabulary levels. From this chart we can see that early individual differences in language ability emerge in toddlerhood and the children with stronger language skills continue to have stronger language abilities later on. Although this chart only extends until 30 months of age, studies that have followed children longitudinally show that stronger language skills in toddlerhood is related to stronger language and cognitive abilities later in childhood (Gilkerson et al., 2018; Marchman & Fernald, 2008).

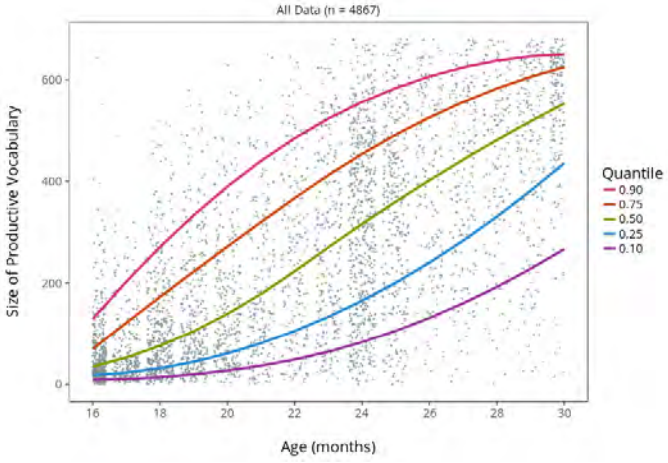


Figure 11.9.4: Growth curves for the number of words children produce. Table of scores found Wordbank | Analyses (stanford.edu) ([3])

[1] Image by Frota et al., (2016). Infant communicative development assessed with the European Portuguese MacArthur–Bates Communicative Development Inventories short forms. *First Language*, *36*(5), 525-545. CC by 3.0.

[2] Image by Wordbank is licensed under CC by 4.0

[3] Image by Wordbank is licensed under CC by 4.0

11.10: Native Language Development in Non-English Languages

Development for Non-English Languages

If you work with infants and toddlers, you may have children who are learning more than one language. Infants may be exposed to one language, such as English, in a group care setting while also learning a different language natively with their family at home. You may wonder: do the comprehension and productive language growth patterns look similar or different across languages? In Figure 11.10.1, the language growth patterns for American English (Fenson et al., 2000), Spanish (Jackson-Maldonado et al., 2013), Galician (Pérez-Pereira & Resches, 2007) and European Portuguese (Frota et al., 2016) are compared. The top graph shows language comprehension growth in children between the ages of 8 to 18 months and the bottom graph shows language production growth in children between the ages of 8 to 18 months. These findings indicate that overall early language development trends are similar across languages.

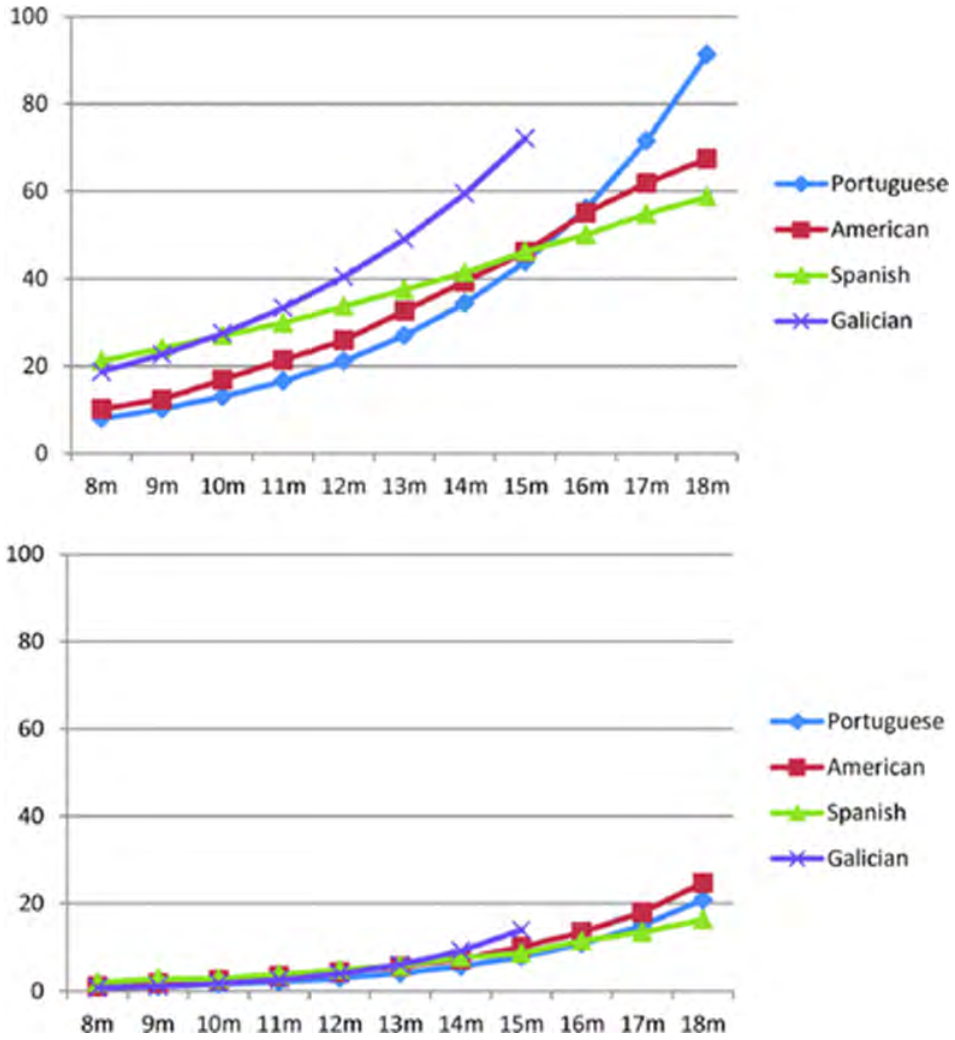


Figure 11.10.1: Fitted vocabulary comprehension (top panel) and vocabulary production (bottom panel) scores by language (50th percentile).. ([1])

As language production is limited during the first year of life, examining production from 16 to 30 months reveals much more growth. Figure 11.10.2 presents the month-by-month vocabulary production scores for toddlers between the ages of 16 to 30 months across the same four languages.

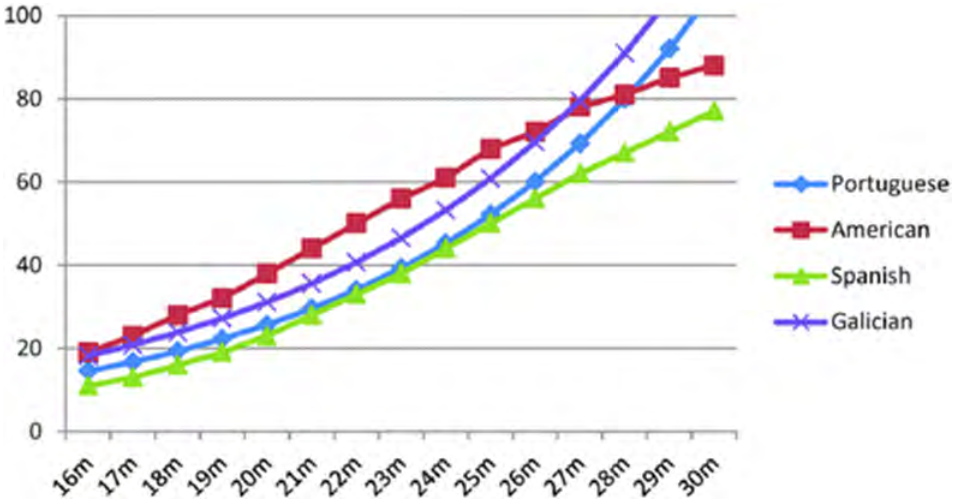


Figure 11.10.2: Toddler form: Fitted vocabulary production scores by language (50th percentile). ([1])

A common finding in language development research is that a sex effect emerges—female and male infants and toddlers have different rates of growth (Bornstein et al., 2004; Eriksson et al., 2012; Simonsen et al., 2014). Figure 11.10.3 presents vocabulary production growth for fourteen different languages from children between the ages of 16 to 36 months of age. Across many languages there are early language differences by sex, often to the advantage of girls in the early months.

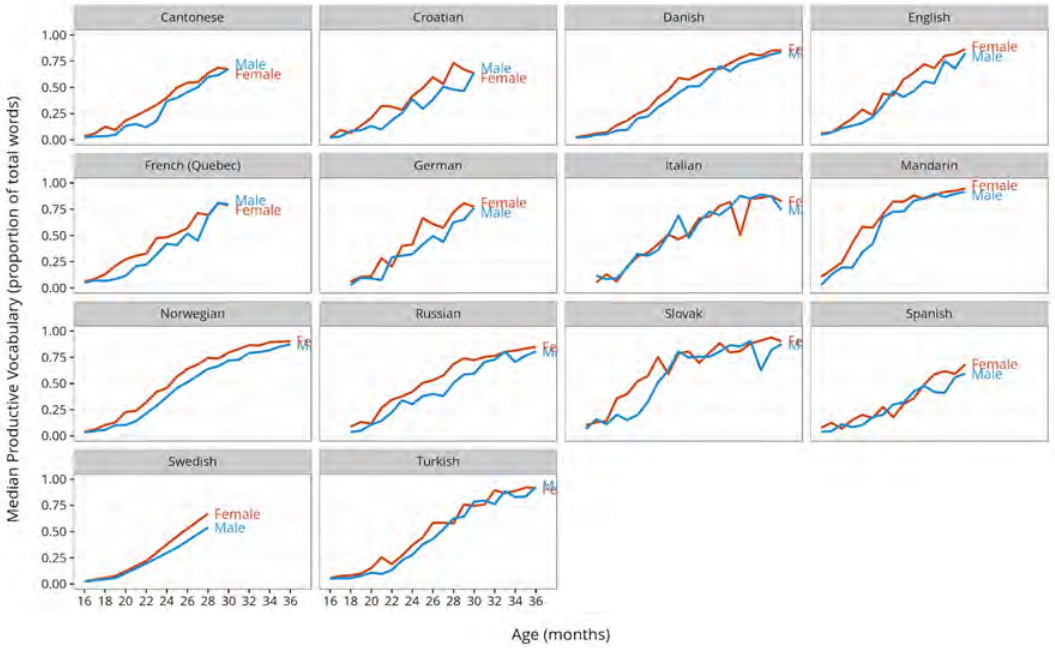


Figure 11.10.3: Sex Differences in Vocabulary Development. Table of scores can be found Wordbank | Analyses (stanford.edu) ([2])

[1] Image by Frota et al., (2016). Infant communicative development assessed with the European Portuguese MacArthur–Bates Communicative Development Inventories short forms. *First Language, 36*(5), 525-545. CC by 3.0.

[2] Image by Wordbank is licensed under CC by 4.0

11.11: Development in Language Processing Efficiency

Language Processing

Throughout the second year of life, toddlers are rapidly developing in their ability to understand and produce language. The speed at which children are able to process language while comprehending it, is a critical aspect of language growth during toddlerhood. An experiment called the looking-while-listening (LWL) task has been used to measure language processing efficiency in children. Typically, in LWL tasks, children see a pair of images on a screen (e.g., a ball on the left side of the screen and a shoe on the right) while simultaneously listening to speech that refers to one of these images (e.g., "Where's the ball?"). Children look towards the objects being named as their eye movements are monitored and are then coded offline to measure the speed with which children move their gaze to the correctly named pictures.[1]

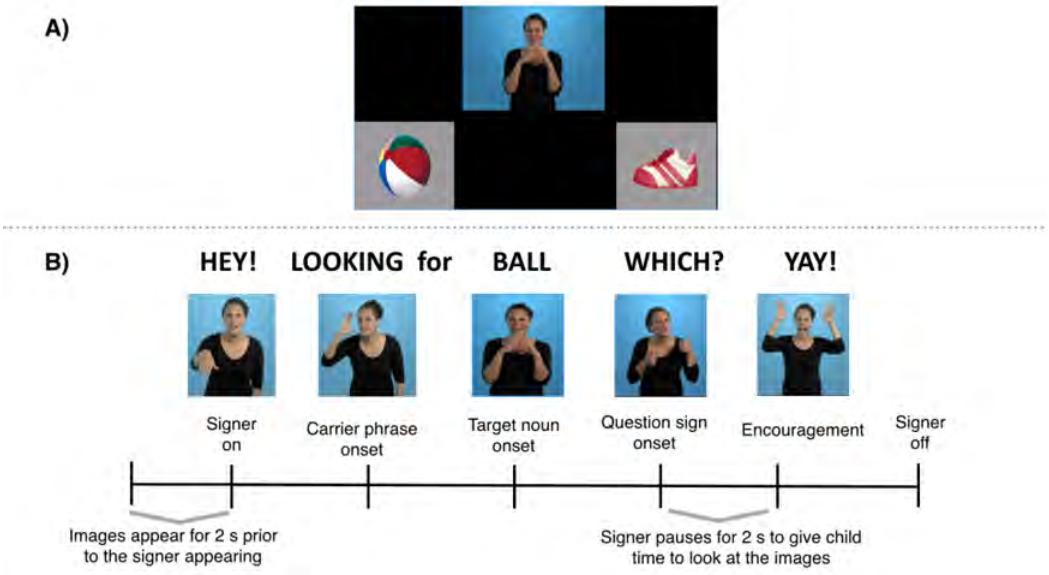


Figure 11.11.1: Configuration of a version of the looking-while-listening task adapted for children learning American Sign Language (ASL): A) shows the stimuli presented to the children and B) shows the configuration of the sentences. ([2])

The large body of research using this task has revealed important discoveries:

1. **Maturational improvement**. Language development involves more than the ability to understand or express single words—children need to be able to efficiently process streams of language in real-time. Over toddlerhood, children are consistently improving in their ability to rapidly and efficiently process language in real-time (Fernald, Perfors & Marchman, 2006; Fernald et al., 1998; MacDonald et al., 2018).
2. **Individual differences**. While all children improve in their language processing efficiency over time, there are important individual differences early on. Children who have larger expressive vocabularies and who are exposed to more child-directed language are more efficient at processing language in real-time (Hurtado, Marchman & Fernald, 2008; MacDonald et al., 2018; Marchman et al., 2017; Weisleder & Fernald, 2013). Already by eighteen months of age, children from higher SES backgrounds had larger vocabularies and faster response times in the LWL task and by twenty four months of age, there was a six month gap in language processing efficiency ability between children from low and high SES backgrounds (Fernald, Marchman & Weisleder, 2013). Late talking toddlers with more efficient language processing skills at eighteen months of age were more likely to "bloom", showing greater increases in language ability at thirty months of age (Fernald & Marchman, 2012).
3. **Links to later abilities**. Early language processing abilities are associated not just with language outcomes later in childhood, but also cognitive outcomes as well. Amongst preterm toddlers, those who were more efficient at processing language at eighteen months scored higher on language and IQ tests at fifty-four months of age (Marchman et al., 2018). In a group of children followed longitudinally, language processing at twenty-five months was associated with language and cognitive outcomes at eight years of age (Marchman & Fernald, 2008). One hypothesis for why more efficient language processing leads to these outcomes is that faster processing of familiar words frees up cognitive resources that can then be dedicated to the learning of new words (Fernald & Marchman 2012).[3]

4. **Caregiver language input increases child language ability**. The quantity and quality of language exposure from caregivers is positively associated with toddlers' language growth. Toddlers who heard more child-directed language from caregivers at 18 to 19 months of age, had larger vocabularies and were more efficient at processing language when they were two years of age (Hurtado, Marchman & Fernald, 2008; Weisleder & Fernald, 2013). It is important to emphasize that it was child-directed language that was most significant, not language that was simply overheard. This research suggests that caregivers should engage in meaningful back-and-forth conversations with infants and toddlers as they increase the quantity and quality of language children are exposed to, especially child-directed language.

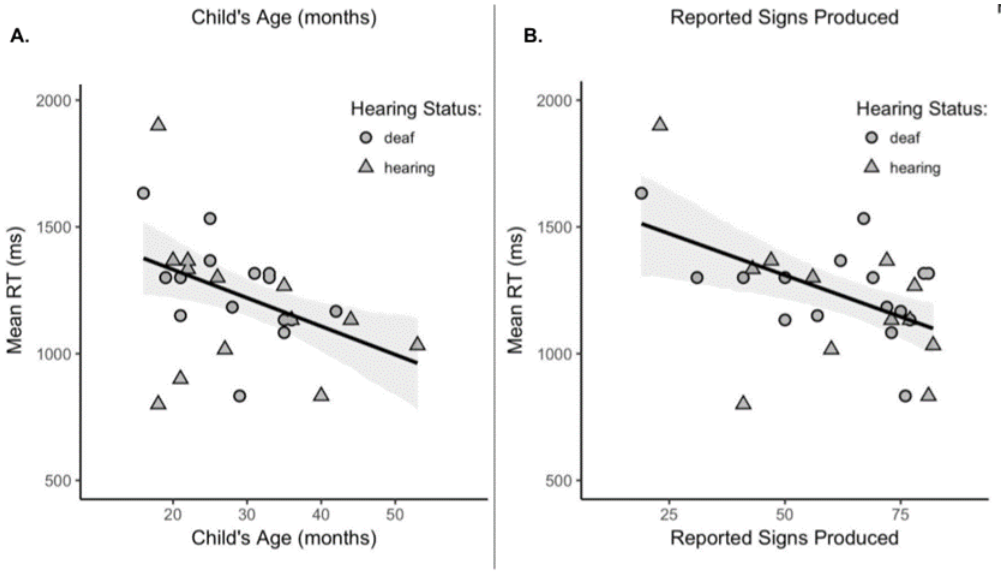


Figure 11.11.2: Scatterplots showing relations between children's age (A.) and vocabulary production (B.) and measures of their mean response time on a LWL task adapted for children learning (ASL). Shapes represent children's hearing status (circle for Deaf native signers; triangles for hearing native signers). ([2])

[1] Peter, et al., (2019). Does speed of processing or vocabulary size predict later language growth in toddlers? *Cognitive Psychology, 115*, 101238. CC by 4.0

[2] Image by MacDonald et al., (2017). Real-time lexical comprehension in young children learning American Sign Language. *PsyArXiv*. CC by 4.0

[3] Peter, et al., (2019). Does speed of processing or vocabulary size predict later language growth in toddlers? *Cognitive Psychology, 115*, 101238. CC by 4.0

11.12: Conclusion

Conclusion of Overview of Language Development

Before children can produce their first word, the process of acquiring a language is already well underway as infants use eye gaze, gestures and vocalizations to communicate. Research has identified acquisition patterns, which has helped in the creation of milestone charts. Milestones reveal the patterns of language development and help caregivers notice if a child's delay should lead to a conversation with a specialist. While there are general language patterns, there are also important individual differences throughout the acquisition process. Despite all we now know, observing children acquiring language is still an amazing experience to behold. Learning how to best support and encourage language development is critical as language experience during the first three years is a foundation for language and cognitive abilities later in childhood (Gilkerson et al., 2018).

11.13: References

References for Overview of Language Development

- Aslin, R. N. (2014). Infant learning: Historical, conceptual, and methodological challenges. *Infancy, 19*(1), 2-27.
- Aslin, R. N., & Newport, E. L. (2012). Statistical learning: From acquiring specific items to forming general rules. *Current Directions in Psychological Science, 21*(3), 170-176.
- Aslin, R. N., Saffran, J. R., & Newport, E. L. (1998). Computation of conditional probability statistics by 8-month-old infants. *Psychological Science, 9*(4), 321-324.
- Bates, E., Benigni, L., Bretherton, I., Camaioni, L., and Volterra, V. (1979). *The emergence of symbols: Cognition and communication in infancy*. New York, NY: Academic Press.
- Bates, E., Camaioni, L., & Volterra, V. (1975). The acquisition of performatives prior to speech. *Merrill-Palmer Quarterly of Behavior and Development, 21*(3), 205-226.
- Batki, A., Baron-Cohen, S., Wheelwright, S., Connellan, J., & Ahluwalia, J. (2000). Is there an innate gaze module? Evidence from human neonates. *Infant Behavior and Development, 23*(2), 223-229.
- Brooks, R., & Meltzoff, A. N. (2008). Infant gaze following and pointing predict accelerated vocabulary growth through two years of age: A longitudinal, growth curve modeling study. *Journal of Child Language, 35*(1), 207-220.
- Buder, E. H., Warlaumont, A. S., & Oller, D. K. (2013). An acoustic phonetic catalog of prespeech vocalizations from a developmental perspective. In B. Peter & A. N. MacLeod (Eds.), *Comprehensive perspectives on child speech development and disorders: Pathways from linguistic theory to clinical practice*. Hauppauge, NY: NOVA.
- Capone, N. C., and McGregor, K. K. (2004). Gesture development: A review for clinical and research practices. *Journal of Speech, Language, and Hearing Research, 47*, 173–186
- Caselli, N., Pyers, J., & Lieberman, A. M. (2021). Deaf children of hearing parents have age-level vocabulary growth when exposed to American Sign Language by 6 months of age. *The Journal of Pediatrics, 232*, 229-236.
- Çetinçelik, M., Rowland, C. F., & Snijders, T. M. (2020). Do the eyes have it? A systematic review on the role of eye gaze in infant language development. *Frontiers in Psychology, 11*, 3627.
- D'Entremont, B., Hains, S. M., & Muir, D. W. (1997). A demonstration of gaze following in 3-to 6-month-olds. *Infant Behavior and Development, 20*(4), 569-572.
- Dimitrova, N., Özçalışkan, Ş., & Adamson, L. B. (2016). Parents' translations of child gesture facilitate word learning in children with autism, Down syndrome and typical development. *Journal of Autism and Developmental Disorders, 46*(1), 221-231.
- Donnellan, E., Bannard, C., McGillion, M. L., Slocombe, K. E., & Matthews, D. (2020). Infants' intentionally communicative vocalizations elicit responses from caregivers and are the best predictors of the transition to language: A longitudinal investigation of infants' vocalizations, gestures and word production. *Developmental Science, 23*(1), e12843.
- Ellis, E. M., Borovsky, A., Elman, J. L., & Evans, J. L. (2021). Toddlers' ability to leverage statistical information to support word learning. *Frontiers in Psychology, 12*, 641.
- Elsabbagh, M., & Johnson, M. H. (2016). Autism and the social brain: The first-year puzzle. *Biological Psychiatry, 80*(2), 94-99.
- Farroni, T., Johnson, M. H., & Csibra, G. (2004). Mechanisms of eye gaze perception during infancy. *Journal of Cognitive Neuroscience, 16*(8), 1320-1326.
- Fenson, L., Dale, P., Reznick, J., Bates, E., Thal, D., Pethick, S., Tomasello, M., Mervis, C. B., & Stiles, J. (1994). Variability in early communicative development. *Monographs of the Society for Research in Child Development*, 59(242).
- Fenson,L., Marchman,V. A., Thal,D., Dale,P. S., Reznick,J. S., & Bates,E. (2007). *MacArthur-Bates Communicative Development Inventories: User's guide and technical manual* (2nd ed.). Baltimore, MD: Brookes Publishing.
- Fernald, A., & Marchman, V. A. (2012). Individual differences in lexical processing at 18 months predict vocabulary growth in typically developing and late-talking toddlers. *Child Development, 83*(1), 203-222.
- Fernald, A., Marchman, V. A., & Weisleder, A. (2013). SES differences in language processing skill and vocabulary are evident at 18 months. *Developmental Science, 16*(2), 234-248.
- Fernald, A., Perfors, A., & Marchman, V. A. (2006). Picking up speed in understanding: Speech processing efficiency and vocabulary growth across the 2nd year. *Developmental Psychology, 42*(1), 98.
- Fernald, A., Pinto, J. P., Swingley, D., Weinberg, A., & McRoberts, G. W. (1998). Rapid gains in speed of verbal processing by infants in the 2nd year. *Psychological Science, 9*(3), 228-231.

- Frota, S., Butler, J., Correia, S., Severino, C., Vicente, S., & Vigário, M. (2016). Infant communicative development assessed with the European Portuguese MacArthur–Bates Communicative Development Inventories short forms. *First Language*, *36*(5), 525-545.
- Fuller, E. A., Oliver, K., Vejnoska, S. F., & Rogers, S. J. (2020). The effects of the Early Start Denver Model for children with autism spectrum disorder: a meta-analysis. *Brain Sciences*, *10*(6), 368.
- Gilkerson, J., Richards, J. A., Warren, S. F., Montgomery, J. K., Greenwood, C. R., Kimbrough Oller, D., Hanson, J. H. L. & Paul, T. D. (2017). Mapping the early language environment using all-day recordings and automated analysis. *American Journal of Speech-language Pathology*, *26*(2), 248-265.
- Gilkerson, J., Richards, J. A., Warren, S. F., Oller, D. K., Russo, R., & Vohr, B. (2018). Language experience in the second year of life and language outcomes in late childhood. *Pediatrics*, *142*(4).
- Gredebäck, G., Fikke, L., & Melinder, A. (2010). The development of joint visual attention: A longitudinal study of gaze following during interactions with mothers and strangers. *Developmental Science*, *13*(6), 839-848.
- Hood, B. M., Willen, J. D., & Driver, J. (1998). Adult's eyes trigger shifts of visual attention in human infants. *Psychological Science*, *9*(2), 131-134.
- Hsu, H. C., & Iyer, S. N. (2016). Early gesture, early vocabulary, and risk of language impairment in preschoolers. *Research in Developmental Disabilities*, *57*, 201-210.
- Hurtado, N., Marchman, V. A., & Fernald, A. (2008). Does input influence uptake? Links between maternal talk, processing speed and vocabulary size in Spanish-learning children. *Developmental Science*, *11*(6), F31-F39.
- Iverson, J. M., & Goldin-Meadow, S. (2005). Gesture paves the way for language development. *Psychological Science*, *16*(5), 367-371.
- Iverson, J. M., Northrup, J. B., Leezenbaum, N. B., Parlade, M. V., Koterba, E. A., & West, K. L. (2018). Early gesture and vocabulary development in infant siblings of children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *48*(1), 55–71.
- Iverson, J. M., & Thal, D. J. (1998). Communicative transitions: There's more to the hand than meets the eye. In A. Wetherby, S. Warren & J. Reichle (Eds.), *Transitions in prelinguistic communication* (pp. 59–86). Baltimore, MD: Paul H. Brookes Publishing Co.
- Lany, J., and Saffran, J.R. (2013). Statistical Learning Mechanisms in Infancy. In J. L. R. Rubenstein and P. Rakic (Eds.) *Comprehensive developmental neuroscience: Neural circuit development and function in the brain* (pp. 231–248). Amsterdam: Elsevier.
- LeBarton, E. S., & Iverson, J. M. (2017). Gesture's role in learning interactions: A focus on clinical populations. In R. B. Church, M. W. Alibali, & S. D. Kelly (Eds.), *Why Gesture? How the hands function in speaking, thinking and communicating* (pp. 331–351). Amsterdam/Philadelphia, Netherlands: John Benjamins Publishing Company.
- Levitt, A. G., & Utman, J. G. A. (1992). From babbling towards the sound systems of English and French: A longitudinal two-case study. *Journal of Child Language*, *19*(1), 19-49.
- Levitt, A. G., & Wang, Q. (1991). Evidence for language-specific rhythmic influences in the reduplicative babbling of French- and English-learning infants. *Language and Speech*, *34*(3), 235-249.
- Liszkowski, U., & Tomasello, M. (2011). Individual differences in social, cognitive, and morphological aspects of infant pointing. *Cognitive Development*, *26*(1), 16-29.
- Lleó, C, Prinz, M, El Mogharbel, C and Maldonado, A (1996). Early phonological acquisition of German and Spanish: A reinterpretation of the continuity issue within the principles and parameters model. In Johnson, CE and Gilbert, JHV (eds), *Children's language*. Mahwah, NJ: Lawrence Erlbaum, 9, pp. 11–31.
- Lock, A., Young, A., & Chandler, P. (1990). Some observations on the origins of the pointing gesture. In V. Volterra, and C. Erting (Eds.), *From gesture to language in hearing and deaf children* (pp. 42-55). Springer, Berlin, Heidelberg.
- Lopez, L. D., Walle, E. A., Pretzer, G. M., & Warlaumont, A. S. (2020). Adult responses to infant prelinguistic vocalizations are associated with infant vocabulary: A home observation study. *PloS One*, *15*(11), e0242232.
- Lüke, C., Ritterfeld, U., Grimminger, A., Liszkowski, U., & Rohlfing, K. J. (2017). Development of pointing gestures in children with typical and delayed language acquisition. *Journal of Speech, Language, and Hearing Research*, *60*(11), 3185-3197.
- Lyakso, E. E., Frolova, O. V., & Grigorev, A. S. (2014). Infant vocalizations at the first year of life predict speech development at 2-7 years: Longitudinal study. *Psychology*, 2014.
- MacDonald, K., LaMarr, T., Corina, D., Marchman, V. A., & Fernald, A. (2018). Real-time lexical comprehension in young children learning American Sign Language. *Developmental Science*, *21*(6), e12672.

- Manwaring, S. S., Swineford, L., Mead, D. L., Yeh, C. C., Zhang, Y., & Thurm, A. (2019). The gesture–language association over time in toddlers with and without language delays. *Autism & Developmental Language Impairments*, *4*, 2396941519845545.
- Marchman, V. A., & Fernald, A. (2008). Speed of word recognition and vocabulary knowledge in infancy predict cognitive and language outcomes in later childhood. *Developmental Science*, *11*(3), F9-F16.
- Marchman, V. A., Loi, E. C., Adams, K. A., Ashland, M., Fernald, A., & Feldman, H. M. (2018). Speed of language comprehension at 18 months predicts school-relevant outcomes at 54 months in children born preterm. *Journal of Developmental and Behavioral Pediatrics*, *39*(3), 246.
- Marchman, V. A., Martínez, L. Z., Hurtado, N., Grüter, T., & Fernald, A. (2017). Caregiver talk to young Spanish-English bilinguals: Comparing direct observation and parent-report measures of dual-language exposure. *Developmental Science*, *20*(1), e12425.
- Mayor, J., & Plunkett, K. (2011). A statistical estimate of infant and toddler vocabulary size from CDI analysis. *Developmental Science*, *14*(4), 769-785.
- Mayor, J., & Plunkett, K. (2014). Shared understanding and idiosyncratic expression in early vocabularies. *Developmental Science*, *17*, 412–423.
- Mitchell, S., Brian, J., Zwaigenbaum, L., Roberts, W., Szatmari, P., Smith, I., & Bryson, S. (2006). Early language and communication development of infants later diagnosed with autism spectrum disorder. *Journal of Developmental & Behavioral Pediatrics*, *27*(2), S69-S78.
- Nelson, K. (1973). Structure and strategy in learning to talk. *Monographs of the Society for Research in Child Development*, *38*(149), 1–135.
- Oller, D. K. (2000). *The emergence of the speech capacity*. Psychology Press.
- Oller, D. K., Caskey, M., Yoo, H., Bene, E. R., Jhang, Y., Lee, C. C., Bowman, D. D., Long, H. L., Buder, E. H., & Vohr, B. (2019). Preterm and full term infant vocalization and the origin of language. *Scientific Reports*, *9*(1), 1-10.
- Özçalişkan, Ş., Adamson, L. B., Dimitrova, N., Bailey, J., & Schmuck, L. (2016). Baby sign but not spontaneous gesture predicts later vocabulary in children with Down syndrome. *Journal of Child Language*, *43*(4), 948-963.
- Petitto, L. A., & Marentette, P. F. (1991). Babbling in the manual mode: Evidence for the ontogeny of language. *Science*, *251*(5000), 1493-1496.
- Rescorla, L. (2011). Late talkers: Do good predictors of outcome exist? *Developmental Disabilities Research Reviews*, *17*(2), 141-150.
- Roberts, M. Y., & Kaiser, A. P. (2015). Early intervention for toddlers with language delays: A randomized controlled trial. *Pediatrics*, *135*(4), 686-693.
- Rogers, S. J. (2009). What are infant siblings teaching us about autism in infancy? *Autism Research*, *2*(3), 125-137.
- Rowe, M. L., & Goldin-Meadow, S. (2009). Early gesture selectively predicts later language learning. *Developmental Science*, *12*(1), 182-187.
- Rowe, M. L., Özçalışkan, Ş., & Goldin-Meadow, S. (2008). Learning words by hand: Gesture's role in predicting vocabulary development. *First language*, *28*(2), 182-199.
- Saffran, J. R. (2001). Words in a sea of sounds: The output of infant statistical learning. *Cognition*, *81*(2), 149-169.
- Saffran, J. R. (2003). Statistical language learning: Mechanisms and constraints. *Current Directions in Psychological Science*, *12*(4), 110-114.
- Saffran, J. R., Aslin, R. N., & Newport, E. L. (1996). Statistical learning by 8-month-old infants. *Science*, *274*(5294), 1926-1928.
- Saffran, J. R., & Kirkham, N. Z. (2018). Infant statistical learning. *Annual Review of Psychology*, *69*, 181-203.
- Sansavini, A., Bello, A., Guarini, A., Savini, S., Stefanini, S., & Caselli, M. C. (2010). Early development of gestures, object-related-actions, word comprehension and word production, and their relationships in Italian infants: A longitudinal study. *Gesture*, *10*(1), 52-85.
- Sansavini, A., Guarini, A., Zuccarini, M., Lee, J. Z., Faldella, G., & Iverson, J. M. (2019). Low rates of pointing in 18-month-olds at risk for autism spectrum disorder and extremely preterm infants: a common index of language delay? *Frontiers in Psychology*, *10*, 2131.
- Schneider, R., Yurovsky, D., & Frank, M. C. (2015). Large-scale investigations of variability in children's first words. In D. C.Noelleet al (Ed.), *Proceedings of the 37th Annual Meeting of the Cognitive Science Society*, (2110–2115). Austin, TX: Cognitive Science Society.

- Simpson, E. A., Maylott, S. E., Mitsven, S. G., Zeng, G., & Jakobsen, K. V. (2020). Face detection in 2-to 6-month-old infants is influenced by gaze direction and species. *Developmental Science*, *23*(2), e12902.
- Stoel-Gammon, C., & Cooper, J. A. (1984). Patterns of early lexical and phonological development. *Journal of Child Language*, *11*(2), 247-271.
- Sundara, M., Ward, N., Conboy, B., & Kuhl, P. K. (2020). Exposure to a second language in infancy alters speech production. *Bilingualism: Language and Cognition*, *23*(5), 978-991.
- Tardif, T., Fletcher, P., Liang, W., Zhang, Z., Kaciroti, N., & Marchman, V. A. (2008). Baby's first 10 words. *Developmental Psychology*, *44*, 929–938.
- Thal, D. J., & Tobias, S. (1992). Communicative gestures in children with delayed onset of oral expressive vocabulary. *Journal of Speech, Language, and Hearing Research*, *35*(6), 1281-1289.
- Tomasello, M., Carpenter, M., & Liszkowski, U. (2007). A new look at infant pointing. *Child Development*, *78*(3), 705-722.
- Warlaumont, A. S., Richards, J. A., Gilkerson, J., & Oller, D. K. (2014). A social feedback loop for speech development and its reduction in autism. *Psychological Science*, *25*(7), 1314-1324.
- Watt, N., Wetherby, A., & Shumway, S. (2006). Prelinguistic predictors of language outcome at 3 years of age. J*ournal of Speech, Language, and Hearing Research*, *49*(6), 1224–1237.
- Weisleder, A., & Fernald, A. (2013). Talking to children matters: Early language experience strengthens processing and builds vocabulary. *Psychological Science*, *24*(11), 2143-2152.
- Werwach, A., Mürbe, D., Schaadt, G., & Männel, C. (2021). Infants' vocalizations at 6 months predict their productive vocabulary at one year. *Infant Behavior and Development*, *64*, 101588.
- Whalen, D. H., Levitt, A. G., & Wang, Q. (1991). Intonational differences between the reduplicative babbling of French-and English-learning infants. *Journal of Child Language*, *18*(3), 501-516.
- Yirmiya, N., & Charman, T. (2010). The prodrome of autism: early behavioral and biological signs, regression, peri-and post-natal development and genetics. *Journal of Child Psychology and Psychiatry*, *51*(4), 432-458.

CHAPTER OVERVIEW

12: Theories of Language Acquisition

12.1: Introduction

Introduction to Theories of Language Acquisition

If you have ever tried to learn a language as an adult, you know just how great of a challenge it is. Despite years of practice, enrollment in language classes, books, videos, and countless resources, etc., learning a language as an adult is difficult! Now imagine what learning a language must be like for an infant. Infants do not enroll in language classes, do not have access to various help resources, and do not have the wealth of previous knowledge you do as an adult. So how do infants acquire language? Language theories attempt to explain the 'how' behind language acquisition. This section presents some of the main theories that have been proposed to explain how infants and toddlers acquire language.

12.2: Behaviorism

Behaviorism and Language Acquisition

You might recall the theory of behaviorism from an introductory child development or psychology course you have taken. Behaviorism is a perspective on learning that focuses on changes in individuals' observable behaviors— changes in what people say or do. In terms of language acquisition, behaviorism might make note of the developmental changes in early non-language communication (i.e., eye gaze, gesture, and vocalization) or the changes in language development as children accumulate increasing vocabularies and then begin combining words. These are all aspects of language development that can be observed.

To explain how these developments in language acquisition actually take place, behaviorists applied many of the same ideas that they used to understand how children learn in general. For example, behaviorists proposed that one way children learn is through operant conditioning. B.F. Skinner believed that behavior is motivated by the consequences we receive for the behavior: the reinforcements and punishments. Operant conditioning focuses on how the consequences of a behavior affect the behavior over time. It begins with the idea that certain consequences tend to make certain behaviors happen more frequently. For example, when an infant vocalizes through cooing or babbling, the result will likely be an adult who turns toward the infant with attention, makes eye contact and responds with engaged infant-directed language. Thus, as a reward for vocalizing, the infant receives adult attention and infant-directed language--a highly desired type of communication for infants! With a great gift like this, the infant is very likely to vocalize again in the hope to receive the same gift next time. Indeed, research has found that the more responsive caregivers are when interacting with infants and toddlers, the earlier they will achieve language milestones (Masek et al., 2021; Tamis-LeMonda, Bornstein & Baumwell, 2001). Through operant conditioning children also receive rewards for using language in a functional manner. For example, a behaviorist might suggest that children learn to say the word "drink" when they are thirsty because after doing so they receive something to drink, which reinforces their use of the word for getting a drink. [1] [2]

Figure 12.2.1: Caregiver and infant engaged in an interaction. ([3])

[1] https://courses.lumenlearning.com/atd-hostos-childdevelopment/chapter/human-language-development/

[2] Behaviorism. Authored by: Nicole Arduini-Van Hoose. CC by NC SA https://courses.lumenlearning.com/edpsy/chapter/behaviorism/

[3] Image by Larry Crayton on Unsplash.

12.3: Nativism

Nativism and Language Acquisition

Nativism suggests that infants are born with an innate ability to acquire language that is hardwired in human brains. The linguist Noam Chomsky, the most well-known nativist, argued that human brains contain a language acquisition device (LAD) that includes a universal grammar that underlies all human language (Chomsky, 1965, 1972). Chomsky proposed that children are born with knowledge of general grammatical rules so that with exposure, children are able to acquire language rapidly and with relative ease. The idea is that each of the many languages used around the world has the same underlying set of grammatical rules that are hardwired into human brains--a "universal grammar". Chomsky (1959) rebutted behaviorism's argument on several grounds. Chomsky argued that it was unlikely that parents were doing the slow and careful shaping of children's vocalizations that behaviorism proposed. According to Chomsky, language develops as long as the infant is exposed to it. No additional teaching, training, or reinforcement is required for language to develop.[1] [2]

Figure 12.3.1: Noam Chomsky. ([3])

1. All human languages share certain properties.
2. Children are exposed to different inputs yet still converge on the same grammar.
3. Children know things about language which they could not have learned from the input available to them. This is the most famous, and most powerful, argument for universal grammar.
4. Humans are the only species that has language.
5. Children learn language quickly and effortlessly, on minimal exposure.
6. All children acquiring language go through the same stages in the same order.
7. Different brain circuits are responsible for representing/processing linguistic and non-linguistic information.

There is general agreement among experts that babies are genetically programmed to learn language. In fact, fetuses have already begun their language acquisition journey while they are still in the womb (DeCasper & Spence, 1986; Ghio, Cara & Tettamanti, 2021; Moon, Lagercrantz & Kuhl, 2013)! Additionally, children are born ready to acquire any language they are exposed to, even languages of an entirely different modality (spoken modality versus a signed modality), such as a American Sign Language (Krentz & Corina, 2008; Stone, Petitto & Bosworth, 2018). Neuroscience continues to document the innate brain mechanisms that support language acquisition in infants (Friederici, 2017; Friederici & Wartenburger, 2010; Kuhl, 2010; Perani, et al., 2011). Nevertheless, there is still debate about Chomsky's idea that there is a universal grammar that can account for all language learning. Evans and Levinson (2009) surveyed the world's languages and found that none of the presumed underlying features of the language acquisition device were entirely universal. In their search they found languages that did not have noun or verb phrases, that did not have tenses (e.g., past, present, future), and even some that did not have nouns or verbs at all, even though a basic assumption of a universal grammar is that all languages should share these features. Another limitation to the nativist theory is their lack of acknowledgement of the role of social interactions and cultural contexts in language acquisition. In summary, most experts agree that children are born primed to acquire language; however, the role of social interactions and the effect various contexts can have on the acquisition process is undeniable.[1] [4]

[1] Martha Lally and Suzanne Valentine-French (2019). Lifespan Development: A Psychological Perspective, Second Edition. CC by 4.0 http://dept.clcillinois.edu/psy/LifespanDevelopment.pdf

[2] Sturdy, C. B., & Nicoladis, E. (2017). How much of language acquisition does operant conditioning explain?. *Frontiers in Psychology*, *8*, 1918. CC by 4.0 https://www.frontiersin.org/articles/10.3389/fpsyg.2017.01918/full

[3] Image from Wikimedia CC by 4.0

[4] Dąbrowska, E. (2015). What exactly is Universal Grammar, and has anyone seen it?. *Frontiers in Psychology*, *6*, 852. CC by 4.0 https://www.frontiersin.org/articles/10.3389/fpsyg.2015.00852/full

---

12.4: Cognitive Theory

Cognitive Theory and Language Acquisition

Cognitivists believe that language emerges within the context of other general cognitive abilities like memory, attention and problem solving. Once language does emerge it is usually within a specific sequence of stages that is universal in most children (Goodluck, 1991). The common progression through these language stages suggests that language is developing alongside other cognitive abilities. For example, infants and toddlers typically go through four stages of language acquisition:

1. Pre-language stage (3 to 10 months) where a child makes a lot of ‘cooing’ and ‘babbling’;
2. The holophrastic stage (12 to 18 months) where a child starts to comprehend a single unit of utterance like ‘milk’, ‘eat’, ‘dad’, ‘brother’;
3. Two-word stage (18 to 20 months) where a child, through a process of acquiring two nouns or a noun and a verb (noun + verb), begins pairing two words together such as ‘baby chair’, ‘mommy eat’, ‘cat bad’;
4. Telegraphic speech-stage (before 3 years old) defines a stage where a child puts some words together, even if the words are in the incorrect order. It has a similar meaning as a sentence, such as ‘cookie I want’, ‘toy me fall’, but is not a complete sentence. [1]

Jean Piaget is famous for his four stages of cognitive development. He believed that children do not think like adults and so before they can begin to develop language they must first actively construct their own understanding of the world through their interactions with the environment. A child has to understand a concept before they can acquire the particular language which expresses that concept. For example, a child first becomes aware of a concept such as a ‘cat’ and only afterward do they acquire the words to convey that concept. Essentially it is impossible for a young child to voice concepts that are cognitively unknown to them; therefore, a child must first learn about their environment, then they can connect language to their prior experiences. [1]

Piaget's cognitive theory states that children's language reflects the development of their logical thinking and reasoning skills in stages. In this way, Piaget’s stages reflect the primary role cognitive development has over language development and also reflects how language develops overtime as a child’s cognitive development progresses through each stage. Infants and toddlers are included in the first two stages of Piaget’s theory. These stages are most often discussed in reference to cognitive development. Their connection with language development will be explained below. [1]

Sensory-Motor Stage (birth to 2 years).

Infants and toddlers are learning about the world through motor and sensory experiences. Initially, language is limited to infants because they must first experience the world and develop mental schemas as a way to represent these experiences. The first words that infants produce are strikingly consistent as they tend to talk about important people in their life (“mom,” “dad”), social routines (“hi,” “uh-oh”), animals (“dog,” “duck”), and foods (“milk,” “banana”) (Schneider, Yurovsky, & Frank, 2015; Tardif et al., 2008). From a cognitive theorist perspective, this makes sense because these first words represent schemas that infants have been able to consistently develop and reinforce, due to high frequency exposure. In other words, infants’ first words are for concepts they have strong cognitive representations for. [2]

Pre-Operational Stage (2 years to 7).

From 2 to 3 years of age, children's cognitive development makes rapid progress. The increase in quantity and complexity of mental schemas to represent and organize the world, allows toddlers to be able to quickly accommodate new words into their vocabulary. As Figure 12.4.1 exemplifies, just within the third year of life (the first year under the preoperational stage) the vocabulary production abilities of toddlers rapidly increases. Children's language becomes "symbolic" allowing them to talk beyond the "here and now" and to talk about things such as the past, future, and feelings. Cognitivists would emphasize that the increase in vocabulary is driven first by an increase in cognitive development.

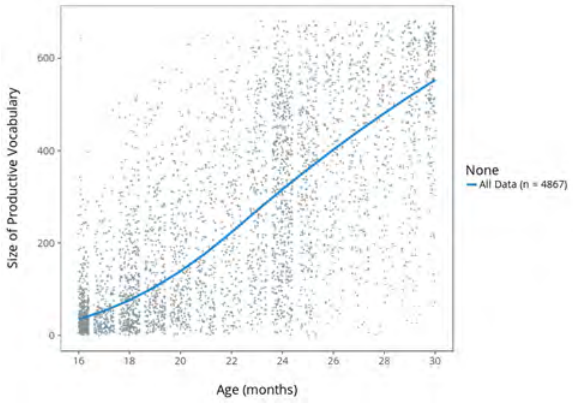


Figure 12.4.1: Productive vocabulary size by child's age. ([3])

[1] Psycholinguistics/Theories and Models of Language Acquisition. CC BY-SA 3.0 https://en.wikiversity.org/wiki/Psycholinguistics/Theories_and_Models_of_Language_Acquisition#cite_note-A_Linguistic_Introduction-8

[2] Braginsky, M., Yurovsky, D., Marchman, V. A., & Frank, M. C. (2019). Consistency and variability in children's word learning across languages. *Open Mind*, *3*, 52-67. CC by 4.0 https://direct.mit.edu/opmi/article/doi/10.1162/opmi_a_00026/5378/Consistency-and-Variability-in-Children-s-Word

[3] Image by Wordbank is licensed under CC by 4.0 http://wordbank.stanford.edu/analyses?name=vocab_norms

12.5: Interactionist/Social Theory

Interactionist/Social Theory of Language Acquisition

The interactionist/social theory proposes that language exists for the purpose of communication and can only be learned in the context of interaction with adults and other children. It stresses the importance of the environment and culture in which the language is being learned. Interactionists acknowledge the presence of innate biological mechanisms, but emphasize the critical role of social interactions (Jensen & Arnett, 2017; Levine & Munsch, 2018). Lev Vygotsky is the most well-known interactionist theorist and provided a theoretical framework for other interactionists to further develop theories of language acquisition. [1]

Influenced by the work of Vygotsky, Jerome Bruner believed that social interaction plays a fundamental role in the development of cognition in general and language in particular. Whereas Chomsky focused on innate mechanisms of language acquisition such as the idea of a language acquisition device (LAD), Bruner proposed the language acquisition support system (LASS) in opposition to Chomsky (Bakhurst & Shanker, 2001). The LASS refers to the social and cultural experiences that support and encourage language acquisition. This includes child-directed language exposure (e.g., parentese, dialogic reading, etc.,) as well as the various activities children engage in while also receiving exposure to language. Whereas the LAD emphasizes that children come into the world programmed ready to learn language, the LASS emphasizes that it is the world that is ready to expose and support children in learning language. [2]

Figure 12.5.1: Caregiver interacting with an infant. . ([3])

A powerful argument for the critical role of social interaction and not just language exposure in general, comes from the body of research comparing language learning from live interactions versus pre-recorded exposure played from a screened device. Toddlers who hear a new word uttered by a speaker on a recorded video are less likely to learn that word than those who hear the same word from an in-person speaker (Krcmar et al., 2007; Krcmar, 2010; Kuhl, Tsao & Liu, 2003; Roseberry et al., 2014; Troseth et al., 2018). Although language learning from video occurs in some situations (e.g., Scofield et al., 2007; Linebarger and Vaala, 2010; Vandewater, 2011), when learning from video is directly compared to learning from face-to-face interactions, toddlers usually learn better from an actual event or person who is present. Even when language is presented through a screen, infants demonstrate greater language learning when two or more infants are present together (Lytle, Garcia-Sierra & Kuhl, 2018). To explain what is missing from video, Patricia Kuhl and her colleagues (2003) proposed that interpersonal social cues offered in a face-to-face setting "attract infants' attention and motivate learning" and that the presence of a person allows the sharing of "information that is referential in nature" (Kuhl, 2007). A speaker's communicative intentions may be less clear when offered on video, and the parts of language may be more challenging to extract. [4]

Figure 12.5.1: Caregiver holding an infant. ([5])

The interactionist approach can also help explain how differences in the quantity and quality of language exposure affect a child's language development. The contexts that children are raised in can be very different and the differences in language exposure across various contexts should be emphasized when considering how children acquire language (Rowe & Weisleder, 2020).

Differences in language exposure, even exposure very early in life, such as exposure at a neonatal intensive care unit (NICU) for children born premature, can have long lasting effects. Variations in the amount of adult language a newborn heard on a single day in the NICU were positively associated with language skills at 7 and 18 months of age (Caskey et al, 2014) and the more language premature children heard at 16 months, the faster their language processing abilities were at 18 months of age (Adams et al., 2018). Furthermore, the higher the quality (responsive, verbally elaborative, and non-intrusive) of caregiver interactions with 22 month old children born prematurely, the larger their vocabulary comprehension was at three years of age (Loi et al., 2017). This research, along with so much more, demonstrates the critical importance of social interaction and exposure in the process of language acquisition. [6]

---

[1] Psycholinguistics/Theories and Models of Language Acquisition from Wiki University is licensed under CC BY-SA 3.0

https://en.wikiversity.org/wiki/Psycholinguistics/Theories_and_Models_of_Language_Acquisition#cite_note-A_Linguistic_Introduction-8

[2] "Jerome S. Bruner" Psychology Wiki. CC-BY-SA https://psychology.wikia.org/wiki/Jerome_S._Bruner

[3] Image by Jonathan Borba on Unsplash.

[4] Troseth, G. L., Strouse, G. A., Verdine, B. N., & Saylor, M. M. (2018). Let's chat: On-screen social responsiveness is not sufficient to support toddlers' word learning from video. Frontiers in psychology, 9, 2195. CC by 4.0 https://www.frontiersin.org/articles/10.3389/fpsyg.2018.02195/full

[5] Image by Bethany Beck on Unsplash.

[6] Brignoni-Pérez, E., Morales, M. C., Marchman, V. A., Scala, M., Feldman, H. M., Yeom, K., & Travis, K. E. (2021). Listening to Mom in the NICU: effects of increased maternal speech exposure on language outcomes and white matter development in infants born very preterm. Trials, 22(1), 1-9. CC by 4.0

https://trialsjournal.biomedcentral.com/track/pdf/10.1186/s13063-021-05385-4.pdf

---

12.6: Statistical Learning

Statistical Learning Theory of Language Acquisition

The natural environment presents infants with multiple streams of information occurring simultaneously. They encounter many objects, some moving, some stationary; they hear sounds, some language-related, others from animals and objects; they see people, some interacting with them, others in the background. Despite all of this information, these experiences are not completely random, there are predictable patterns that occur together. An infant's surroundings contain statistical regularities that they can use to detect structure in a busy environment. Infants are able to detect regularities and co-occurrences in visual shape sequences and visual scenes (Fiser & Aslin, 2002; Kirkham et al., 2002, 2007). For example, take a look at Figure 12.6.1, which shows three object clusters, each cluster is composed of three colored shapes. Can you spot the regularity that co-occurs across the three object clusters? Although the three object clusters are not exactly the same, the regularity that occurs across all three are the yellow and pink connected shapes. In one study (Wu et al., 2011), 9-month-old infants were shown sequences involving these same three-shape object clusters in which two pieces always co-occurred and one piece constantly changed. They found that infants could keep track of which pieces co-occurred, suggesting that infants were able to track the statistical regularities they experience. [1]

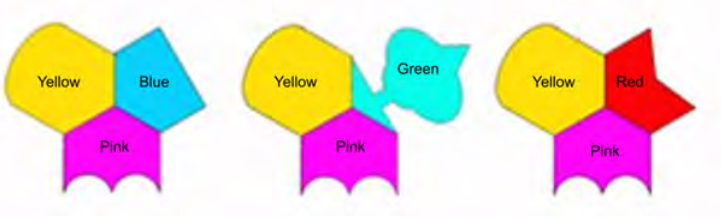


Figure 12.6.1: Sample of stimuli from an infant statistical learning task. ([2])

Just as infants are able to track regularities in the visual environment, they are also able to track the regularities that naturally occur in language. When we talk, we produce a consistent stream of speech sounds. An important task for an infant is to figure out which specific set of sounds within a speech stream go together to create words. One way infants do this is by tracking the statistical regularities of speech sounds that co-occur together. To demonstrate this, a research study (Antovich & Graf Estes, 2018) had 14 month olds listen to a speech stream consisting of four made up words: timay, dobu, kuga, pimo. While listening, the children heard each of the four words repeated 120 times, but the order of the words was mixed up. Despite the random presentation of words in a consistent speech stream, there were regularities of sounds that always co-occurred. For example, 'ti' was always followed by 'may' (the two syllables in the word 'timay'), and 'pi' always co-occurred with 'mo' (the two syllables in the word 'pimo'). However, as the order of the words was mixed up, the last syllable of a word and the first syllable of the next consecutive word occurred much less frequently as 'may' (the last syllable in the word 'timay') could be followed up by either of the other three words at any time. The results revealed that even though the words used were made up, the infants were able to track the statistical regularities and segment the words from the continuous speech stream. This research study, along with many others (for a review, see Romberg & Saffran, 2010), demonstrates that infants are able to track the statistical regularities of the language they are exposed to and this helps them in the initial stages of acquiring their native language(s).

There is now a wealth of data documenting the statistical learning abilities of infants and toddlers (Saffran, 2020; Saffran & Kirkham, 2018). Detecting visual statistical regularities has even been documented in newborns (Bulf et al., 2011). Researchers have argued that statistical learning plays an important role in language learning (Saffran, 2001, 2003). These studies suggest that during their first year of language acquisition, before children begin to produce words, they start learning the patterns of the language they hear, tracking the sound combinations that correspond to potential words. Newman et al. (2006) discovered a relationship between infants' ability to segment the speech stream into words and language proficiency at 24 months and, even later in childhood, between 4 and 6 years of age. Additionally, there is a growing body of evidence showing that statistical learning recruits the same brain areas as those used in language processing (de Vries et al., 2011; Folia et al., 2011; Petersson et al., 2012). [3] [4]

---

[1] Barry, R. A., Graf Estes, K., & Rivera, S. M. (2015). Domain general learning: Infants use social and non-social cues when learning object statistics. *Frontiers in Psychology*, *6*, 551. CC by 4.0

[2] Image adapted from Barry, R. A., Graf Estes, K., & Rivera, S. M. (2015). Domain general learning: Infants use social and non-social cues when learning object statistics. *Frontiers in Psychology*, *6*, 551. CC by 4.0

[3] Ellis, E. M., Borovsky, A., Elman, J. L., & Evans, J. L. (2021). Toddlers' Ability to Leverage Statistical Information to Support Word Learning. *Frontiers in Psychology, 12*, 641. CC by 4.0 https://www.frontiersin.org/articles/10.3389/fpsyg.2021.600694/full

[4] Arciuli, J., & Torkildsen, J. V. K. (2012). Advancing our understanding of the link between statistical learning and language acquisition: The need for longitudinal data. Frontiers in psychology, 3, 324. https://www.frontiersin.org/articles/10.3389/fpsyg.2012.00324/full#h9

12.7: Native Language Magnet Theory Expanded (NLM-e)

Native Language Magnet Theory of Language Acquisition

Young children are born ready to learn their native language or languages rapidly and with relative ease, following similar developmental paths regardless of culture or language. In this way, young infants are “citizens of the world” (Kuhl, 2004) because they are able to phonetically distinguish between the sounds of all the world’s languages and acquire any language they are exposed to. Phonetics refers to how the sounds in a language are made and what they actually sound like. Infants are very good at noticing phonetic differences, and they can tell the difference between all kinds of different sounds from many different languages. But this ability changes within the first year of life. To acquire a language, infants must be able to discover which specific phonetic distinctions will be utilized in their native language. The early ability of young infants to phonetically distinguish between the sounds of different languages begins to diminish as repeated exposure to one’s native language leads to infants becoming “culture-bound listeners”, now only able to distinguish the sounds in their native language (Kuhl, 2004). For example, at six months of age, English-learning babies are about 80-90% successful at noticing phonetic differences in English, in Hindi, and in Salish (Werker & Tees, 1984). But by ten months of age, their success rate drops to about 50-60%, and by the time they are one year old, they are only about 10-20% successful at hearing the phonetic differences in Hindi and Salish. The theory of NLM-e explains the narrowing of infant speech perception and the subsequent growth of native language abilities. [1] [2]

NLM-e proposes that young infants’ universal early speech perception ability narrows with language experience as the brain neurally commits to the child’s native language, thereby fostering the language acquisition process. There are five basic principles of NLM-e (Kuhl et al., 2008):

Distributional patterns and infant-directed language are agents of change.

In order to comprehend language infants first have to acquire the sound inventory of a given language, that is, learn how many and which speech sounds are functionally distinct units. When a caregiver talks with an infant, what the infant hears is a long strand of continuous language sounds. How does an infant learn the individual words within a speech stream? One of the mechanisms they use is distributional learning, which refers to learning by simply listening to the frequency distributions of the speech sounds in language. Different languages have different distributional sound patterns, as some sounds are more likely to frequently be heard together than others. Infants as young as 2 months of age are sensitive to the distributional sound patterns in language (Maye, Werker, & Gerken, 2002; Wanrooij, Boersma, & van Zuijen, 2014). As research suggests distributional learning is one of the mechanisms by which infants start to acquire the phonemes of their native language, NLM-e includes it as an important agent of change. [3] When adult caregivers talk with infants and toddlers, they tend to use a different speech style, often referred to as infant-directed speech, that includes higher pitch, greater pitch range, and longer pauses between words, (Fernald et al.,1989; Outters et al., 2020). Infants prefer to listen to infant-directed speech over adult-directed speech at birth (Cooper & Aslin, 1990), as well as later in infancy (Fernald, 1985; Werker & McLeod, 1989). When listening to infant-directed speech, compared to adult-directed speech, infants are better able to discriminate speech sounds (Karzon, 1985; Trainor & Desjardins, 2002), more efficiently segment words from continuous speech (Thiessen, Hill & Saffran, 2005), demonstrate better long-term memory for words (Singh et al., 2009), and learn new words more effectively (Graf Estes & Hurley, 2013; Ma et al., 2011). As a result, NLM-e proposes that infant-directed speech is an agent of change because it helps infants phonetically discriminate language sounds as well as helps them acquire their native language. [4] [5]

Language exposure produces neural commitment that affects future learning.

Adults who either heard or spoke an additional language as a child have better perception and production abilities when relearning that childhood language later in life. Thus, exposure to a language within the first year of life provides sustained benefit to learners as language exposure in infancy leads to neural commitment. Furthermore, the benefits of early non-native language exposure begins to be observed almost immediately. For example, infants’ speech perception abilities change with as little as 5 hours of exposure to a second language (Kuhl et al., 2003; Conboy & Kuhl, 2011) and remain changed even a month after exposure has been discontinued (Sundara et al., 2020). [6]

Social interaction influences early language learning at the phonetic level.

In a series of studies Kuhl and colleagues have shown the significance of social interaction on phonetic learning. When English-monolingual infants were exposed to Mandarin Chinese through a “live condition” (experimenter directly interacting with the infant during learning) the infants demonstrated phonetic learning of the foreign language; however, exposure to Mandarin Chinese

from a video did need lead to phonetic learning (Kuhl, Tsao & Liu, 2003). When these same Mandarin Chinese videos were presented to infants over an interactive touchscreen device, greater phonetic learning occurred for infants paired together, compared to infants without a social partner (Lytle, Garcia-Sierra & Kuhl, 2018). This line of research highlights the importance social interactions have on language learning at the phonetic level. [7]

Early speech perception predicts language growth.

NLM-e proposes that early language perception abilities (such as phonetic perception) is related to later language abilities. Indeed research has shown this association. Six month old infants' speech perception ability is related, longitudinally, to language development at 13 months, 16 months and 24 months of age (Tsao, Liu & Kuhl, 2004). More recent research is finding this association lasts throughout early childhood as infants with greater speech perception abilities at 11 months of age demonstrated greater grammatical abilities as six year olds (Zhao et al., 2021).

The perception-production link is forged developmentally.

Early phonetic perception abilities are related to later language production abilities (Zhao et al., 2021). The connection between language perception and language production is built through the experiences of language exposure and infant vocalizations. Through language exposure, infants establish mental maps to represent the specific sounds of their native language. Through vocalization, infants relate the articulatory properties they use to create various sounds, to the sounds they hear themselves produce and then relate that to the language sounds they have mapped out from adult language exposure. This developmental perspective on language acquisition suggests that early language perception is critical and that language production relies upon perceptual abilities

[1] Psycholinguistics/Theories and Models of Language Acquisition. CC BY-SA 3.0

https://en.wikiversity.org/wiki/Psycholinguistics/Theories_and_Models_of_Language_Acquisition#cite_note-A_Linguistic_Introduction-8

[2] Essentials of Linguistics by Catherine Anderson is licensed under CC by 4.0

[3] Chládková, K., & Šimáčková, Š. (2021). Distributional learning of speech sounds: An exploratory study into the effects of prior language experience. Language Learning, 71(1), 131-161. CC by 4.0

[4] Outters, V., Schreiner, M. S., Behne, T., & Mani, N. (2020). Maternal input and infants' response to infant-directed speech. Infancy, 25(4), 478-499. CC by 4.0

[5] Byers-Heinlein et al., (2021). A Multilab Study of Bilingual Infants: Exploring the Preference for Infant-Directed Speech. Advances in Methods and Practices in Psychological Science, 4(1), 2515245920974622. CC by 4.0

[6] Sundara, M., Ward, N., Conboy, B., & Kuhl, P. K. (2020). Exposure to a second language in infancy alters speech production. Bilingualism: Language and Cognition, 23(5), 978-991. CC by 4.0

[7] Li, P., & Jeong, H. (2020). The social brain of language: grounding second language learning in social interaction. npj Science of Learning, 5(1), 1-9. CC by 4.0

12.8: Conclusion

Conclusion for Theories of Language Acquisition

The process of language acquisition for infants and toddlers is truly a remarkable phenomenon. This section presented a few of the prominent theories of language acquisition. As research progresses and techniques are developed, we continue to gain new insights into the language acquisition process. While children may be born with mechanisms that aid in the early phases of language acquisition, such as statistical learning, the critical importance of the quantity and quality of interactions infants and toddlers have with caregivers and other people is of pivotal significance

12.9: References

References for Theories of Language Acquisition

- Adams, K. A., Marchman, V. A., Loi, E. C., Ashland, M. D., Fernald, A., & Feldman, H. M. (2018). Caregiver talk and medical risk as predictors of language outcomes in full term and preterm toddlers. *Child Development*, *89*(5), 1674-1690.
- Antovich, D. M., & Graf Estes, K. (2018). Learning across languages: Bilingual experience supports dual language statistical word segmentation. *Developmental Science*, *21*(2), e12548.
- Aslin, R. N., Saffran, J. R., & Newport, E. L. (1998). Computation of conditional probability statistics by 8-month-old infants. *Psychological Science*, *9*(4), 321-324.
- Bakhurst, D., & Shanker, S. (2001). *Jerome Bruner language, culture, self*. SAGE.
- Bulf, H., Johnson, S. P., & Valenza, E. (2011). Visual statistical learning in the newborn infant. *Cognition*, *121*(1), 127-132.
- Caskey, M., Stephens, B., Tucker, R., & Vohr, B. (2014). Adult talk in the NICU with preterm infants and developmental outcomes. *Pediatrics*, *133*(3), e578-e584.
- DeCasper, A. J., & Spence, M. J. (1986). Prenatal maternal speech influences newborns' perception of speech sounds. *Infant Behavior and Development*, *9*(2), 133-150.
- Fernald, A. (1985). Four-month-old infants prefer to listen to motherese. *Infant Behavior and Development*, *8*(2), 181-195.
- Fernald, A. (1989). Intonation and communicative intent in mothers' speech to infants: Is the melody the message?. *Child Development*, 1497-1510.
- Fiser, J., & Aslin, R. N. (2002). Statistical learning of new visual feature combinations by infants. *Proceedings of the National Academy of Sciences*, *99*(24), 15822-15826.
- Friederici, A. D. (2017). *Language in our brain: The origins of a uniquely human capacity*. MIT Press.
- Friederici, A. D., & Wartenburger, I. (2010). Language and brain. Wiley Interdisciplinary Reviews: *Cognitive Science*, *1*(2), 150-159.
- Ghio, M., Cara, C., & Tettamanti, M. (2021). The prenatal brain readiness for speech processing: A review on foetal development of auditory and primordial language networks. *Neuroscience & Biobehavioral Reviews*.
- Goodluck, H. (1991). *Language acquisition: A linguistic introduction*. Basil Blackwell.
- Graf Estes, K., & Hurley, K. (2013). Infant-directed prosody helps infants map sounds to meanings. *Infancy*, *18*(5), 797-824.
- Hay, J. F., & Saffran, J. R. (2012). Rhythmic grouping biases constrain infant statistical learning. *Infancy*, *17*(6), 610-641.
- Jensen, L. A., & Arnett, J. J. (2017). *Child development worldwide: A cultural approach*. Pearson.
- Karzon, R. G. (1985). Discrimination of polysyllabic sequences by one-to four-month-old infants. *Journal of Experimental Child Psychology*, *39*(2), 326-342.
- Kirkham, N. Z., Slemmer, J. A., & Johnson, S. P. (2002). Visual statistical learning in infancy: Evidence for a domain general learning mechanism. *Cognition*, *83*(2), B35-B42.
- Kirkham, N. Z., Slemmer, J. A., Richardson, D. C., & Johnson, S. P. (2007). Location, location, location: Development of spatiotemporal sequence learning in infancy. *Child Development*, *78*(5), 1559-1571.
- Krcmar, M. (2010). Can social meaningfulness and repeat exposure help infants and toddlers overcome the video deficit?. *Media Psychology*, *13*(1), 31-53.
- Krcmar, M., Grela, B., & Lin, K. (2007). Can toddlers learn vocabulary from television? An experimental approach. *Media Psychology*, *10*(1), 41-63.
- Krentz, U. C., & Corina, D. P. (2008). Preference for language in early infancy: the human language bias is not speech specific. *Developmental Science*, *11*(1), 1-9.
- Kuhl, P. K. (2004). Early language acquisition: cracking the speech code. *Nature Reviews Neuroscience*, *5*(11), 831-843.
- Kuhl, P. K. (2007). Is speech learning ‘gated’ by the social brain? *Developmental Science*, *10*(1), 110-120.
- Kuhl, P. K. (2010). Brain mechanisms in early language acquisition. *Neuron*, *67*(5), 713-727.
- Kuhl, P. K., Conboy, B. T., Coffey-Corina, S., Padden, D., Rivera-Gaxiola, M., & Nelson, T. (2008). Phonetic learning as a pathway to language: new data and native language magnet theory expanded (NLM-e). *Philosophical Transactions of the Royal Society B: Biological Sciences*, *363*(1493), 979-1000.
- Kuhl, P. K., Tsao, F. M., & Liu, H. M. (2003). Foreign-language experience in infancy: Effects of short-term exposure and social interaction on phonetic learning. *Proceedings of the National Academy of Sciences*, *100*(15), 9096-9101.
- Kuhl, P. K., Williams, K. A., Lacerda, F., Stevens, K. N., & Lindblom, B. (1992). Linguistic experience alters phonetic perception in infants by 6 months of age. *Science*, *255*(5044), 606-608.

- Levine, L. E., & Munsch, J. (2018). *Child development from infancy to adolescence: An active learning approach*. Sage Publications.
- Linebarger, D. L., & Vaala, S. E. (2010). Screen media and language development in infants and toddlers: An ecological perspective. *Developmental Review, 30*(2), 176-202.
- Loi, E. C., Vaca, K. E., Ashland, M. D., Marchman, V. A., Fernald, A., & Feldman, H. M. (2017). Quality of caregiver-child play interactions with toddlers born preterm and full-term: Antecedents and language outcome. *Early human development, 115*, 110-117.
- Lytle, S. R., Garcia-Sierra, A., & Kuhl, P. K. (2018). Two are better than one: Infant language learning from video improves in the presence of peers. *Proceedings of the National Academy of Sciences, 115*(40), 9859-9866.
- Ma, W., Golinkoff, R. M., Houston, D. M., & Hirsh-Pasek, K. (2011). Word learning in infant-and adult-directed speech. *Language Learning and Development, 7*(3), 185-201.
- Masek, L. R., McMillan, B. T., Paterson, S. J., Tamis-LeMonda, C. S., Golinkoff, R. M., & Hirsh-Pasek, K. (2021). Where language meets attention: How contingent interactions promote learning. *Developmental Review, 60*, 100961.
- Maye, J., Werker, J. F., & Gerken, L. (2002). Infant sensitivity to distributional information can affect phonetic discrimination. *Cognition, 82*(3), B101-B111.
- Moon, C., Lagercrantz, H., & Kuhl, P. K. (2013). Language experienced in utero affects vowel perception after birth: A two-country study. *Acta Paediatrica, 102*(2), 156-160.
- Newman, R., Ratner, N. B., Jusczyk, A. M., Jusczyk, P. W., & Dow, K. A. (2006). Infants' early ability to segment the conversational speech signal predicts later language development: a retrospective analysis. *Developmental Psychology, 42*(4), 643.
- Outters, V., Schreiner, M. S., Behne, T., & Mani, N. (2020). Maternal input and infants' response to infant-directed speech. *Infancy, 25*(4), 478-499.
- Perani, D., Saccuman, M. C., Scifo, P., Anwander, A., Spada, D., Baldoli, C., Poloniato, A., Lohmann, G., & Friederici, A. D. (2011). Neural language networks at birth. *Proceedings of the National Academy of Sciences, 108*(38), 16056-16061.
- Rivera-Gaxiola, M., Silva-Pereyra, J., & Kuhl, P. K. (2005). Brain potentials to native and non-native speech contrasts in 7-and 11-month-old American infants. *Developmental Science, 8*(2), 162-172.
- Romberg, A. R., & Saffran, J. R. (2010). Statistical learning and language acquisition. *Wiley Interdisciplinary Reviews: Cognitive Science, 1*(6), 906-914.
- Roseberry, S., Hirsh-Pasek, K., & Golinkoff, R. M. (2014). Skype me! Socially contingent interactions help toddlers learn language. *Child Development, 85*(3), 956-970.
- Rowe, M. L., & Weisleder, A. (2020). Language development in context. *Annual Review of Developmental Psychology, 2*, 201-223.
- Saffran, J. R. (2001). Words in a sea of sounds: The output of infant statistical learning. *Cognition, 81*(2), 149-169.
- Saffran, J. R. (2020). Statistical language learning in infancy. *Child Development Perspectives, 14*(1), 49-54.
- Saffran, J. R. (2003). Statistical language learning: Mechanisms and constraints. *Current Directions in Psychological Science, 12*(4), 110-114.
- Saffran, J. R., Aslin, R. N., & Newport, E. L. (1996). Statistical learning by 8-month-old infants. *Science, 274*(5294), 1926-1928.
- Saffran, J. R., & Kirkham, N. Z. (2018). Infant statistical learning. *Annual Review of Psychology, 69*, 181-203.
- Schneider, R., Yurovsky, D., & Frank, M. C. (2015). Large-scale investigations of variability in children's first words. In D. C.Noelleet al (Ed.), Proceedings of the 37th Annual Meeting of the Cognitive Science Society, Pasadena, California, July 22–25, 2015 (2110–2115). Austin, TX: Cognitive Science Society.
- Scofield, J., Williams, A., & Behrend, D. A. (2007). Word learning in the absence of a speaker. *First Language, 27*(3), 297-311.
- Singh, L., Nestor, S., Parikh, C., & Yull, A. (2009). Influences of infant-directed speech on early word recognition. *Infancy, 14*(6), 654-666.
- Stone, A., Petitto, L. A., & Bosworth, R. (2018). Visual sonority modulates infants' attraction to sign language. *Language Learning and Development, 14*(2), 130-148.
- Troseth, G. L., Strouse, G. A., Verdine, B. N., & Saylor, M. M. (2018). Let's chat: On-screen social responsiveness is not sufficient to support toddlers' word learning from video. *Frontiers in Psychology, 9*, 2195.
- Sundara, M., Ward, N., Conboy, B., & Kuhl, P. K. (2020). Exposure to a second language in infancy alters speech production. *Bilingualism: Language and Cognition, 23*(5), 978-991.

- Tamis-LeMonda, C. S., Bornstein, M. H., & Baumwell, L. (2001). Maternal responsiveness and children's achievement of language milestones. *Child development*, *72*(3), 748-767.
- Tardif, T., Fletcher, P., Liang, W., Zhang, Z., Kaciroti, N., & Marchman, V. A. (2008). Baby's first 10 words. *Developmental Psychology*, *44*, 929–938.
- Thiessen, E. D., Hill, E. A., & Saffran, J. R. (2005). Infant-directed speech facilitates word segmentation. *Infancy*, *7*(1), 53-71.
- Trainor, L. J., & Desjardins, R. N. (2002). Pitch characteristics of infant-directed speech affect infants' ability to discriminate vowels. *Psychonomic Bulletin & Review*, *9*(2), 335-340.
- Tsao, F. M., Liu, H. M., & Kuhl, P. K. (2004). Speech perception in infancy predicts language development in the second year of life: A longitudinal study. *Child Development*, *75*(4), 1067-1084.
- Vandewater, E. A. (2011). Infant word learning from commercially available video in the US. *Journal of Children and Media*, *5*(3), 248-266.
- Wanrooij, K., Boersma, P., & Van Zuijen, T. (2014). Fast phonetic learning occurs already in 2-to-3-month old infants: an ERP study. *Frontiers in Psychology*, *5*, 77.
- Werker, J. F., & McLeod, P. J. (1989). Infant preference for both male and female infant-directed talk: a developmental study of attentional and affective responsiveness. *Canadian Journal of Psychology*, *43*(2), 230.
- Werker, J. F., & Tees, R. C. (1984). Cross-language speech perception: Evidence for perceptual reorganization during the first year of life. *Infant Behavior and Development*, *7*(1), 49-63.
- Wu, R., Gopnik, A., Richardson, D. C., & Kirkham, N. Z. (2011). Infants learn about objects from statistics and people. *Developmental Psychology*, *47*(5), 1220.
- Zhao, T. C., Boorom, O., Kuhl, P. K., & Gordon, R. (2021). Infants' neural speech discrimination predicts individual differences in grammar ability at 6 years of age and their risk of developing speech-language disorders. *Developmental Cognitive Neuroscience*, *48*, 100949.

CHAPTER OVERVIEW

13: Supporting Language in Group Care

13.1: Introduction

Introduction to Supporting Language in Group Care

While children are born ready to acquire language, the quantity and quality of exposure they receive is critical for the trajectory of their language development. For children who attend group care, the language caregivers share with infants and toddlers is essential. This section will emphasize the importance of the quantity and quality of language exposure during the first three years and explain various practices caregivers can implement to increase both the quantity and quality of the language they use with infants and toddlers

13.2: Language Growth and Individual Differences

Individuality of Language Growth

Language develops rapidly during the first three years of life. Figure 13.2.1 shows growth curves for the development of toddlers' productive vocabulary between 16 to 30 months of age. On the x-axis is the age of children and the y-axis represents how many words children produce. Each gray dot is a child's data. When you look at this chart closely, what do you notice? Did you notice the individual differences within each age? For example, look at the spread of dots at 24 months. Even within the same age, 24 months, there is a large variability in productive vocabulary between children. At 24 months, some children have been heard to speak more than 500 or even 600 words, while many others spoke less than 200 words. Also, notice that the growth curves suggest that these individual differences start early, before 16 months and continue throughout the second year of life. Where do these individual differences in language ability come from and do they have any long term significance?

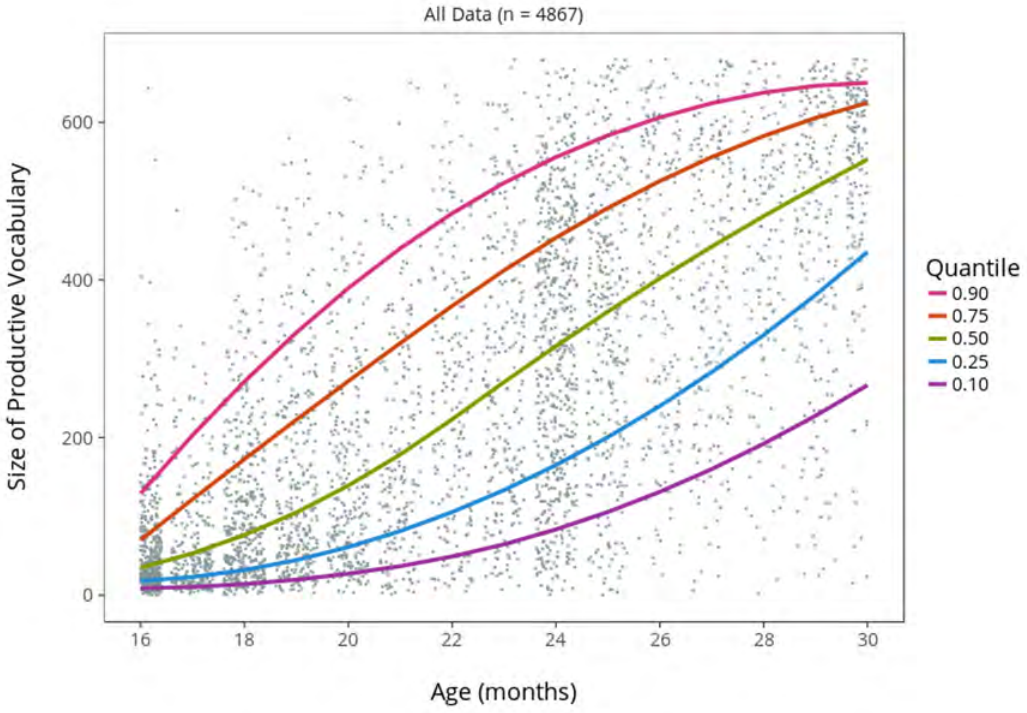


Figure 13.2.1: Growth curves for the number of words children produce. Table with all data points can be found Wordbank | Analyses (stanford.edu) ([1])

Early individual differences in language ability does have long term significance. For example, individual differences in language processing abilities remain stable across development – those children who were faster at processing language at 19 months continued to be faster at processing language 12 months later (Peter et al., 2019). For children born prematurely, children who were faster at processing language at 18 months, had larger vocabulary comprehension abilities at 30 months (Marchman et al., 2016) and had higher scores on language and IQ at 54 months (Marchman et al., 2018). By 18 months, children from higher SES backgrounds already have larger productive vocabularies and are more efficient at processing language (Fernald, Marchman & Weisleder, 2013). When these same children were followed up six months later, those with larger vocabularies and more efficient language processing skills at 18 months continued to perform at a higher level: at two years of age, children from lower SES backgrounds performed at the level children from higher SES backgrounds did when they were 18 months old—representing a six month performance gap by age two. [2]

In summary, individual differences in language ability begin to form early in life and have the potential to lead to very different developmental outcomes later in childhood. Specifically, larger vocabularies and more efficient language processing skills in toddlerhood is related to higher performance on language, cognitive and academic assessments in later childhood. Clearly early individual differences in language ability are important, but where do they come from?

The Word Gap

The individual differences in language abilities that appear early in the first three years can be partly explained by the various levels of language exposure children recieve. For example, early language processing abilities are associated with the amount of language children hear as research has found that children who are exposed to less language tend to have lower language abilities (Fernald & Weisleder, 2010; Hurtado, Marchman & Fernald, 2008).[3]

Figure 13.2.2: Caregiver interacting with a toddler. ([4])

In one important study on individual differences, researchers went into families' homes once per month and recorded what children heard and said for one hour (Hart & Risley, 1995). They started doing this when the infants were nine months old, and they kept going to their homes every month until the children were three years old. During this time, the toddlers began to talk, and the scientists tracked every new word that they produced. They also wrote down all the words and sentences that parents said to their children. After analyzing these recordings, they found that most children started speaking around their first birthday, but some learned new words much more quickly than others did. They also found that children were better at learning new words if their parents talked to them a lot at home. Children who heard lots of language—more words, more different words, more questions, more encouraging words, and more words that described things—had bigger vocabularies than children who did not hear as much language.[5]

One important finding from this study was that children heard more language if they were from families with a higher socioeconomic status (SES). This relationship between family (SES) and the amount of words spoken to the child has become known as the word gap. Hart and Risley (2003) estimated that there is a 30 million word gap□children from higher SES families are exposed to 30 million more words by age three than children from families with a lower SES. While some researchers argue that the actual word gap may be less than the 30 million words originally proposed, the word gap is nonetheless present and impactful, as numerous studies have documented a difference in language exposure based on family SES (Ellwood-Lowe, Foushee & Srinivasan, 2022; Hoff, 2003; Huttenlocher et al., 2010; Golinkoff et al., 2019; Rowe, Leech & Cabrera, 2017). For example, the language of parents with a lower SES often use a lower diversity of words in comparison to the language of parents with a higher SES (Burchinal et al., 2008; Huttenlocher et al., 2010). As a consequence of these input differences, children with a higher SES background often have a larger vocabulary (Gilkerson et al., 2017; Hoff, 2006) and more often use diverse and advanced grammatical constructions than children from lower SES families (Huttenlocher, Vasilyeva, Cymerman & Levine, 2002).[6]

The idea of a word gap highlights the importance of early language exposure for positive long term developmental trajectories. Early language experiences and abilities lead to stronger later language performance and are even related to later cognitive and academic abilities (Bornstein, Hahn, Putnick & Pearson, 2018; Lehrl et al., 2020; Rodriguez & Tamis-LeMonda, 2011; Rose, Lehrl,

Ebert & Weinert, 2018; Tamis-LeMonda et al., 2019). For example toddlers with larger vocabularies and more efficient language processing demonstrated stronger language and cognitive skills at 8 years of age (Marchman & Fernald, 2008).

Quantity of Language Exposure

While indeed family SES is related to early language differences in children, family SES alone does not reveal the full story. In one study, researchers looked at the potential factors in language growth across a group of toddlers, all from families with a low SES (Weisleder & Fernald, 2013). Children wore a special recorder that captured the language they were exposed to throughout the day, over multiple days. Results revealed great variability in language exposure, even though the children were all from families with lower SES. Figure 13.2.3 charts the varied language exposure of the children. Each colored column represents one child and the height of the column represents the number of words a child heard in a 10 hour day the taller the bar, the more words heard by a child. Some children heard over 25,000 words in one day, while others heard under 2,500 words in one day. This is data from just one day, but imagine the compounding effect this has over the first three years of a child's life if these daily patterns are repeated! [5]

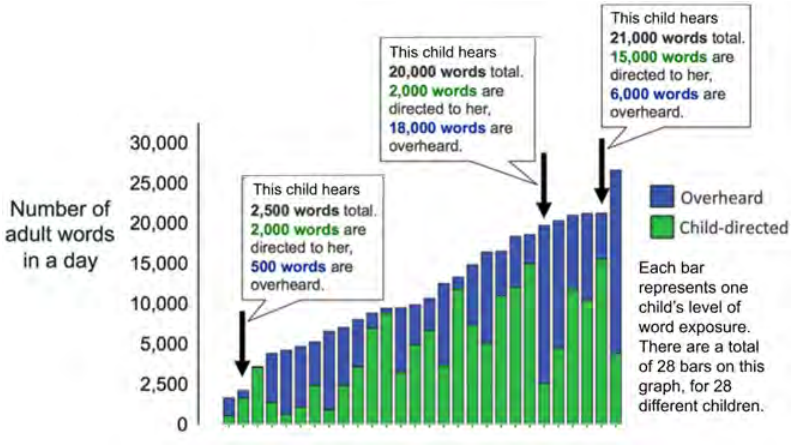


Figure 13.2.3: Number of words toddlers, from low SES families, heard in one day. Each bar represents one child's level of word exposure. There are total of 28 bars on this graph, for 28 different children. This graph shows the number of words that different kids heard from grownups in 1 day. The bottom section/green part of each bar shows the number of words that grownups said to that kid in 1 day. The top/blue part of each bar shows the number of words that kids overheard when grownups were talking to other people. For example, kid 2 heard 2,500 words total. 2,000 words are directed to her, and 500 words are overheard. Child 23 hears 20,000 words total. 2,000 words are directed to her, 18,000 words are overheard. Child 27 hears 21,000 words total. 15,000 words are directed to her, 6,000 words are overheard. ([7]

These results move the spotlight away from SES per se and instead shine it more specifically on the variable language experiences of children, one of which can include SES. In general, children from families with high SES hear more language than children from families with low SES, but even within the same SES level there are significant differences in language experience. There are also other reasons besides SES for wide-ranging levels of language exposure. For example, in Senegal, cultural traditions and beliefs discourage caregivers from talking with infants and toddlers, therefore greatly restricting their language exposure (Weber, Fernald & Diop, 2017). Other research shows that the quantity of words infants experience varies greatly based on how infants are placed during activities and the type of activity. Infants placed in sitting devices (e.g., bouncy seats, highchairs) experience fewer adult words and less consistent language exposure throughout the day (Malachowski, Salo, Needham & Humphreys, 2021). Considering various daily activities, infants were exposed to the most words during book sharing (mean of 55.91 words per minute) and grooming (mean of 56.60 words per minute) and the least amount of words during object play (mean of 34.10 words per minute) and feeding (mean of 32.44 words per minute) (Tamis-LeMonda et al., 2019).

Until now we have learned that the number of words children are exposed to can vary greatly depending on factors such as SES and culture, but what does the "typical" amount of language exposure look like? To estimate how many words infants and toddlers hear across different ages, another team of researchers also used small language recorders worn by children to count the number of words infants and toddlers heard throughout the day (Gilkerson et al., 2017). Figure 13.2.4 summarizes some of their data. Take a moment to look carefully at the data in Figure 13.2.4 What did you notice? Consider how developmental growth in other domains, such as motor abilities, might influence the amount of words children hear.

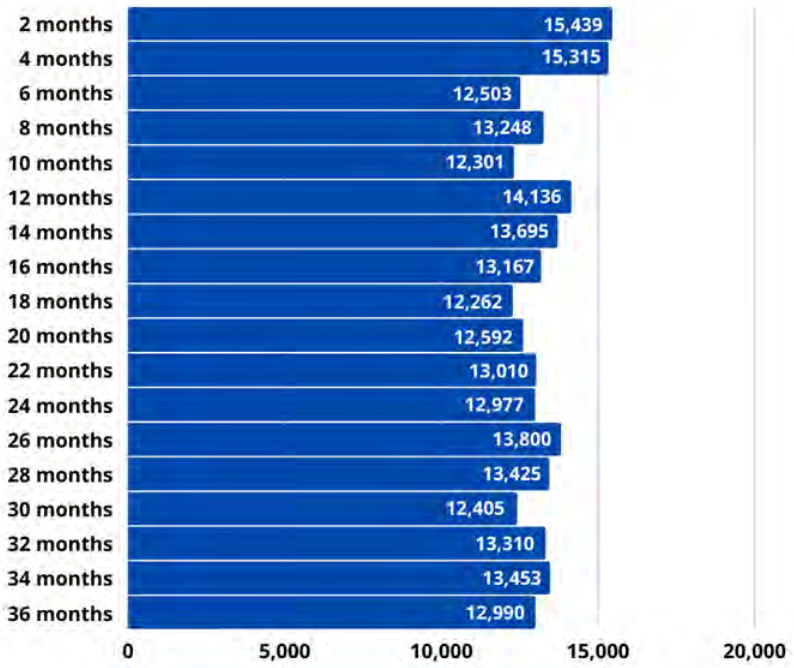


Figure 13.2.4:Average number of words children are exposed to daily at different ages. 2 months = 15,439, 4 months=15,315, 6 months=12,503, 8 months-13,248, 10 months=12,301, 12 months=14,136, 14 months=13,695, 16 months=13,167, 18 months = 12,262, 20 months = 12,592, 22 months=13,010, 24 months=12,977, 26 months=13,800, 28 months=13,425, 30 months-12,405, 32 months =13,310, 34 months=13,456, 36 months=12,990 [8])

Did you notice that infants typically heard more words than toddlers, with the youngest infants, 2 to 4 months of age, hearing the most words? Why do you think infants and younger toddlers are exposed to more words than older toddlers? Across 2 to 36 months of age, children are approximately exposed to an average amount of words between the range of 12,000 to just over 15,000. Although the difference between 12,000 and 15,000 may not seem very significant, consider how these numbers could play out over just one year. A child who is exposed to 12,000 words everyday for one year would hear 4,380,000 words, but a child exposed to 15,000 words daily would hear 5,475,000 words in one year. This represents a difference of over one million words!

It is critical to stress that while this data was recorded in the child's home environment as families moved throughout their daily routines in an attempt to capture "natural" language exposure, the data in no way should be interpreted as representing what may be "typical" language exposure for all children. The participants in the study were all monolingual English speaking children, mostly (66%) white, all from the Denver, Colorado area and educated with a high school GED (26%), some college experience (29%) and a college degree (23%). Irrespective of these limitations, the data does provide intriguing insight into daily natural language exposure for infants and toddlers.

Quality of Language Exposure

While quantity, the sheer amount of language children are exposed to, is clearly important, research suggests the quality of the exposure is even more important (Hirsh-Pasek et al., 2015; Romeo et al., 2018). Let's revisit the chart that showed the number of words toddlers, from low SES families, heard in one day (see Figure 13.2.5). While the height of the columns represents the quantity of language exposure, the colored sections of the columns represent the quality of exposure. Some children heard lots of language spoken directly to them, like when they were talking and playing with their caregivers, this is referred to as child-directed speech. The bottom color of each column is green, representing the amount of words heard that were child-directed. Other children heard lots of language that was not directed to them, like when their caregivers were talking to each other or to other children nearby, this is referred to as overheard speech. The top color of each column is blue, representing the amount of overheard words. [8]

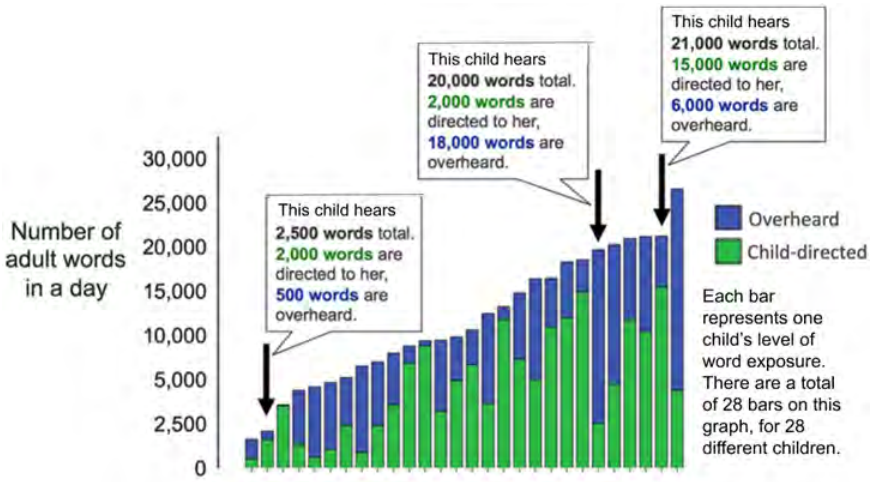


Figure 13.2.5: Number of words toddlers, from low SES families, heard in one day. Each bar represents one child's level of word exposure. There are total of 28 bars on this graph, for 28 different children. This graph shows the number of words that different kids heard from grownups in 1 day. The bottom section/green part of each bar shows the number of words that grownups said to that kid in 1 day. The top/blue part of each bar shows the number of words that kids overheard when grownups were talking to other people. For example, kid 2 heard 2,500 words total. 2,000 words are directed to her, and 500 words are overheard. Child 23 hears 20,000 words total. 2,000 words are directed to her, 18,000 words are overheard. Child 27 hears 21,000 words total. 15,000 words are directed to her, 6,000 words are overheard. ([5])

Distinguishing between the quantity of language children are exposed to is critical. The research revealed that the toddlers who heard more child-directed language had bigger vocabularies and had more efficient language processing abilities than the children who did not hear as much child-directed speech. This shows that the quality of the words caregivers use with infants and toddlers, such as child-directed speech, may be even more important than the overall quantity of language exposure.

Child-directed language is just one way to think about the quality of language infants and toddlers experience. Another way to perceive language quality is through the conversational turn counts between children and adults. Turn counts are an important quality measure because they capture the critical interactive and responsive aspect of a back-and-forth conversation. After controlling for SES, toddlers who experienced more conversational turn counts with caregivers had higher IQ scores and language abilities later in childhood at ages 9 and 13 (Gilkerson et al., 2018).

Figure 13.2.6: Caregiver holding a toddler. ([9])

There are important early differences in the quantity and quality of language that infants and toddlers experience above and beyond SES. Research has found that both quantity and quality of language exposure during the first three years of life is related to language and cognitive abilities in later childhood. While caregivers should consider increasing the quantity of language their infants and toddlers experience, focusing on various quality aspects of their language interactions is the most important. The next session will introduce various strategies that caregivers can use to improve the quantity and quality of the language they share with infants and toddlers.

---

[1] Image by Wordbank is licensed under CC by 4.0

[2] Peter et al., (2019). Does speed of processing or vocabulary size predict later language growth in toddlers? Cognitive Psychology, 115, 101238. CC by 4.0

[3] Dickinson et al., (2012). How reading books fosters language development around the world. *Child Development Research.* CC by 3.0

[4] Image by Luiza Braun on Unsplash.

[5] Lew-Williams & Weisleder (2017). How do little kids learn language? *Frontiers in Young Minds*, 5(45). CC by 4.0

[6] Grolig (2020). Shared storybook reading and oral language development: A bioecological perspective. *Frontiers in Psychology, 11*, 1818. CC by 4.0

[7] Image adapted from Lew-Williams & Weisleder (2017). How do little kids learn language? *Frontiers for Young Minds, 5*, 45. CC by 4.0

[8] Image by Todd LaMarr is licensed under CC by 4.0.

[9] Image by Luiza Braun on Unsplash.

13.3: Strategies that Support Language Development

13.3.1: Strategies that Support Language Development-Responsiveness and Sensitivity

Responsiveness and Sensitivity

Responsiveness refers to a caregiver's ability to detect and respond to a child's behavioral signals during shared interactions (Landry et al., 2001). Sensitivity refers to caregivers who are aware and capable of understanding a child's behaviors and that respond to the child's needs in a timely and appropriate manner (Grossmann, Bretherton, Waters & Grossmann, 2013). Thus responsiveness and sensitivity are related constructs that when implemented, support the language development of infants and toddlers (Alvarenga et al., 2021; Madigan et al., 2019). [1]

Figure 13.3.1.1: Caregiver responding to an infant's interest. ([2])

Infants and toddlers benefit from interacting with responsive and sensitive caregivers. For example, removing social feedback from interactions between caregivers and infants leads to fewer vocalizations from 5-month-old infants (Goldstein, Schwade & Bornstein, 2009), while providing social feedback in response to 8 month olds' vocalizations results in a higher number of vocalizations (Goldstein, King & West, 2003). One study found that when children were 9 and 13 months old caregivers' responsiveness predicted when children reached various language milestones, such as when children produced their first words and first fifty words (Tamis-LeMonda, Bornstein & Baumwell, 2001). Both caregiver responsiveness and sensitivity are related to the development of expressive language abilities in toddlers (Bruce, Panneton & Taylor, 2022; Prime, Wade & Gonzalez, 2020) and higher levels of caregiver sensitivity during infancy are related to greater abilities in language comprehension in toddlerhood (Baumwell, Tamis-LeMonda & Bornstein, 1997). [3] [4]

To support language development, caregivers should participate in training sessions that practice and improve their ability to provide responsive and sensitive care and interactions with infants and toddlers. When caregivers do receive such training, their responsiveness improves and is linked to an improvement in communication abilities of infants (Alvarenga et al., 2021). Engaging in responsive and sensitive interactions not only takes practice, but also uninterrupted focused time with children. To be responsive, a caregiver must pay close attention to a child's signals and to be sensitive, a caregiver must respond to their signals in a timely and appropriate way.

[1] Caldas et al., (2018). The socio-communicative development of preterm infants is resistant to the negative effects of parity on maternal responsiveness. *Frontiers in Psychology, 9*, 43. CC by 4.0

[2] Image by Alina Ryabchenko on Unsplash.

[1] Marklund et al., (2021). An association between phonetic complexity of infant vocalizations and parent vowel hyperarticulation. *Frontiers in Psychology*, 2873. CC by 4.0

[2] Dickinson et al., (2012). How reading books fosters language development around the world. *Child Development Research.* CC by 3.0

13.3.2: Strategies that Support Language Development-Turn-taking

Turn-taking

Infants spend much of their awake time in face-to-face interactions with their caregivers and it is this face-to-face conversational setting that provides an important context for infants to start acquiring language. Additionally, before infants acquire language they start to interact in social exchanges with caregivers characterized by turn-taking patterns, such as peek-a-boo games and give and take interactional sequences (Bates, Camaioni & Volterra, 1975; Ratner & Bruner, 1978; Rochat, Querido & Striano, 1999). These mutually engaged interactions can consist of behaviors in multiple modalities such as vocalizations, gazes and smiles. Conversational turn-taking is important during infancy as it lays the foundation for the flow and pattern of interactions, but continues to be important throughout toddlerhood and the preschool years as the amount of turn-taking children and caregivers engage in is related to language development and brain function (Donnelly & Kidd, 2021; Romeo et al., 2018, 2021). [1]

Figure 13.3.2.1: Caregiver and an infant engaged in a face-to-face turn-taking interaction ([2]

There are many ways caregivers can engage in turn-taking with children. Questions are a common way to start back-and-forth conversations (Gilkerson et al., 2018; Rowe, Leech & Cabrera, 2017). Questions can have many formats (Wasik & Hindman, 2013), including open (involving no single correct answer and likely requiring multiple word response) or closed (single correct answer), with the latter including label questions (What's this called?) or yes/no questions (Is this a dog?). There is extensive evidence that questions in the classroom are a powerful tool for eliciting child language and fostering conversation. Open-ended questions may be relatively rare, representing approximately only 5% of caregivers' prompts (Davis, Torr & Degotardi, 2015; Siraj-Blatchford & Manni, 2008). Interestingly, Kidd and Rowland (2021) found that, with two and three year olds, when presented with conversational opportunities, children contributed just about one-third (37%) of the turns. Caregivers can try to increase the number of turn-taking exchanges during interactions by talking about abstract, non-present concepts (Leech & Rowe, 2021). [3]

[1] Hilbrink et al., (2015). Early developmental changes in the timing of turn-taking: a longitudinal study of mother–infant interaction. *Frontiers in Psychology, 6*, 1492. CC by 4.0

[2] Image by Marcin Jozwiak on Unsplash.

[3] Hindman et al., (2021). Understanding child-directed speech around book reading in toddler classrooms: Evidence from early Head Start programs. *Frontiers in Psychology, 12*, 719783-719783. CC by 4.0

13.3.3: Strategies that Support Language Development- Protoconversations

Protoconversations

Infants produce both speech-like vocalizations (i.e., protophones) and cries from birth (Nathani, Ertmer & Stark, 2006). Even before infants produce their first words, caregivers and infants show turn-taking communication patterns referred to as "protoconversation" (Bateson, 1975; Trevarthen & Aitken, 2001). Protoconversations involve communicative turn-taking between caregivers and infants using a variety of communication such as vocalizations, gestures, facial expressions and language. Infants between 3 and 5 months produce more than 40% of their turns in overlap with caregivers, while this proportion of overlap decreases after 5 months and drops to around 20% at 18 months (Hilbrink, Gattis & Levinson, 2015). Caregiver responses (verbal or non-verbal) to infant protophones most often occur within one second after infant protophones (Keller et al., 1999; Yoo, Bowman & Oller, 2018). Caregiver responses to protophones thus appear to provide a rich learning opportunity. Through protoconversation, caregivers play a key role for infants in helping them learn the turn-taking system necessary for communication (Hilbrink, Gattis & Levinson, 2015). Furthermore, many longitudinal studies have shown that protophones are foundations for language development (Koopmans-van Beinum & van der Stelt, 1986; Oller, 1980; Roug et al., 1989; Stark, 1980). In summary, early turn-taking and protoconversations support language development by laying the foundation of back-and-forth communication and highlight the role of social interactions for supporting language development (Donnelly & Kidd, 2021). [1]

Figure 13.3.3.1: Caregiver and an infant engaged in a protoconversation. ([2])

Caregivers can use protoconversations to support language development in the following ways:

- Recognize that protophones offer a special opportunity to bond with an infant and are important for the beginning development of speech.
- Even before an infant's vocalizations begin to sound like speech, engage with the infant in protoconversations.
- A protoconversation involves contingent, bidirectional turn taking, so make sure you allow for time devoted to an infant where you can respond to their communication promptly and continue the turn taking conversation.
- Being an engaging caregiver in the communicative partnership positively affects the quantity and quality of infant vocalizations (Goldstein & Schwade, 2008).
- There are various ways to respond to infant vocalizations including physical touch, vocalizations, speech and facial expressions. In terms of vocal and speech responses, caregivers have been found to primarily use affirmations and imitations with young infants, and then expand their responses to include expansions, descriptions, and questions as children's abilities increase

(Tamis-LeMonda, Bornstein & Baumwell, 2001). This shows that caregivers are sensitive to infant vocal capacities and respond accordingly, thereby fostering infant vocal development.

[1] Yoo et al., (2018). The origin of protoconversation: An examination of caregiver responses to cry and speech-like vocalizations. *Frontiers in Psychology, 9*, 1510. CC by 4.0

[2] Image by Raul Angel on Unsplash.

13.3.4: Strategies that Support Language Development-Infant-Directed Speech

Infant-Directed Speech

When caregivers interact with infants, their speech often takes on specific, distinguishing features in a speech register known as infant-directed speech (Ferjan Ramírez, 2022; Fernald et al., 1989). Infant-directed speech is produced by caregivers of most (although not all) linguistic and cultural backgrounds and is typically characterized by a slow, melodic, high-pitched, and exaggerated cadence (Farran, Lee, Yoo & Oller, 2016; Fernald et al., 1989; Kitamura, Thanavishuth, Burnham & Luksaneeyanawin, 2001; Pye, 1986; Shute & Wheldall, 1999). From early in life, infants tune their attention to infant-directed speech, preferring to listen to infant-directed speech over adult-directed speech at birth (Cooper & Aslin, 1990), as well as later in infancy (Cooper & Aslin, 1994; Cooper, Abraham, Berman & Staska, 1997; Fernald, 1985; Hayashi, Tamekawa & Kiritani, 2001; Kitamura & Lam, 2009; ManyBabies Consortium, 2020; Newman & Hussain, 2006; Pegg, Werker & McLeod, 1992; Santesso, Schmidt & Trainor, 2007; Singh, Morgan & Best, 2002).[1]

Infants' preference for infant-directed speech may play a useful role in early language learning. For example, infants are better able to discriminate speech sounds in infant-directed speech than in adult-directed speech (Karzon, 1985; Trainor & Desjardins, 2002), more efficiently segment words from continuous speech in an infant-directed speech register (Thiessen, Hill & Saffran, 2005), demonstrate better long-term memory for words spoken in infant-directed speech (Singh, Nestor, Parikh & Yull, 2009), and learn new words more effectively from infant-directed speech (Graf Estes & Hurley, 2013; Ma, Golinkoff, Houston & Hirsh-Pasek, 2011). Overall amount of infant-directed speech in everyday speech input between 7 to 11 months is positively correlated with language outcomes at five years of age (Weisleder & Fernald, 2013), and amount of infant-directed speech in a one-on-one setting between 11 and 14 months of age is correlated with productive vocabulary at 24 months (Ramírez-Esparza, García-Sierra & Kuhl, 2014; 2017a) as well as word production at 33 months (Ramírez-Esparza et al., 2017b).[2] [3]

[1] Byers-Heinlein et al., (2021). A multilab study of bilingual infants: Exploring the preference for infant-directed speech. *Advances in Methods and Practices in Psychological Science*, *4*(1), 2515245920974622. CC by 4.0

[2] Byers-Heinlein et al., (2021). A multilab study of bilingual infants: Exploring the preference for infant-directed speech. *Advances in Methods and Practices in Psychological Science*, *4*(1), 2515245920974622. CC by 4.0

[3] Marklund et al., (2021). Relationship between parents' vowel hyperarticulation in infant-directed speech and infants' phonetic complexity on the level of conversational turns. *Frontiers in Psychology*, *12*, 2712. CC by 4.0

13.3.5: Strategies that Support Language Development-Singing

Singing

While infant-directed speech has been extensively investigated, research on infant-directed singing and its relationship with language development is gaining more attention (Falk & Tsang, 2020; Papadimitriou et al., 2021). Across most cultures, caregivers naturally sing to infants throughout the day (Fernald, 1992; Hilton et al., 2022; Trehub & Trainor, 1998; Yan et al., 2021). In fact, one study captured daylong audio recordings from thirty-five 6 to 12 month old infants and found that 100% of the infants heard both live and recorded music (Mendoza & Fausey 2021). However, not all children are exposed to singing daily. Nationally in the U.S., only 57.4% of infants and toddlers are sung to everyday (Keating, 2021). Comparing the prevalence of daily singing with infants and toddlers across the U.S., Texas had the lowest prevalence (47.6%), Alaska had the highest (72.3%) and California was just under the national average (56.4%) (Keating, 2021). Similar to infant-directed speech, infant-directed singing is characterized by higher pitch and slower tempo than non-infant-directed versions of the same songs by the same singers (Trainor, Clark, Huntley & Adams, 1997; Trehub, Hill & Kamenetsky, 1997; Trehub et al., 1998). [1] [2] [3]

Two common types of songs for infants and toddlers include lullabies and play songs. In line with their soothing function, lullabies feature very slow tempo, low pitch, falling pitch contours, limited amplitude variation, and soothing tone of voice (Trehub, Trainor & Unyk, 1993; Trehub & Trainor, 1998; Unyk, Trehub, Trainor & Schellenberg, 1992), properties that are shared with soothing infant-directed speech. Although play songs are commonly sung to Western infants, unlike lullabies, they are not universal (Trehub & Trainor, 1998). Examples of play songs are “Old MacDonald had a farm”, “Five little monkeys jumping on the bed” and “The wheels on the bus”. [4]

Figure 13.3.5.1: Caregiver singing with an infant. (Copyright; author via source)

Research indicates that infants find infant-directed singing more engaging and prefer to listen to it compared to non-infant-directed singing (Masataka, 1999; Nakata & Trehub, 2004; Trainor, 1996; Tsang, Falk & Hessel, 2017). Singing lullabies to infants, even unfamiliar lullabies in an unfamiliar language, helps infants relax and enter a calmer state (Bainbridge et al., 2021). Songs allow infants to capitalize on the acoustic boundary cues within song melodies to organize a continuous song into structurally relevant parts and recognize different phrases while the song unfolds. For example, six month old infants are able to segment children’s songs into phrases (Hahn, Benders, Snijders & Fikkert, 2020). Already before their first birthday infants are able to recognize changes in the syllable order in songs (François et al., 2017; Lebedeva & Kuhl, 2010; Suppanen, Huotilainen, & Ylinen, 2019; Thiessen & Saffran, 2009), differentiate between rhyming and non-rhyming songs (Hahn, Benders, Snijders, & Fikkert, 2018), and learn novel words recurring in the song lyrics (Snijders, Benders, & Fikkert, 2020). Furthermore, infant-directed singing is related to later language development. Specifically, higher levels of infant-directed singing is related to greater language comprehension abilities in infants and later language skills in toddlerhood (Franco et al., 2020; Papadimitriou et al., 2021; Schaal et al., 2020). [5] [6]

Early newborn neural responses to singing predicts later language development at 18 months (François et al., 2017). Even a short, one-month intervention at nine months of age was found to be associated with enhanced neural responses for temporal structure processing in both music and speech contexts, compared to a control group (Zhao & Kuhl, 2016). This research suggests that detection and prediction of auditory patterns, crucial skills for both music and speech, were positively affected by early musical activities. [7]

Similar to infant-directed speech, infant-directed singing is more engaging and has the potential to positively influence children's language development. Caregivers can take advantage of the power of singing by including singing across a range of activities. While singing to calm a child or while putting them to sleep is common, caregivers can include singing through daily routines and activities and create short songs in the moment.

---

[1] Franco et al., (2020). Singing to infants matters: Early singing interactions affect musical preferences and facilitate vocabulary building. *Journal of Child Language*, 1-26. CC by 4.0

[2] Yan et al., (2021, preprint). Across demographics and recent history, most parents sing to their infants and toddlers daily. CC by 4.0

[3] Corbeil et al., (2013). Speech vs. singing: Infants choose happier sounds. *Frontiers in Psychology, 4*, 372. CC by 3.0

[4] Corbeil et al., (2013). Speech vs. singing: Infants choose happier sounds. *Frontiers in Psychology, 4*, 372. CC by 3.0

[5] Corbeil et al., (2013). Speech vs. singing: Infants choose happier sounds. *Frontiers in Psychology, 4*, 372. CC by 3.0

[6] Hahn et al., (2020). Six-month-old infants recognize phrases in song and speech. *Infancy, 25*(5), 699-718. CC by 4.0

[7] Franco et al., (2020). Singing to infants matters: Early singing interactions affect musical preferences and facilitate vocabulary building. *Journal of Child Language*, 1-26. CC by 4.0

13.3.6: Strategies that Support Language Development-Joint Attention

Joint Attention

Joint attention refers to a shared focus between a caregiver and a child (including gaze, pointing, and visual attention). Joint attention is an important feature of language development because once joint attention is shared, the caregiver and child have a communicative context in which information about objects or events in the environment can effectively be communicated. [1]

Figure 13.3.6.1: Caregiver and toddler engaged in joint attention ([2])

During the child's first two years of life, joint attention is thought to emerge gradually in interaction with the child's emotional and social development, as well as resulting from cognitive development involving skills like processing, attention and self-regulation (Morales et al., 2000). Already in the first four months of life, infants start to engage with their caregivers in sustained periods of face-to-face or mutual eye gaze (Johnson & de Haan, 2011). Between the ages of 9 to 12 months, children start to explore their environment more. At this point, dyadic attention shifts to triadic attention in which caregiver and child start to coordinate and systematically divide their attention between objects or events in the environment and with each other (Carpenter et al., 1998; Wille, Van Lierde & Van Herreweghe, 2019). It should be noted, however, that these episodes of triadic joint attention do not occur frequently until children are about 15 to 18 months old (Carpenter et al., 1998). [1]

Joint attention is related to language development. Children's ability to respond to bids of joint attention by their caregiver at 6, 8, 10, and 18 months of age has been reported to predict vocabulary size at 30 months of age (Morales et al., 2000). Interestingly, there is also some evidence suggesting that responding to joint attention may be predictive of receptive vocabulary size and that initiating joint attention may be predictive of expressive vocabulary size (Markus et al., 2001; Mundy, Fox & Card, 2003; Mundy & Gomes, 1998). Gaze-following behavior at 10 to 11 months predicted receptive vocabulary at both 14 and 18 months (Brooks & Meltzoff, 2005). Further, full-term infants' responsiveness to gaze alternations in triadic interactions at 9 months and initiating triadic interactions at 14 months were positively correlated with later language, such that infants with more responsivity to gaze shifts had better receptive and expressive language scores at 30 months (De Schuymer et al., 2011). Individual differences in responding to joint attention at 9 and 12 months and initiating joint attention at 18 months predicted 24-months expressive language (Mundy et al., 2007). [4] [3]

Figure 13.3.6.1: Caregiver and toddler engaged in joint attention. ([4])

One reason joint attention is related to language development is because shared attention toward an object allows for language to be more easily mapped to objects. For example if a caregiver and an infant are jointly attending to the same object, such as a dinosaur, when the caregiver uses the word “dinosaur” it creates a clear link between the object (dinosaur) and its linguistic label.

Although engaging in joint attention is a natural activity for caregivers, it does require an investment of uninterrupted time to truly engage with infants and toddlers. So much of a caregivers’ time can be devoted to care routines, preparation and cleaning, it can be a challenge to set aside time for joint attention to take place. For joint attention to occur, caregivers must be fully present in their interactions with children as they share joint attention through eye gaze, visual attention and pointing, oftentimes accompanied with physical touch and language. One study found that across 200 toddlers recorded for twenty minutes while attending group care programs, one third of the children did not engage in any joint attention with caregivers (Smith, 1999). When caregivers practice reading the communicative cues and practice engaging in joint attention with infants and toddlers, they improve in their ability to share in joint attention with children (Cain, Rudd & Saxon, 2007; Gouri-Guberman, 2015; Rudd, Cain & Saxon, 2008). One reason joint attention may be beneficial is that it increases the amount of time infants pay attention to something, such as an object. During moments of joint attention, caregivers can increase an infant’s attention by talking about and manually manipulating the object an infant is interested in (Suarez-Rivera, Smith & Yu, 2019).

[1] Lammertink et al., (2022). Joint attention in the context of hearing loss: A meta-analysis and narrative synthesis. *Journal of Deaf Studies and Deaf Education*, *27*(1), 1-15. CC by 4.0

[2] Image by Kenny Krosky on Unsplash.

[3] Çetinçelik et al., (2021). Do the eyes have it? A systematic review on the role of eye gaze in infant language development. *Frontiers in Psychology*, *11*, 3627. CC by 4.0

[4] Image by Praveen kumar Mathivanan on Unsplash.

13.3.7: Strategies that Support Language Development-Baby Signs and Sign Language

Baby Signs and Sign Language

Baby signs are gestures created to provide an early way for caregivers to communicate with infants and toddlers and acquire insight and respect for underestimated communicative abilities of children before they can talk (Vallotton, 2008; 2011). The baby signs system is not a full system and is not the same as sign language. Baby signs were created as a means to ease communication as manual communication often precedes spoken language production (Goldin-Meadow, Goodrich, Sauer & Iverson, 2007). Baby signs are usually used while simultaneously using a spoken language and do not mark each word spoken in a sentence. For example, if a caregiver asks an infant, “Do you want more?”, the baby sign for ‘more’ will be used when the spoken word ‘more’ is pronounced.

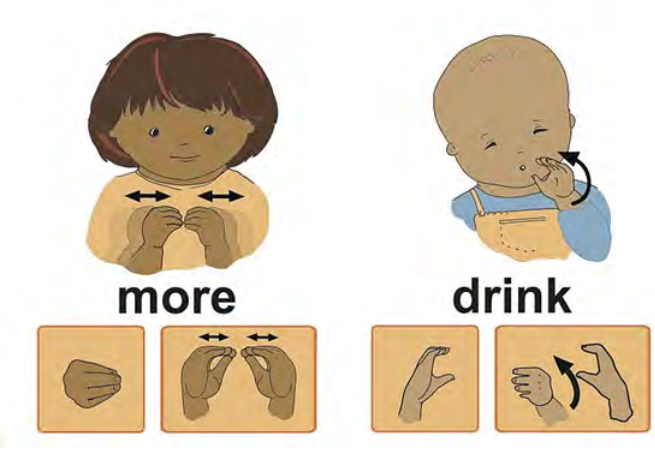


Figure 13.3.7.1: Signs for ‘more’ and ‘drink’. Signs for more: fingers of both hands together and bring them together and apart repeatedly. Sign for drink, hold hand as if holding a cup and bring to mouth to mimic drinking. ([1])

In comparison to baby signs, sign languages are fully-fledged language systems naturally created by Deaf individuals. As misconceptions about sign languages continue to persist, there are a few facts to know: [2]

- Sign languages are complex language systems with similar linguistic properties as spoken languages (Sandler, 2017; Woll, 2013).
- Most countries have their own sign language (Jepsen, De Clerck, Lutalo-Kiingi & McGregor, 2015), such American Sign Language in the U.S., Lengua de Señas Mexicana in Mexico and Nederlandse Gebarentaal, the primary sign language used in the Netherlands.
- Infants and toddlers learning a signed language as a native language show acquisition patterns and reach milestones similar to children learning a spoken language (Caselli, Lieberman & Pyers, 2020; Lillo-Martin & Henner, 2021; MacDonald et al., 2018).
- Similar neural systems support the processing of both signed and spoken languages (Corina & McBurney, 2001; MacSweeney, Capek, Campbell & Woll, 2008).

After early investigations reported that very young children of Deaf parents often attained early language milestones in sign language at younger ages than children learning a spoken language (Bellugi, & Klima, 1982; Bonvillian, Orlansky & Novack, 1983; McIntire, 1977), other investigators began to study the learning of signs or symbolic gestures by the young hearing children of hearing parents (Acredolo & Goodwyn, 1996; Goodwyn & Acredolo, 1993, 1998). In this research, those infants who were taught a collection of “baby signs” typically acquired the signs faster than speech-trained infants acquired a collection of spoken target words. The investigators attributed the children’s slower acquisition of spoken words to the difficulties and complexities involved in spoken language production early in a child’s development. In other words, a child’s physical ability to produce speech or control the muscles needed for recognizable speech seems to lag behind the child’s physical ability to control the arm and hand movements needed to produce recognizable signs. The children in the sign-trained group showed a long-term advantage on a number of language development measures throughout early childhood, as well as higher school-age IQ scores (Acredolo, Goodwyn, & Abrams, 2002; Goodwyn, Acredolo, & Brown, 2000). These findings indicate that early signing or symbolic gesturing does not hamper verbal development and may, in fact, enhance it. [3]

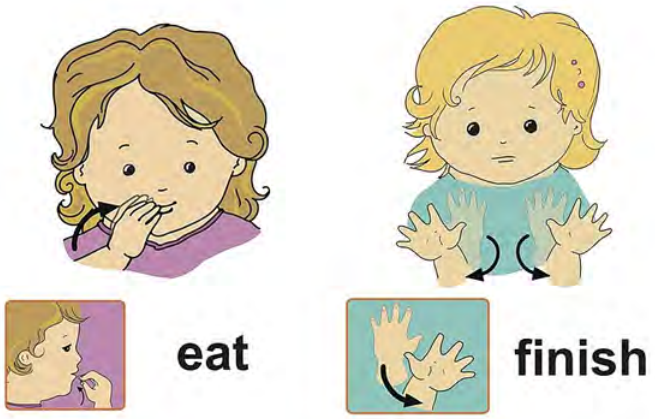


Figure 13.3.7.2: Signs for ‘eat’ and ‘finish’. Sign for eat bring fingers of one hand to mouth repeatedly. Sign for finish spread fingers apart and with palms facing out shake hands back and forth. ([4])

In another investigation, forty infants were followed from the age of eight months to twenty months where half of the mothers modeled signs or gestures for a limited number of target set signs, whereas the remaining half of the mothers focused on spoken language input (Kirk, Howlett, Pine & Fletcher, 2013). The mothers in the sign/gesture-input conditions became more sensitive to their infants’ nonverbal cues than the mothers in the speech-only condition. Numerous studies have shown that use of baby signs is related to more responsiveness from caregivers and helps infants and caregivers to be more insync with each other when interacting (Góngora & Farkas, 2009; Norman & Byrne, 2021; Olson & Masur, 2013; Paul et al., 2019; Vallotton, 2009; 2012; Zammit & Atkinson, 2017). This increased sensitivity to infants’ nonverbal cues may be an important benefit of sign input as such sensitivity may contribute to closer caregiver-infant bonding.[3]

In an attempt to explain the positive outcomes associated with baby-signing in their research, Goodwyn and Acredolo suggested that the children’s symbolic gestures or signs may have elicited more spoken language input from the children’s parents as well as indicated to the parents the specific topics in which the children were interested in. There are, however, other possible interpretations. One is that combining sign and spoken language input may facilitate the vocal production of typically developing babies as it does for many children with Down syndrome (Özçalişkan et al., 2016) or autism (Özçalişkan et al., 2017). A second possibility is that because “baby-signing” typically involves caregivers producing signs for only the key words in their utterances, this combining of signs and spoken language may help infants segment the speech stream by making the signed words more prominent, thus facilitating their acquisition (Mueller & Acosta, 2015).[3]

Figure 13.3.7.3: Signs for ‘tired’ and ‘hurt’ . Sign for tired, cup hands and drag down chest. Sign for hurt, extend pointer finger, curl other fingers in and move hands together and apart. ([5])

Along with the claim of potentially fostering more rapid spoken language development, the early use of signs also has been associated with fewer and less severe temper tantrums in infancy and early childhood (Acredolo et al., 2002). Additional support for this claim of improved social behavior is seen in a study of hearing infants who were taught manual signs early in their lives. Once these infants acquired minimal functional sign skills, their incidence of crying and whining decreased substantially (Thompson et al., 2007). [3]

Caregivers can easily learn basic signs and use them with infants and toddlers. Using baby signs per se is not necessary. Baby signs are based on signed languages and often require unnecessary financial purchases. Baby signs are sometimes modified to be easier to manually produce for young children, but young children natively acquire sign languages and naturally produce signs that caregivers can understand even if they are not exact replicates of the adults'. Two free resources to learn signs are Lifeprint created by Dr. Bill Vicar and the ASL Sign Bank.

---

[1] Image from Michael D. Fetters is licensed under CC by SA 3.0

[2] Corina et al., (2013). Cross-linguistic differences in the neural representation of human language: Evidence from users of signed languages. *Frontiers in Psychology, 3*, 587. CC by 3.0

[3] Bonvillian et al., (2020). *Simplified signs: A manual sign-communication system for special populations*. Cambridge, UK: Open Book Publishers. CC by 4.0

[4] Image from Michael D. Fetters is licensed under CC by SA 3.0

[5] Image from Michael D. Fetters is licensed under CC by SA 3.0

13.3.8: Strategies that Support Language Development-Shared Reading

Shared Reading

Is reading books with infants and toddlers important? Most likely, you quickly answered this question with a resounding “yes!”. While most people might strongly agree that reading with young children is an important activity, only 37.2% of infants and toddlers nationally are read to everyday (Keating et al., 2021). Reading is so important because it maximizes the kinds of experiences that optimally predict language learning. A study of 3,547 children between 1 to 2 years of age, found that children who were read to for at least eleven minutes everyday had stronger reading, spelling, and grammatical skills in both third grade and fifth grade (Brown, Wang & McLeod, 2022). There are at least three ways in which book reading influences language learning: [1]

- First, it offers children the opportunity to hear new vocabulary items embedded in varied grammatical sentences. Books written for children use well-formed, relatively short sentences that are rich in varied vocabulary. Furthermore, books often use the same words in diverse grammatical constructions, offering implicit lessons in how words are used. The texts of books tend to have more words that are less commonly used than does spoken language (Dickinson & Tabors, 2001) and books encourage use of a wider range of words than would occur in everyday conversations. Indeed, shared reading is a robust predictor of children’s vocabulary and reading comprehension abilities (Demir-Lira, Applebaum, Goldin-Meadow & Levine, 2019; Sénéchal, 2011). [1]
- The second way in which book reading enriches children’s language development is that it promotes joint attention and interest. Consider all the ways in which books help children maintain their attention. Children’s books often use bold colors and strong contrasts and typically depict illustrated objects and animals that appeal to young children. The page of the book provides a clear focus for attention, and, unlike movable toys such as balls and trucks, books are held and remain relatively stationary. An attentive adult can easily notice what a child is attending to and build on it with commentary. In turn, children are able to draw an adult’s attention to interesting areas of the pictures using a broad range of cues including gestures, sounds, and words. Thus, attention can be managed by the child as well as the adult. [1]
- Finally, book reading helps children learn language because it requires the participants, both caregiver and child, to be active and engage in responsive interactions about word meanings. It is an opportunity for a caregiver to focus on the child and make efforts to be responsive to their interests. When caregivers and young children communicate during book reading and move away from the text, they are engaging in a language-rich activity that yields even more varied vocabulary and diverse sentence structures (Arnold, D. H., Lonigan, Whitehurst & Epstein, 1994; Whitehurst et al., 1988). Dialogic reading occurs when adults follow the child’s interest and engage in conversation about material on the printed page or about experiences the child has had that relate to the story. Book reading becomes an “up close and personal” experience when done in this way and yields the most in the way of language learning (Valdez-Menchaca & Whitehurst, 1992). [1]

Additionally, the frequency of shared reading, the age at which caregivers begin to read to children and repeated reading of books are important factors that further the benefits of shared reading for language development.

The importance of reading frequency for children from birth to age three is clearly revealed by numerous studies (Rodriguez & Tamis-LeMonda, 2011). Just reading one picture book every day can lead to an increase of approximately 78,000 words each year (Logan, Justice, Yumus & Chaparro-Moreno, 2019). Findings of a large study finding caregivers’ reports of daily book reading at age 14 months related to vocabulary and language comprehension at 14 and 24 months (Raikes et al., 2006). A longitudinal study focused on 1,046 children examined language and cognitive abilities at 14, 24, and 36 months of age (Rodriguez et al., 2009). Literacy experiences at each of the three ages was related to language and cognitive skills at three years of age. [1]

Figure 13.3.8.1: Infant looking through a collection of books. ([2])

There is also evidence that the age at which parents begin to read to children is important. One observational study found that children in households where reading was reported with children as young as eight months had stronger early language growth (Debaryshe, 1993). An intervention study compared the effects of interactive reading when their babies were 4 months old and when babies were 8 months old. Only the condition with older babies was effective, with improved language abilities being found when the babies were 12 and 16 months old (Karrass & Braungart-Rieker, 2005). [1]

Repeated readings of the same books can also increase children's engagement (Fletcher & Jean-Francois, 1998; Morrow, 1988) and enhance their language learning through shared reading (Snow & Goldfield, 1983). Children who read a familiar book talk more than when reading a novel book (Fletcher & Reese, 2005). Moreover, parents and children talk more about related content or their own experiences when re-reading the same book, which also increases children's world knowledge (Haden et al., 1996; Hayden & Fagan, 1987). For children with lower language abilities, repeated readings of the same book increase engagement in comparison to readings of different books (Morrow, 1988). Repeated readings provide multiple opportunities for repeated imitation (Ninio, 1983) and processing of novel words in a meaningful context (Sénéchal, 1997) as books contain more unique words compared to child-directed speech (Montag, Jones & Smith, 2015). Experimental studies have found that children's expressive vocabulary is enhanced after two or more readings of the same book, whereas one reading often does not result in significant vocabulary gains (Horst, Parsons & Bryan, 2011; McLeod & McDade, 2011; Sénéchal & Cornell, 1993; Sénéchal, 1997;). [3]

[1] Dickinson et al., (2012). How reading books fosters language development around the world. *Child Development Research.* CC by 3.0

[2] Image from Brina Blum on Unsplash.

[3] Grolig (2020). Shared storybook reading and oral language development: A bioecological perspective. *Frontiers in Psychology, 11*, 1818. CC by 4.0

13.3.9: Strategies that Support Language Development-Dialogic Reading

Dialogic Reading

Imagine you are sitting down to read a book with a toddler. You open the book and Figure 13.3.9.1shows what is on the first page. Take a moment to look at the page in Figure 13.3.9.1and consider how you would read this page with a toddler.

Figure 13.3.9.1: A page from a children's book. [1]

For many of us, we read books with children by focusing on the text. Reading the words on the pages is a great start, but there can be so much more to discuss! Variation in how books are read and discussed has been found to be important. Ninio (1980) examined interactions between Israeli caregivers and infants between 17 and 22 months of age. Caregivers tended to use one of three interactional routines, asking one of two types of questions "What's that?," "Where's that?," or simply naming objects. A large study of the reading approaches of 126 caregivers found variability in how they read to children at age 7 and 24 months (Britto, Brooks-Gunn & Griffin, 2006). Caregiver reading style was related to language growth, with children showing greater language growth when they were encouraged to participate in the reading and supported in their understanding; however, this reading style was found in only 30 of the 126 caregivers. [2]

One of the most common methods to improve caregivers' reading with young children is dialogic reading as it is not commonly implemented when caregivers read with infants and toddlers (Huebner & Meltzoff, 2005). To encourage caregivers to see that reading should be about more than just the words on pages, reading with infants and toddlers is best perceived as an interaction between the caregiver, the child and the book. Perceiving book reading as more of an interaction is oftentimes referred to as dialogic reading. Dialogic reading uses techniques that encourage the caregiver to be responsive to the child with conversations that follow the child's interest and lead. Dialogic reading typically involves recasts, expansions, and open-ended questions, all of which have been shown to have a positive impact on a child's language development (Baker & Nelson, 1984; Cleave et al., 2015; Farrar, 1990; Girolametto & Weitzman, 2002; Huttenlocher et al., 2010; Nelson, 1977). A meta-analysis of dialogic reading found that it loses its value with the older children (Mol, Bus, De Jong & Smeets, 2008). It may be that the method is best suited to book reading with infants, toddlers, and younger preschool children. [2] [3]

Figure 13.3.9.2: Caregiver reading with two toddlers. ([1])

One reason dialogic reading is so beneficial for children's language development is because it involves quality language-boosting practices. For example, the child-directed speech delivered during interactive shared book reading contains higher levels of syntactic and lexical diversity than the speech children are exposed to during play-based activities (Cameron-Faulkner & Noble, 2013; Demir-Lira, Applebaum, Goldin-Meadow & Levine, 2019; Noble et al., 2018; Salo, Rowe, Leech & Cabrera, 2016), and high levels of syntactic and lexical diversity in speech directed to children are linked to higher levels of syntactic and lexical diversity in children's speech (Huttenlocher et al., 2002). Interactive shared book reading has also been shown to foster higher levels of joint attention, responsiveness, and contingent talk, all of which have been shown to support language development (Carpenter et al., 1998; Farrant & Zubrick, 2013; McGillion, Pine, Herbert & Matthews, 2017; Tomasello & Farrar, 1986). It also encourages the caregiver to use additional language-boosting practices, which have all been shown to support children's language development, including expanding, recasting, and asking open-ended questions (Baker & Nelson, 1984; Cleave et al., 2015; Girolametto & Weitzman, 2002; Huttenlocher et al., 2010). []

Figure 13.3.9.3:Caregiver reading with an infant. ([4])

Many studies that have trained caregivers in dialogic reading strategies report positive gains in young children's language outcomes (Chacko, Fabiano, Doctoroff & Fortson, 2018; Grolig, Cohrdes, Tiffin-Richards & Schroeder, 2020; Kim & Riley, 2021; Lonigan et al., 1999; Opel, Ameer & Aboud, 2009; Purpura, Napoli, Wehrspann & Gold, 2017; Simsek & Erdogan, 2015; Towson, Gallagher, & Bingham, 2016; Valdez-Menchaca & Whitehurst, 1992). For example, Valdez-Menchaca and Whitehurst (1992) trained teachers to read using a dialogic reading style that involved asking more open-ended questions and responding to children's attempts to answer these questions with low-income Mexican toddlers. Children who received the dialogic reading intervention scored significantly higher on measures of both expressive and receptive language than children in the control group. [3]

Many studies have found that asking basic comprehension questions during shared reading increases the effects on oral language skills in comparison to reading story books aloud without asking questions (Flack, Field & Horst, 2018; Wasik, Hindman & Snell, 2016). Asking such literal comprehension questions both serves to attain joint attention and to establish a fundamental

understanding of concepts and events. Discussing the meanings of new words in the context of the story and in other contexts facilitates a deeper word understanding (Coyne et al., 2009). [5]

By implementing the PEER sequence, the caregiver: [3]

- prompts the child to say something about the book,
- evaluates the child's response,
- expands the child's response, and
- repeats the prompt to help the child learn from the expansion.

A fundamental element of dialogic reading is the use of prompts to begin the PEER sequence while reading with a child. The acronym CROWD stands for five recommended prompts: [3] [6]

- Completions
  - Example: “Five little monkeys jumping on the _____”. The child fills in “bed” to participate in completing the thought.
- Recalls
  - Example: What happens after the wolf huffs and puffs? The child recalls the story and puts that into their own words.
- Open questions
  - Example: “Tell me what is happening in this picture.” The child practices putting their own thoughts into words.
- Wh-questions
  - Example: What is that? Why is that happening? At many different levels children can put their thoughts into words.
- Distancing questions
  - Example: What happened when we made your birthday cake? Children remember past events and relate them to the present and future.

Let’s take another look at the page from a children’s book presented earlier. Imagine creating an interaction with the child about this page using the PEER and/or CROWD dialogic reading strategies. After imagining what you might say using the dialogic reading strategies, reflect on how the quantity and quality of your language was impacted.

Figure 13.3.9.1: A page from a children’s book. ([1])

[1] Haathibhai by Pratham Books is licensed under CC by 4.0

[2] Dickinson et al., (2012). How reading books fosters language development around the world. *Child Development Research.* CC by 3.0

[3] Noble et al., (2020). The impact of interactive shared book reading on children's language skills: A randomized controlled trial. *Journal of Speech, Language, and Hearing Research*, *63*(6), 1878-1897. CC by 4.0

[4] Image from Head Start ECLKC is in the public domain.

[5] Grolig (2020). Shared storybook reading and oral language development: A bioecological perspective. *Frontiers in Psychology, 11*, 1818. CC by 4.0

[6] "Using Mariposa, Mariposa (Butterfly, Butterfly) to promote dialogic reading: A powerful way to encourage language development in one or more languages" from Head Start ECLKC is in the public domain.

13.4: Conclusion

Conclusion to Supporting Language Development in Group Care

Language develops rapidly during the first three years of life and the quantity and quality of language exposure is important not only for later language development, but also for later cognitive and academic abilities. Caregivers play an essential role in exposing children to a high quantity and high quality of language and can use many strategies to improve their ability to do so.

13.5: References

References for Supporting Language Development in Group Care

- Acredolo, L. P., & Goodwyn, S. W. (1996). *Baby signs: How to talk with your baby before your baby can talk*. Chicago, IL: Contemporary Books.
- Acredolo, L., Goodwyn, S., & Abrams, D. (2002). *Baby signs: How to talk with your baby before your baby can talk*. New York, NY: McGraw-Hill.
- Alvarenga, P., Kuchirko, Y., Cerezo, M. Á., de Mendonça Filho, E. J., Bakeman, R., & Tamis-LeMonda, C. S. (2021). An intervention focused on maternal sensitivity enhanced mothers' verbal responsiveness to infants. *Journal of Applied Developmental Psychology, 76*, 101313.
- Anderson-Yockel, J., & Haynes, W. O. (1994). Joint book-reading strategies in working-class African American and White mother-toddler dyads. *Journal of Speech, Language, and Hearing Research, 37*(3), 583-593.
- Arnold, D. H., Lonigan, C. J., Whitehurst, G. J., & Epstein, J. N. (1994). Accelerating language development through picture book reading: Replication and extension to a videotape training format. *Journal of Educational Psychology, 86*(2), 235.
- Bainbridge, C. M., Bertolo, M., Youngers, J., Atwood, S., Yurdum, L., Simson, J., Lopez, K., Xing, F., Martin, A. & Mehr, S. A. (2021). Infants relax in response to unfamiliar foreign lullabies. *Nature Human Behaviour, 5*(2), 256-264.
- Baker, N. D., & Nelson, K. E. (1984). Recasting and related conversational techniques for triggering syntactic advances by young children. *First Language, 5*(13), 3-21.
- Bates, E., Camaioni, L., & Volterra, V. (1975). The acquisition of performatives prior to speech. *Merrill-Palmer Quarterly of Behavior and Development, 21*(3), 205-226.
- Bateson, M. C. (1975). Mother-infant exchanges: The epigenesis of conversational interaction. *Annals of the New York Academy of Sciences, 263*(1), 101-113.
- Baumwell, L., Tamis-LeMonda, C. S., & Bornstein, M. H. (1997). Maternal verbal sensitivity and child language comprehension. *Infant Behavior and Development, 20*(2), 247-258.
- Bellugi, U., & Klima, E. S. (1982). The acquisition of three morphological systems in American Sign Language. *Papers and Reports on Child Language Development, 21*.
- Bonvillian, J. D., Orlansky, M. D., & Novack, L. L. (1983). Developmental milestones: Sign language acquisition and motor development. *Child Development*, 1435-1445.
- Bornstein, M. H., Hahn, C. S., Putnick, D. L., & Pearson, R. M. (2018). Stability of core language skill from infancy to adolescence in typical and atypical development. *Science Advances, 4*(11), 7422.
- Britto, P. R., Brooks-Gunn, J. & Griffin, T. M. (2006). Maternal reading and teaching patterns: Associations with school readiness in low-income African American families. *Reading Research Quarterly, 41*(1), 68-89.
- Brooks, R., & Meltzoff, A. N. (2005). The development of gaze following and its relation to language. *Developmental Science, 8*(6), 535-543.
- Brown, M. I., Wang, C., & McLeod, S. (2022). Reading with 1–2 year olds impacts academic achievement at 8–11 years. *Early Childhood Research Quarterly, 58*, 198-207.
- Bruce, M., Panneton, R., & Taylor, C. (2022). Multisensory integration and maternal sensitivity are related to each other and predictive of expressive vocabulary in 24-month-olds. *Journal of Experimental Child Psychology, 214*, 105304.
- Burchinal, M., Vernon-Feagans, L., Cox, M., & Key Family Life Project Investigators. (2008). Cumulative social risk, parenting, and infant development in rural low-income communities. *Parenting: Science and Practice, 8*(1), 41-69.
- Cain, D. W., Rudd, L. C., & Saxon, T. F. (2007). Effects of professional development training on joint attention engagement in low-quality childcare centers. *Early Child Development and Care, 177*(2), 159-185.
- Cameron-Faulkner, T., & Noble, C. (2013). A comparison of book text and child directed speech. *First Language, 33*(3), 268-279.
- Carpenter, M., Nagell, K., Tomasello, M., Butterworth, G., & Moore, C. (1998). Social cognition, joint attention, and communicative competence from 9 to 15 months of age. *Monographs of the Society for Research in Child Development, 63*(4), 1–174.
- Caselli, N. K., Lieberman, A. M., & Pyers, J. E. (2020). The ASL-CDI 2.0: An updated, normed adaptation of the MacArthur bates communicative development inventory for American sign language. *Behavior Research Methods, 49*, 784–801.
- Chacko, A., Fabiano, G. A., Doctoroff, G. L., & Fortson, B. (2018). Engaging fathers in effective parenting for preschool children using shared book reading: A randomized controlled trial. *Journal of Clinical Child & Adolescent Psychology, 47*(1),

79-93.
- Cleave, P. L., Becker, S. D., Curran, M. K., Van Horne, A. J. O., & Fey, M. E. (2015). The efficacy of recasts in language intervention: A systematic review and meta-analysis. *American Journal of Speech-Language Pathology, 24*(2), 237-255.
- Cooper, R. P., Abraham, J., Berman, S., & Staska, M. (1997). The development of infants' preference for motherese. *Infant Behavior and Development, 20*(4), 477-488.
- Cooper, R. P., & Aslin, R. N. (1994). Developmental differences in infant attention to the spectral properties of infant-directed speech. *Child Development, 65*(6), 1663-1677.
- Corina, D. P., & McBurney, S. L. (2001). The neural representation of language in users of American Sign Language. *Journal of Communication Disorders, 34*(6), 455-471.
- Coyne, M. D., McCoach, D. B., Loftus, S., Zipoli Jr, R., & Kapp, S. (2009). Direct vocabulary instruction in kindergarten: Teaching for breadth versus depth. *The Elementary School Journal, 110*(1), 1-18.
- Davis, B., Torr, J., & Degotardi, S. (2015). Infants and toddlers: How visible are they in the Early Years Learning Framework? *International Journal of Child Care and Education Policy, 9*(1), 1-14.
- Debaryshe, B. D. (1993). Joint picture-book reading correlates of early oral language skill. *Journal of Child Language, 20*(2), 455-461.
- Demir-Lira, Ö. E., Applebaum, L. R., Goldin-Meadow, S., & Levine, S. C. (2019). Parents' early book reading to children: Relation to children's later language and literacy outcomes controlling for other parent language input. *Developmental Science, 22*(3), e12764.
- De Schuymer, L., De Groote, I., Striano, T., Stahl, D., & Roeyers, H. (2011). Dyadic and triadic skills in preterm and full term infants: A longitudinal study in the first year. *Infant Behavior and Development, 34*(1), 179-188.
- Dickinson, D. K., & Tabors, P. O. (2001). *Beginning literacy with language: Young children learning at home and school*. Paul H Brookes Publishing.
- Donnelly, S., & Kidd, E. (2021). The longitudinal relationship between conversational turn-taking and vocabulary growth in early language development. *Child Development, 92*(2), 609-625.
- Ellwood-Lowe, M. E., Foushee, R., & Srinivasan, M. (2022). What causes the word gap? Financial concerns may systematically suppress child-directed speech. *Developmental Science, 25*(1), e13151.
- Falk, S., & Tsang, C. D. (2020). The role and functions of infant-directed singing in early development. In *The Routledge companion to interdisciplinary studies in singing* (pp. 179-188). Routledge.
- Farran, L. K., Lee, C. C., Yoo, H., & Oller, D. K. (2016). Cross-cultural register differences in infant-directed speech: An initial study. *PloS One, 11*(3), e0151518.
- Farrant, B. M., & Zubrick, S. R. (2013). Parent–child book reading across early childhood and child vocabulary in the early school years: Findings from the Longitudinal Study of Australian Children. *First Language, 33*(3), 280-293.
- Ferjan Ramírez, N. (2022). Fathers' infant-directed speech and its effects on child language development. *Language and Linguistics Compass, 16*(1), e12448.
- Fernald, A. (1985). Four-month-old infants prefer to listen to motherese. *Infant Behavior and Development, 8*(2), 181-195.
- Fernald, A. (1992). Meaningful melodies in mothers' speech to infants. In H. Papoušek & U. Jürgens (Eds.), *Nonverbal Vocal Communication: Comparative and Developmental Approaches* (pp. 262–282). New York, NY: Cambridge University Press.
- Fernald, A., Marchman, V. A., & Weisleder, A. (2013). SES differences in language processing skill and vocabulary are evident at 18 months. *Developmental Science, 16*(2), 234-248.
- Fernald, A., Taeschner, T., Dunn, J., Papousek, M., de Boysson-Bardies, B., & Fukui, I. (1989). A cross-language study of prosodic modifications in mothers' and fathers' speech to preverbal infants. *Journal of Child Language, 16*(3), 477-501.
- Fernald A, Weisleder A. (2010). Early language experience is vital to developing fluency in understanding. In S. Neuman & D. Dickinson (Eds), *Handbook of Early Literacy Research* (Vol. 3, pp. 3–19). Guilford Publications: New York.
- Flack, Z. M., Field, A. P., & Horst, J. S. (2018). The effects of shared storybook reading on word learning: A meta-analysis. *Developmental Psychology, 54*(7), 1334.
- Fletcher, K. L., & Jean-Francois, B. (1998). Spontaneous responses during repeated reading in young children from 'at risk' backgrounds. *Early Child Development and Care, 146*(1), 53-68.
- Fletcher, K. L., & Reese, E. (2005). Picture book reading with young children: A conceptual framework. *Developmental Review, 25*(1), 64-103.
- Franco, F., Suttora, C., Spinelli, M., Kozar, I., & Fasolo, M. (2020). Singing to infants matters: Early singing interactions affect musical preferences and facilitate vocabulary building. *Journal of Child Language*, 1-26.

- François, C., Teixidó, M., Takerkart, S., Agut, T., Bosch, L., & Rodriguez-Fornells, A. (2017). Enhanced neonatal brain responses to sung streams predict vocabulary outcomes by age 18 months. *Scientific Reports, 7*(1), 1-13.
- Gilkerson, J., Richards, J. A., Warren, S. F., Montgomery, J. K., Greenwood, C. R., Kimbrough Oller, D., Hansen, J. & Paul, T. D. (2017). Mapping the early language environment using all-day recordings and automated analysis. *American Journal of Speech-language Pathology, 26*(2), 248-265.
- Gilkerson, J., Richards, J. A., Warren, S. F., Oller, D. K., Russo, R., & Vohr, B. (2018). Language experience in the second year of life and language outcomes in late childhood. *Pediatrics, 142*(4).
- Girolametto, L., & Weitzman, E. (2002). Responsiveness of child care providers in interactions with toddlers and preschoolers. *Language, Speech, and Hearing Services in Schools, 33*(4), 268–281.
- Gogate, L. J., Bahrick, L. E., & Watson, J. D. (2000). A study of multimodal motherese: The role of temporal synchrony between verbal labels and gestures. *Child Development, 71*(4), 878–894.
- Goldin-Meadow, S., Goodrich, W., Sauer, E., & Iverson, J. (2007). Young children use their hands to tell their mothers what to say. *Developmental Science, 10*(6), 778-785.
- Goldstein, M. H., King, A. P., & West, M. J. (2003). Social interaction shapes babbling: Testing parallels between birdsong and speech. *Proceedings of the National Academy of Sciences, 100*(13), 8030-8035.
- Goldstein, M. H., & Schwade, J. A. (2008). Social feedback to infants' babbling facilitates rapid phonological learning. *Psychological Science, 19*(5), 515-523.
- Goldstein, M. H., Schwade, J. A., & Bornstein, M. H. (2009). The value of vocalizing: Five-month-old infants associate their own noncry vocalizations with responses from caregivers. *Child Development, 80*(3), 636-644.
- Golinkoff, R. M., Hoff, E., Rowe, M. L., Tamis-LeMonda, C. S., & Hirsh-Pasek, K. (2019). Language matters: Denying the existence of the 30-million-word gap has serious consequences. *Child Development, 90*(3), 985-992.
- Góngora, X., & Farkas, C. (2009). Infant sign language program effects on synchronic mother–infant interactions. *Infant Behavior and Development, 32*(2), 216-225.
- Goodwyn, S. W., & Acredolo, L. P. (1993). Symbolic gesture versus word: Is there a modality advantage for onset of symbol use? *Child Development, 64*(3), 688-701.
- Goodwyn, S. W., & Acredolo, L. P. (1998). Encouraging symbolic gestures: A new perspective on the relationship between gesture and speech. In J. M. Iverson & S. Goldin-Meadow (eds.), *The nature and functions of gesture in children's communication* (pp. 61–73). San Francisco, CA: Jossey-Bass.
- Goodwyn, S. W., Acredolo, L. P., & Brown, C. A. (2000). Impact of symbolic gesturing on early language development. *Journal of Nonverbal behavior, 24*(2), 81-103.
- Gouri-Guberman, N. (2015). Enhancing joint attention skills among Ethiopian origin children. *Procedia-Social and Behavioral Sciences, 209*, 201-207.
- Graf Estes, K., & Hurley, K. (2013). Infant-directed prosody helps infants map sounds to meanings. *Infancy, 18*(5), 797-824.
- Grolig, L., Cohrdes, C., Tiffin-Richards, S. P., & Schroeder, S. (2020). Narrative dialogic reading with wordless picture books: A cluster-randomized intervention study. *Early Childhood Research Quarterly, 51*, 191-203.
- Grossmann, K. E., Bretherton, I., Waters, E., & Grossmann, K. (2013). Maternal sensitivity: Observational studies honoring Mary Ainsworth's 100th year. *Attachment & Human Development, 15*(5-6), 443-447.
- Haden, C. A., Reese, E., & Fivush, R. (1996). Mothers' extratextual comments during storybook reading: Stylistic differences over time and across texts. *Discourse Processes, 21*(2), 135-169.
- Hahn, L. E., Benders, T., Snijders, T. M., & Fikkert, P. (2018). Infants ' sensitivity to rhyme in songs. *Infant Behavior and Development, 52*, 130–139.
- Hahn, L. E., Benders, T., Snijders, T. M., & Fikkert, P. (2020). Six-month-old infants recognize phrases in song and speech. *Infancy, 25*(5), 699-718.
- Hart, B., and Risley, T. R. (1995). *Meaningful differences in the everyday experience of young American children*. Baltimore, MD: Brookes.
- Hart, B., & Risley, T. R. (2003). The early catastrophe: The 30 million word gap by age 3. *American Educator, 27*(1), 4-9.
- Hayashi, A., Tamekawa, Y., & Kiritani, S. (2001). Developmental change in auditory preferences for speech stimuli in Japanese infants. *Journal of Speech, Language, and Hearing Research, 44*(6), 1189–1200.
- Hayden, H. M. R., & Fagan, W. T. (1987). Keeping it in context: Strategies for enhancing literacy awareness. *First Language, 7*(20), 159-171.
- Hilbrink, E. E., Gattis, M., & Levinson, S. C. (2015). Early developmental changes in the timing of turn-taking: a longitudinal study of mother–infant interaction. *Frontiers in Psychology, 6*, 1492.

- Hilton, C. B., Moser, C. J., Bertolo, M., Lee-Rubin, H., Amir, D., Bainbridge, C. M., Simson, J., Knox, D., Glowacki, L., Galbarczyk, A., Jasienska, G., Ross, C. T., Neff, M. B., Martin, A., Cirelli, L. K., Trehub, S. E., Song, J., Kim, M., Schachner, A., Vardy, T. A., Atkinson, Q. D., Antfolk, J., Madhivanan, P., Siddaiah, A., Placek, C. D., Salali, G. D., Keestra, S., Singh, M., Collins, S. A., Patton, J. Q., Scaff, C.,Stieglitz, J., Moya, C., Sagar, R. R., Wood, B. M., Krasnow, M. M., & Mehr, S. A. (2022). Acoustic regularities in infant-directed speech and song across cultures. *BioRxiv*, 2020.04.09.032995. doi: https://doi.org/10.1101/2020.04.09.032995
- Hirsh-Pasek, K., Adamson, L. B., Bakeman, R., Owen, M. T., Golinkoff, R. M., Pace, A., ... & Suma, K. (2015). The contribution of early communication quality to low-income children's language success. *Psychological Science*, *26*(7), 1071-1083.
- Hoff, E. (2006). How social contexts support and shape language development. *Developmental Review*, *26*(1), 55-88.
- Horst, J. S., Parsons, K. L., & Bryan, N. M. (2011). Get the story straight: Contextual repetition promotes word learning from storybooks. *Frontiers in Psychology*, *2*, 17.
- Huebner, C. E., & Meltzoff, A. N. (2005). Intervention to change parent–child reading style: A comparison of instructional methods. *Journal of Applied Developmental Psychology*, *26*(3), 296-313.
- Hurtado, N., Marchman, V. A., & Fernald, A. (2008). Does input influence uptake? Links between maternal talk, processing speed and vocabulary size in Spanish-learning children. *Developmental Science*, *11*(6), 31-39.
- Huttenlocher, J., Vasilyeva, M., Cymerman, E., & Levine, S. (2002). Language input and child syntax. *Cognitive Psychology*, *45*(3), 337-374.
- Huttenlocher, J., Waterfall, H., Vasilyeva, M., Vevea, J., & Hedges, L. V. (2010). Sources of variability in children's language growth. *Cognitive Psychology*, *61*(4), 343-365.
- Keating, K., Daily, S., Cole, P., Murphey, D., Pina, G., Ryberg, R., Moron, L., & Laurore, J. (2021). *State of babies yearbook: 2019*. Washington, DC: Zero to Three and Bethesda M.D.: Child Trends.
- Jepsen, J. B., De Clerck, G., Lutalo-Kiingi, S., & McGregor, W. B. (Eds.). (2015). *Sign languages of the world: A comparative handbook*. Walter de Gruyter GmbH & Co KG.
- Johnson, M. H., & de Haan, M. (2011). *Developmental cognitive neuroscience* (3rd Ed.). Wiley-Blackwell.
- Karrass, J., & Braungart-Rieker, J. M. (2005). Effects of shared parent–infant book reading on early language acquisition. *Journal of Applied Developmental Psychology*, *26*(2), 133-148.
- Karzon, R. G. (1985). Discrimination of polysyllabic sequences by one-to four-month-old infants. *Journal of Experimental Child Psychology*, *39*(2), 326-342.
- Keller, H., & Schölmerich, A. (1987). Infant vocalizations and parental reactions during the first 4 months of life. *Developmental Psychology*, *23*(1), 62.
- Kim, Y., & Riley, D. (2021). Accelerating early language and literacy skills through a preschool-home partnership using dialogic reading: A randomized trial. *Child & Youth Care Forum*, *50*, 901–924.
- Kitamura, C., & Lam, C. (2009). Age-specific preferences for infant-directed affective intent. *Infancy*, *14*(1), 77-100.
- Kitamura, C., Thanavishuth, C., Burnham, D., & Luksaneeyanawin, S. (2001). Universality and specificity in infant-directed speech: Pitch modifications as a function of infant age and sex in a tonal and non-tonal language. *Infant Behavior and Development*, *24*(4), 372-392.
- Koopmans-van Beinum, F. J., & van der Stelt, J. M. (1986). Early stages in the development of speech movements. In *Precursors of early speech* (pp. 37-50). Palgrave Macmillan, London.
- Landry, S. H., Smith, K. E., & Swank, P. R. (2006). Responsive parenting: establishing early foundations for social, communication, and independent problem-solving skills. *Developmental Psychology*, *42*(4), 627.
- Landry, S. H., Smith, K. E., Swank, P. R., Assel, M. A., & Vellet, S. (2001). Does early responsive parenting have a special importance for children's development or is consistency across early childhood necessary? *Developmental Psychology*, *37*(3), 387.
- Lebedeva, G. C., & Kuhl, P. K. (2010). Sing that tune: Infants' perception of melody and lyrics and the facilitation of phonetic recognition in songs. *Infant Behavior and Development*, *33*(4), 419-430.
- Leech, K. A. & Rowe, M. L. (2021). An intervention to increase conversational turns between parents and young children. *Journal of Child Language*, *48*(2), 399-412.
- Lehrl, S., Ebert, S., Blaurock, S., Rossbach, H. G., & Weinert, S. (2020). Long-term and domain-specific relations between the early years home learning environment and students' academic outcomes in secondary school. *School Effectiveness and School Improvement*, *31*(1), 102-124.
- Lillo-Martin, D., & Henner, J. (2021). Acquisition of sign languages. *Annual Review of Linguistics*, *7*, 395-419.

- Logan, J. A., Justice, L. M., Yumus, M., & Chaparro-Moreno, L. J. (2019). When children are not read to at home: The million word gap. *Journal of Developmental & Behavioral Pediatrics*, *40*(5), 383-386.
- Lonigan, C. J., Anthony, J. L., Bloomfield, B. G., Dyer, S. M., & Samwel, C. S. (1999). Effects of two shared-reading interventions on emergent literacy skills of at-risk preschoolers. *Journal of Early Intervention*, *22*(4), 306-322.
- Ma, W., Golinkoff, R. M., Houston, D. M., & Hirsh-Pasek, K. (2011). Word learning in infant-and adult-directed speech. *Language Learning and Development*, *7*(3), 185-201.
- MacDonald, K., LaMarr, T., Corina, D., Marchman, V. A., & Fernald, A. (2018). Real-time lexical comprehension in young children learning American Sign Language. *Developmental Science*, *21*(6), e12672.
- MacSweeney, M., Capek, C. M., Campbell, R., & Woll, B. (2008). The signing brain: The neurobiology of sign language. *Trends in Cognitive Sciences*, *12*(11), 432-440.
- Madigan, S., Prime, H., Graham, S. A., Rodrigues, M., Anderson, N., Khoury, J., & Jenkins, J. M. (2019). Parenting behavior and child language: A meta-analysis. *Pediatrics*, *144*(4).
- Malachowski, L., Salo, V. C., Needham, A., & Humphreys, K. L. (2021, preprint). Infant placement and language exposure. https://doi.org/10.31234/osf.io/dnkru
- ManyBabies Consortium. (2020). Quantifying sources of variability in infancy research using the infant-directed-speech preference. *Advances in Methods and Practices in Psychological Science*, *3*(1), 24-52.
- Marchman, V. A., Adams, K. A., Loi, E. C., Fernald, A., & Feldman, H. M. (2016). Early language processing efficiency predicts later receptive vocabulary outcomes in children born preterm. *Child Neuropsychology*, *22*(6), 649-665.
- Marchman, V. A., & Fernald, A. (2008). Speed of word recognition and vocabulary knowledge in infancy predict cognitive and language outcomes in later childhood. *Developmental Science*, *11*(3), F9-F16.
- Marchman, V. A., Loi, E. C., Adams, K. A., Ashland, M., Fernald, A., & Feldman, H. M. (2018). Speed of language comprehension at 18 months predicts school-relevant outcomes at 54 months in children born preterm. *Journal of Developmental and Behavioral Pediatrics*, *39*(3), 246.
- Markus, J., Mundy, P., Morales, M., Delgado, C. E. F., & Yale, M. (2001). Individual differences in infant skills as predictors of child-caregiver joint attention and language. *Social Development*, *9*(3), 302–315.
- Masataka, N. (1999). Preference for infant-directed singing in 2-day-old hearing infants of deaf parents. *Developmental Psychology*, *35*(4), 1001.
- Mendoza, J. K., & Fausey, C. M. (2021). Everyday music in infancy. *Developmental Science*, *24*(6), e13122.
- McGillion, M., Pine, J. M., Herbert, J. S., & Matthews, D. (2017). A randomized controlled trial to test the effect of promoting caregiver contingent talk on language development in infants from diverse socioeconomic status backgrounds. *Journal of Child Psychology and Psychiatry*, *58*(10), 1122-1131.
- McIntire, M. L. (1977). The acquisition of American Sign Language hand configurations. *Sign Language Studies*, 247-266.
- McLeod, A. N., & McDade, H. L. (2011). Preschoolers' incidental learning of novel words during storybook reading. *Communication Disorders Quarterly*, *32*(4), 256-266.
- Mol, S. E., Bus, A. G., De Jong, M. T., & Smeets, D. J. (2008). Added value of dialogic parent–child book readings: A meta-analysis. *Early Education and Development*, *19*(1), 7-26.
- Montag, J. L., Jones, M. N., & Smith, L. B. (2015). The words children hear: Picture books and the statistics for language learning. *Psychological Science*, *26*(9), 1489-1496.
- Morales, M., Mundy, P., Delgado, C. E. F., Yale, M., Messinger, D., Neal, R., & Schwartz, H. K. (2000). Responding to joint attention across the 6- through 24-month age period and early language acquisition. *Journal of Applied Developmental Psychology*, *21*(3), 283–298.
- Morrow, L. M. (1988). Young children's responses to one-to-one story readings in school settings. *Reading Research Quarterly*, 89-107.
- Mueller, V., & Acosta, A. (2015). Infants' use of baby sign to extract unfamiliar words from the speech stream. *Early Child Development and Care*, *185*(6), 943-951.
- Mundy, P., Block, J., Delgado, C., Pomares, Y., Van Hecke, A. V., & Parlade, M. V. (2007). Individual differences and the development of joint attention in infancy. *Child Development*, *78*(3), 938-954.
- Mundy, P., Fox, N., & Card, J. (2003). EEG coherence, joint attention and language development in the second year. *Developmental Science*, *6*(1), 48-54.
- Mundy, P., & Gomes, A. (1998). Individual differences in joint attention skill development in the second year. *Infant Behavior & Development*, *21*(3), 469–482.

- Nakata, T., & Trehub, S. E. (2004). Infants' responsiveness to maternal speech and singing. *Infant Behavior and Development, 27*(4), 455-464.
- Nathani, S., Ertmer, D. J., & Stark, R. E. (2006). Assessing vocal development in infants and toddlers. *Clinical Linguistics & Phonetics, 20*(5), 351-369.
- Newman, R. S., & Hussain, I. (2006). Changes in preference for infant-directed speech in low and moderate noise by 4.5-to 13-month-olds. *Infancy, 10*(1), 61-76.
- Ninio, A. (1980). Picture-book reading in mother-infant dyads belonging to two subgroups in Israel. *Child Development*, 587-590.
- Ninio, A. (1983). Joint book reading as a multiple vocabulary acquisition device. *Developmental Psychology, 19*(3), 445.
- Noble, C. H., Cameron-Faulkner, T., & Lieven, E. (2018). Keeping it simple: The grammatical properties of shared book reading. *Journal of Child Language, 45*(3), 753-766.
- Norman, A., & Byrne, J. (2021). Symbolic gesturing: creating opportunities for emotional connections between practitioners and infants in daycare. *Early Child Development and Care, 191*(10), 1577-1589.
- Olson, J., & Masur, E. F. (2013). Mothers respond differently to infants' gestural versus nongestural communicative bids. *First Language, 33*(4), 372-387.
- Opel, A., Ameer, S. S., & Aboud, F. E. (2009). The effect of preschool dialogic reading on vocabulary among rural Bangladeshi children. *International Journal of Educational Research, 48*(1), 12-20.
- Özçalişkan, Ş., Adamson, L. B., Dimitrova, N., Bailey, J., & Schmuck, L. (2016). Baby sign but not spontaneous gesture predicts later vocabulary in children with Down syndrome. *Journal of Child Language, 43*(4), 948-963.
- Özçalışkan, Ş., Adamson, L. B., Dimitrova, N., & Baumann, S. (2017). Early gesture provides a helping hand to spoken vocabulary development for children with autism, Down syndrome, and typical development. *Journal of Cognition and Development, 18*(3), 325-337.
- Papadimitriou, A., Smyth, C., Politimou, N., Franco, F., & Stewart, L. (2021). The impact of the home musical environment on infants' language development. *Infant Behavior and Development, 65*, 101651.
- Paul, I. M., Hohman, E. E., Birch, L. L., Shelly, A., Vallotton, C. D., & Savage, J. S. (2019). Exploring infant signing to enhance responsive parenting: Findings from the INSIGHT study. *Maternal & Child Nutrition, 15*(3), e12800.
- Pegg, J. E., Werker, J. F., & McLeod, P. J. (1992). Preference for infant-directed over adult-directed speech: Evidence from 7-week-old infants. *Infant Behavior and Development, 15*(3), 325-345.
- Peter, M. S., Durrant, S., Jessop, A., Bidgood, A., Pine, J. M., & Rowland, C. F. (2019). Does speed of processing or vocabulary size predict later language growth in toddlers? *Cognitive Psychology, 115*, 101238.
- Prime, H., Wade, M., & Gonzalez, A. (2020). The link between maternal and child verbal abilities: An indirect effect through maternal responsiveness. *Developmental Science, 23*(3), e12907.
- Purpura, D. J., Napoli, A. R., Wehrspann, E. A., & Gold, Z. S. (2017). Causal connections between mathematical language and mathematical knowledge: A dialogic reading intervention. *Journal of Research on Educational Effectiveness, 10*(1), 116-137.
- Pye, C. (1986). Quiché Mayan speech to children. *Journal of Child Language, 13*(1), 85-100.
- Raikes, H., Alexander Pan, B., Luze, G., Tamis-LeMonda, C. S., Brooks-Gunn, J., Constantine, J., Tarullo, L. B., Raikes, A. & Rodriguez, E. T. (2006). Mother–child book reading in low-income families: Correlates and outcomes during the first three years of life. *Child Development, 77*(4), 924-953.
- Ramírez-Esparza, N., García-Sierra, A., Kuhl, P. K. (2014). Look who's talking: Speech style and social context in language input to infants are linked to concurrent and future speech development. *Developmental Science, 17*(6), 880–891.
- Ramírez-Esparza, N., García-Sierra, A., & Kuhl, P. K. (2017a). The impact of early social interactions on later language development in Spanish–English bilingual infants. *Child Development, 88*(4), 1216-1234.
- Ramírez-Esparza, N., García-Sierra, A., & Kuhl, P. K. (2017b). Look who's talking NOW! Parentese speech, social context, and language development across time. *Frontiers in Psychology, 8*, 1008.
- Ratner, N., & Bruner, J. (1978). Games, social exchange and the acquisition of language. *Journal of Child Language, 5*(3), 391-401.
- Rochat, P., Querido, J. G., & Striano, T. (1999). Emerging sensitivity to the timing and structure of protoconversation in early infancy. *Developmental Psychology, 35*(4), 950.
- Rodriguez, E. T., & Tamis-LeMonda, C. S. (2011). Trajectories of the home learning environment across the first 5 years: Associations with children's vocabulary and literacy skills at prekindergarten. *Child Development, 82*(4), 1058-1075.
- Rodriguez, E. T., Tamis-LeMonda, C. S., Spellmann, M. E., Pan, B. A., Raikes, H., Lugo-Gil, J., & Luze, G. (2009). The formative role of home literacy experiences across the first three years of life in children from low-income families. *Journal of*

Applied Developmental Psychology, *30*(6), 677-694.
- Romeo, R. R., Leonard, J. A., Grotzinger, H. M., Robinson, S. T., Takada, M. E., Mackey, A. P., Scherer, E., Rowe, M. L., West, M. R. & Gabrieli, J. D. (2021). Neuroplasticity associated with changes in conversational turn-taking following a family-based intervention. *Developmental Cognitive Neuroscience*, 100967.
- Romeo, R. R., Leonard, J. A., Robinson, S. T., West, M. R., Mackey, A. P., Rowe, M. L., & Gabrieli, J. D. (2018). Beyond the 30-million-word gap: Children's conversational exposure is associated with language-related brain function. *Psychological Science*, *29*(5), 700-710.
- Rose, E., Lehrl, S., Ebert, S., & Weinert, S. (2018). Long-term relations between children's language, the home literacy environment, and socioemotional development from ages 3 to 8. *Early Education and Development*, *29*(3), 342-356.
- Roug, L., Landberg, I., & Lundberg, L. J. (1989). Phonetic development in early infancy: A study of four Swedish children during the first eighteen months of life. *Journal of Child Language*, *16*(1), 19-40.
- Rowe, M. L., Leech, K. A., & Cabrera, N. (2017). Going beyond input quantity: Wh-questions matter for toddlers' language and cognitive development. *Cognitive Science*, *41*, 162-179.
- Rudd, L. C., Cain, D. W., & Saxon, T. F. (2008). Does improving joint attention in low-quality child-care enhance language development? *Early Child Development and Care*, *178*(3), 315-338.
- Salo, V. C., Rowe, M. L., Leech, K. A., & Cabrera, N. J. (2016). Low-income fathers' speech to toddlers during book reading versus toy play. *Journal of Child Language*, *43*(6), 1385-1399.
- Sandler, W. (2017). The challenge of sign language phonology. *Annual Review of Linguistics*, *3*, 43-63.
- Santesso, D. L., Schmidt, L. A., & Trainor, L. J. (2007). Frontal brain electrical activity (EEG) and heart rate in response to affective infant-directed (ID) speech in 9-month-old infants. *Brain and Cognition*, *65*(1), 14-21.
- Schaal, N. K., Politimou, N., Franco, F., Stewart, L., & Müllensiefen, D. (2020). The German Music@ Home: Validation of a questionnaire measuring at home musical exposure and interaction of young children. *PloS One*, *15*(8), e0235923.
- Sénéchal, M. (1997). The differential effect of storybook reading on preschoolers' acquisition of expressive and receptive vocabulary. *Journal of Child Language*, *24*(1), 123-138.
- Sénéchal, M. (2011). A model of the concurrent and longitudinal relations between home literacy and child outcomes. In *Handbook of early literacy research*, S. B. Neuman and D. K. Dickinson, (Eds.), (Vol. 3, pp. 175–188). Guilford, New York, NY, USA, 2011.
- Senechal, M., & Cornell, E. H. (1993). Vocabulary acquisition through shared reading experiences. *Reading Research Quarterly*, 360-374.
- Shute, B., & Wheldall, K. (1999). Fundamental frequency and temporal modifications in the speech of British fathers to their children. *Educational Psychology*, *19*(2), 221-233.
- Simsek, Z. C., & Erdogan, N. I. (2015). Effects of the dialogic and traditional reading techniques on children's language development. *Procedia-Social and Behavioral Sciences*, *197*, 754-758.
- Singh, L., Morgan, J. L., & Best, C. T. (2002). Infants' listening preferences: Baby talk or happy talk? *Infancy*, *3*(3), 365-394.
- Singh, L., Nestor, S., Parikh, C., & Yull, A. (2009). Influences of infant-directed speech on early word recognition. *Infancy*, *14*(6), 654-666.
- Siraj-Blatchford, I., & Manni, L. (2008). 'Would you like to tidy up now?' An analysis of adult questioning in the English Foundation Stage. *Early Years*, *28*(1), 5-22.
- Smith, A. B. (1999). Quality childcare and joint attention. *International Journal of Early Years Education*, *7*(1), 85-98.
- Snijders, T. M., Benders, T., & Fikkert, P. (2020). Infants segment words from songs–an EEG study. *Brain Sciences*, *10*(39), 1–25.
- Snow, C. E., & Goldfield, B. A. (1983). Turn the page please: Situation-specific language acquisition. *Journal of Child language*, *10*(3), 551-569.
- Stark, R. E. (1980). Stages of speech development in the first year of life. In *Child Phonology* (pp. 73-92). Academic Press.
- Suarez-Rivera, C., Smith, L. B., & Yu, C. (2019). Multimodal parent behaviors within joint attention support sustained attention in infants. *Developmental Psychology*, *55*(1), 96.
- Suppanen, E., Huotilainen, M., & Ylinen, S. (2019). Rhythmic structure facilitates learning from auditory input in newborn infants. *Infant Behavior and Development*, *57*, 101346.
- Tamis-LeMonda, C. S., Bornstein, M. H., & Baumwell, L. (2001). Maternal responsiveness and children's achievement of language milestones. *Child Development*, *72*(3), 748-767.
- Tamis-LeMonda, C. S., Custode, S., Kuchirko, Y., Escobar, K., & Lo, T. (2019). Routine language: Speech directed to infants during home activities. *Child Development*, *90*(6), 2135-2152.

- Tamis-LeMonda, C. S., Luo, R., McFadden, K. E., Bandel, E. T., & Vallotton, C. (2019). Early home learning environment predicts children's 5th grade academic skills. *Applied Developmental Science*, *23*(2), 153-169.
- Thiessen, E. D., Hill, E. A., & Saffran, J. R. (2005). Infant-directed speech facilitates word segmentation. *Infancy*, *7*(1), 53-71.
- Thiessen, E. D., & Saffran, J. R. (2009). How the melody facilitates the message and vice versa in infant learning and memory. *Annals of the New York Academy of Sciences*, *1169*, 225–233.
- Thompson, R. H., Cotnoir-Bichelman, N. M., McKerchar, P. M., Tate, T. L., & Dancho, K. A. (2007). Enhancing early communication through infant sign training. *Journal of Applied Behavior Analysis*, *40*(1), 15-23.
- Tomasello, M., & Farrar, M. J. (1986). Joint attention and early language. *Child Development*, 1454-1463.
- Towson, J. A., Gallagher, P. A., & Bingham, G. E. (2016). Dialogic reading: Language and preliteracy outcomes for young children with disabilities. *Journal of Early Intervention*, *38*(4), 230-246.
- Trainor, L. J. (1996). Infant preferences for infant-directed versus noninfant-directed play songs and lullabies. *Infant Behavior and Development*, *19*(1), 83-92.
- Trainor, L. J., Clark, E. D., Huntley, A., & Adams, B. A. (1997). The acoustic basis of preferences for infant-directed singing. *Infant Behavior and Development*, *20*(3), 383-396.
- Trainor, L. J., & Desjardins, R. N. (2002). Pitch characteristics of infant-directed speech affect infants' ability to discriminate vowels. *Psychonomic Bulletin & Review*, *9*(2), 335-340.
- Trehub, S. E., Hill, D. S., & Kamenetsky, S. B. (1997). Parents' sung performances for infants. *Canadian Journal of Experimental Psychology*, *51*(4), 385.
- Trehub, S. E., & Trainor, L. (1998). Singing to infants: Lullabies and play songs. *Advances in Infancy Research*, *12*, 43-78.
- Trehub, S. E., Unyk, A. M., Kamenetsky, S. B., Hill, D. S., Trainor, L. J., Henderson, J. L., & Saraza, M. (1997). Mothers' and fathers' singing to infants. *Developmental Psychology*, *33*(3), 500.
- Trehub, S. E., Trainor, L. J., & Unyk, A. M. (1993). Music and speech processing in the first year of life. *Advances in Child Development and Behavior*, *24*, 1-35.
- Trevarthen, C., & Aitken, K. J. (2001). Infant intersubjectivity: Research, theory, and clinical applications. *The Journal of Child Psychology and Psychiatry and Allied Disciplines*, *42*(1), 3-48.
- Tsang, C. D., Falk, S., & Hessel, A. (2017). Infants prefer infant-directed song over speech. *Child Development*, *88*(4), 1207-1215.
- Unyk, A. M., Trehub, S. E., Trainor, L. J., & Schellenberg, E. G. (1992). Lullabies and simplicity: A cross-cultural perspective. *Psychology of Music*, *20*(1), 15-28.
- Valdez-Menchaca, M. C., & Whitehurst, G. J. (1992). Accelerating language development through picture book reading: A systematic extension to Mexican day care. *Developmental Psychology*, *28*(6), 1106.
- Vallotton, C. D. (2008). Signs of emotion: What can preverbal children "say" about internal states? *Infant Mental Health Journal*, *29*(3), 234-258.
- Vallotton, C. D. (2009). Do infants influence their quality of care? Infants' communicative gestures predict caregivers' responsiveness. *Infant Behavior and Development*, *32*(4), 351-365.
- Vallotton, C. (2011). Babies open our minds to their minds: How "listening" to infant signs complements and extends our knowledge of infants and their development. *Infant Mental Health Journal*, *32*(1), 115-133.
- Vallotton, C. D. (2012). Infant signs as intervention? Promoting symbolic gestures for preverbal children in low-income families supports responsive parent–child relationships. *Early Childhood Research Quarterly*, *27*(3), 401-415.
- Wasik, B. A., & Hindman, A. H. (2013). Realizing the promise of open-ended questions. *The Reading Teacher*, *67*(4), 302-311.
- Wasik, B. A., Hindman, A. H., & Snell, E. K. (2016). Book reading and vocabulary development: A systematic review. *Early Childhood Research Quarterly*, *37*, 39-57.
- Weber, A., Fernald, A., & Diop, Y. (2017). When cultural norms discourage talking to babies: Effectiveness of a parenting program in rural Senegal. *Child Development*, *88*(5), 1513-1526.
- Weisleder, A., & Fernald, A. (2013). Talking to children matters: Early language experience strengthens processing and builds vocabulary. *Psychological Science*, *24*(11), 2143-2152.
- Whitehurst, G. J., Falco, F. L., Lonigan, C. J., Fischel, J. E., DeBaryshe, B. D., Valdez-Menchaca, M. C., & Caulfield, M. (1988). Accelerating language development through picture book reading. *Developmental Psychology*, *24*(4), 552.
- Wille, B., Van Lierde, K. & Van Herreweghe, M. (2019). Parental strategies used in communication with their deaf infants. *Child Language Teaching and Therapy*, *35*(2), 165–183.
- Woll, B. (2013). The history of sign language linguistics. *The Oxford Handbook of the History of Linguistics*.

- Yan, R., Jessani, G., Spelke, E., de Villiers, P., de Villiers, J., & Mehr, S. (2021, preprint). Across demographics and recent history, most parents sing to their infants and toddlers daily. https://doi.org/10.31234/osf.io/fy5bh
- Yoo, H., Bowman, D. A., & Oller, D. K. (2018). The origin of protoconversation: An examination of caregiver responses to cry and speech-like vocalizations. *Frontiers in Psychology, 9*, 1510.
- Zammit, M., & Atkinson, S. (2017). The relations between 'baby signing', child vocabulary and maternal mind-mindedness. *Early Child Development and Care, 187*(12), 1887-1895.
- Zhao, T. C., & Kuhl, P. K. (2016). Musical intervention enhances infants' neural processing of temporal structure in music and speech. *Proceedings of the National Academy of Sciences, 113*(19), 5212–521
- Zimmerman, F. J., Gilkerson, J., Richards, J. A., Christakis, D. A., Xu, D., Gray, S., & Yapanel, U. (2009). Teaching by listening: The importance of adult-child conversations to language development. *Pediatrics, 124*(1), 342-349.

CHAPTER OVERVIEW

14: Multilingualism

14.1: Introduction

Introduction to Multilingualism

Many infants and toddlers around the world, and a growing number in the U.S. are learning more than one language. In order to design the most responsive and linguistically enriching care and educational experiences for multilingual infants and toddlers, it is important for caregivers to have a good understanding of the unique contexts that shape the development of children learning multiple languages, in which ways they differ from those of monolingual children and practices to best support their multilingual development. This section will explain what multilingualism means, address common misconceptions, describe how infants and toddlers develop multiple languages and provide strategies for caregivers to best support multilingual children.

14.2: Defining Multilingualism

What is Multilingualism?

What does it mean to be multilingual? Across educational and research fields, a number of different terms and definitions have been used to describe children who are multilingual. The term multilingual may encompass or overlap substantially with other terms frequently used, such as ‘bilingual’, ‘dual language learner’, ‘English language learner’ and ‘children who speak a language other than English’. For the purpose of this section, the term multilingual refers to children who are learning two (or more) languages at the same time, or learning an additional language while continuing to develop their native language(s). [1]

Figure 14.2.1: Toddler and caregiver from India. ([2])

Multilingualism is a complex construct that has been redefined over the past several decades. Scholars once defined multilinguals exclusively as a small group of speakers who were perfectly “balanced” in their languages (Lambert, Havelka, Gardner, 1959). The definition of multilingualism has since expanded to include individuals with varying degrees of proficiency and different language experiences. An individual’s multilingual status is not a trait that can be directly measured—multilingualism cannot be determined in the same way as someone’s height, for example. When measuring multilingualism, researchers often rely on a combination of factors, such as language proficiency and amount of exposure, to determine an individual’s multilingual status (Anderson, Mak, Keyvani Chahi & Bialystok, 2018; Li, Sepanski & Zhao, 2006, 2014; Marian, Blumenfeld & Kaushanskaya, 2007; Marian & Hayakawa, 2020). [1]

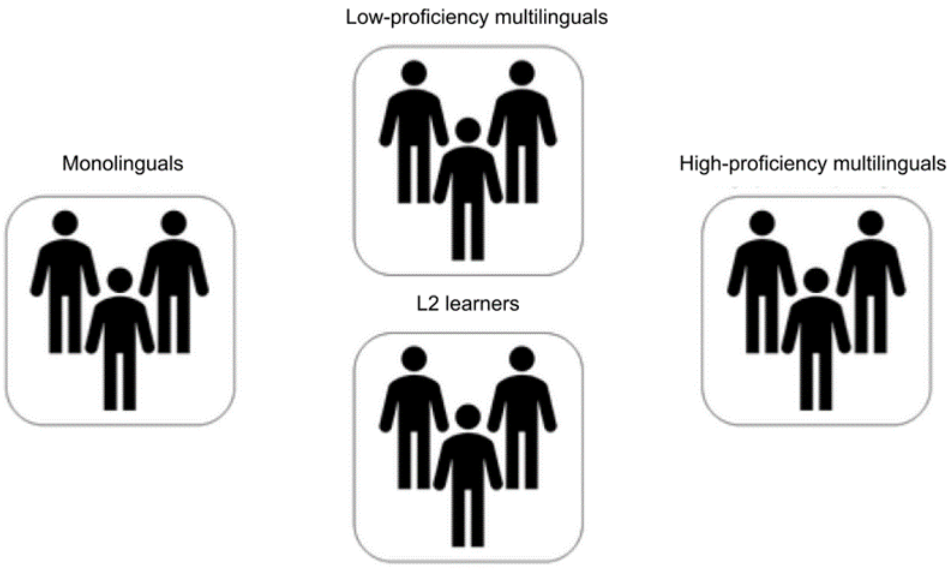


Figure 14.2.2: Representation of a categorical model of multilingualism with different possible groups of multilinguals. ([4])

In order to account for the full spectrum of multilinguals’ experiences and language abilities, some scholars have proposed that multilingualism should be viewed as a continuous variable (Baum & Titone, 2014; de Bruin, 2019; Kaushanskaya & Prior, 2015;

Marian & Hayakawa, 2020; Takahesu Tabori, Mech & Atagi, 2018). Under such an approach, the continuum of being multilingual would span the range from completely monolingual (i.e., never having any exposure to a second language) to fully proficient multilingual (i.e., "balanced" across languages).Figure 14.2.3 shows a visual representation of a continuous model of multilingualism. Other models of multilingualism may even combine both categorical and continuous models (Kremin & Byers-Heinlein, 2021). Clearly, being multilingual is much more complex than simply learning or knowing two or more languages. [3]

Figure 14.2.3: Representation of a continuous model of multilingualism. ([5])

Each multilingual child's language learning experience is unique: children differ in terms of the specific languages they are learning, when they start learning each, and how they experience them. Contexts for multilingualism may be very different across families, child care programs, communities, and cultures (Rowe & Weisleder, 2020). Taking this diversity into account is key to understanding early multilingual development. As a result, each multilingual child will have their own developmental path (de Bruin, 2019)there are nearly as many ways to grow up multilingual as there are multilingual children! [6]

Despite the diversity, a common factor across multilingual development is the crucial role of the quantity and quality of exposure infants and toddlers receive in their different languages (Marchman, Fernald & Hurtado, 2010; Ramírez-Esparza, García-Sierra & Kuhl, 2017). For example, we would not expect a child to learn a language they only hear for 5 minutes per day (low quantity) or to learn a language from 5 hours a day of isolated vocabulary words recited from an audiotape (low quality). It is difficult to know exactly what combination of quantity and quality is required, but some studies estimate that children need a minimum of 10% to 25% of overall exposure in a language to achieve fluency in it, which will only occur if their language experience is rich and varied (Place & Hoff, 2011). If children do not receive sufficient high-quality multilingual exposure, they are unlikely to become proficient in all of their languages. [7]

---

[1] US Department of Health and Human Services. (2017). Policy statement on supporting the development of children who are dual language learners in early childhood programs is in the public domain.

[2] Image from Saradhi Photography on Unsplash.

[3] Kremin & Byers-Heinlein (2021). Why not both? Rethinking categorical and continuous approaches to bilingualism. *International Journal of Bilingualism*, *25*(6), 1560-1575. CC by 4.0

[4] Image adapted from Kremin & Byers-Heinlein (2021). Why not both? Rethinking categorical and continuous approaches to bilingualism. *International Journal of Bilingualism*, *25*(6), 1560-1575. CC by 4.0

[5] Image from Kremin & Byers-Heinlein (2021). Why not both? Rethinking categorical and continuous approaches to bilingualism. *International Journal of Bilingualism*, *25*(6), 1560-1575. CC by 4.0

[6] Fibla et al., (2021 preprint). Bilingual language development in infancy: What can we do to support bilingual families? CC by 4.0

[7] Fibla et al., (2021 preprint). Bilingual language development in infancy: What can we do to support bilingual families? CC by 4.0

14.3: Demographics of Multilingual Children

Multilingual Children

Many children around the world are multilingual. Recent estimates suggest that approximately 7,000 languages are currently spoken worldwide in only 196 Countries (Simons & Fennig, 2018). This suggests that the vast majority of the world's population is consistently exposed to two or more languages and can be considered multilingual (Baker, 2006; Jonak, 2015; Marian & Shook, 2012). Reported rates of multilingualism in places such as Europe (67%), Canada (55%), India (25%), and the United States (20%) indicate that multilingualism is both common and increasing (Luk, 2017; Office of the Registrar General & Census Commissioner, India, 2001). The current rates for the number of multilingual children are often even higher than that for adults. For example, in the U.S. 26% of 5 to 17 year children nationwide are multilingual, although rates differ by state. In the U.S. the state of California has the highest percentage of multilingual children at 43%, while only 2% of children in West Virginia are multilingual (Kids Count Data Center, 2019). An estimated 15% of children in Australia (Australian Bureau of Statistics, 2006), 18% to 25% of children in Canada (Schott et al., 2021), 29% of children in parts of Spain (Statistical Institute of Catalonia, 2007) and 90% of children in Singapore (Wu et al., 2020) grow up multilingual. [1] [2] [3]

It is much more challenging to find estimates of the number of children under age three that are multilingual. Data from Canada provides unique insight into estimates of infant and toddler multilingualism and how rates differ geographically even within the same country. Across Canada, 15.6% of children aged 0 to 4 and 20.4% of children aged 5 to 9 years of age are multilingual. Broken down by province/region, the rate of child multilingualism was highest in Northern Canada (Yukon, Northwest Territories, and Nunavut), with nearly one in three children speaking two languages at home, in most cases an Indigenous language and English. Nearly one in four children aged 0 to 4 in Toronto, Vancouver, Ottawa, and Montréal, spoke at least two languages at home. In Calgary and Edmonton, rates were one in six for children aged 0 to 4. Provinces with larger cities had higher overall rates of multilingualism (i.e., British Columbia, Alberta, Ontario, and Quebec). Across all provinces, the rate of multilingualism among 5 to 9 year olds was higher than 0 to 4 year olds, which could be due to some children acquiring a community language at school and then starting to use that language at home. This pattern has been documented in the United States for native Spanish-speaking children learning English (Hammer, Lawrence & Miccio 2008). [4]

Figure 14.3.1: Map of Canada. ([5])

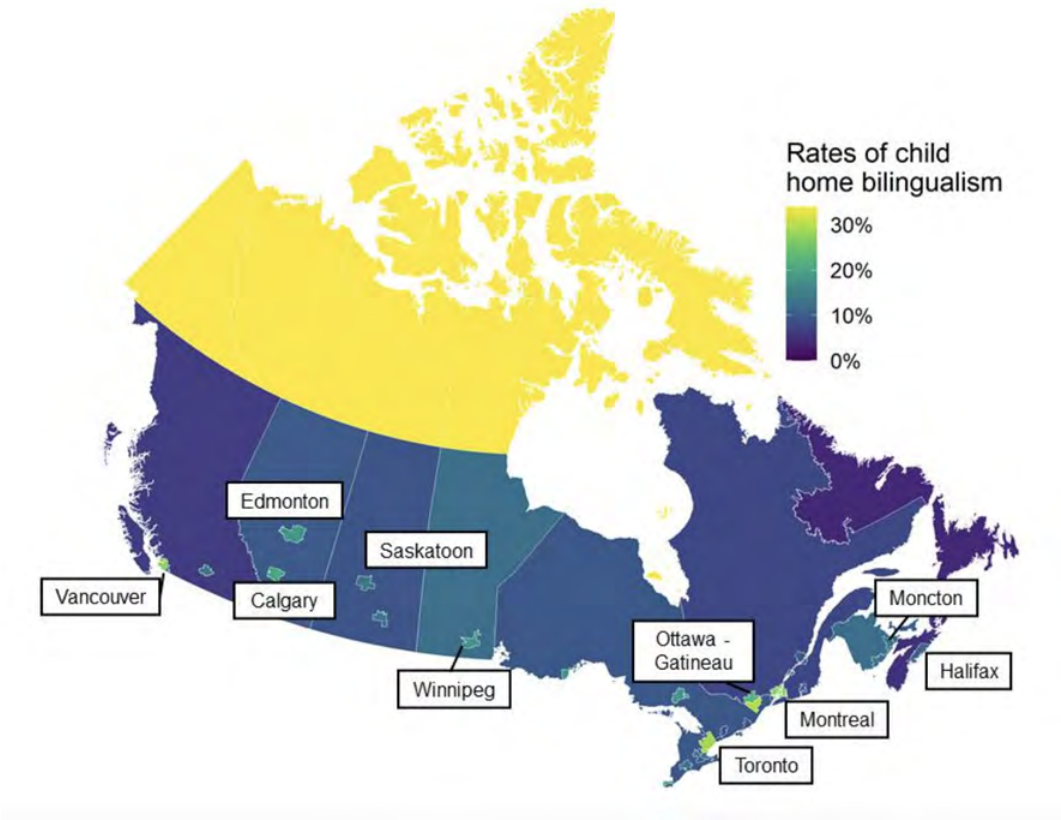


Figure 14.3.2: Rates of multilingualism amongst children between 0 to 9 years of age across Canada. ([6])

Rates of multilingualism amongst children between 0 to 9 years of age across Canada

Children who are multilingual are a highly diverse group from varied family backgrounds with a wide variety of life and language experiences. In the U.S., children in a multilingual home, are likely to have parents without a high school education, are likely to be growing up under economic challenges, and are likely to be raised in specific cultural contexts that may differ from mainstream U.S. norms. (Winsler et al., 2014). In addition, it has been found that children with immigrant parents (who are likely to be multilingual) are more likely than those with parents born in the U.S. to live in two-parent families (Hernandez & Napierala, 2012); immigrant mothers are more likely to be married, less likely to be depressed, and more likely to have larger families than nonimmigrant mothers (Mistry, Biesanz, Chien, Howes, & Benner, 2008). These sociocultural factors represent a constellation of strengths and potential challenges for multilingual children growing up in the U.S. [7]

Figure 14.3.3: Infant with his Indonesian grandmother ([1])

14.4: Multilingualism- Beliefs and Misconceptions

Beliefs and Misconceptions

Caregiver beliefs and knowledge about multilingualism affect their caregiving practices, which in turn can impact children's developmental outcomes. As infant and toddler multilingualism becomes a prominent phenomenon across the U.S. it is critical to examine how caregivers' beliefs and knowledge regarding multilingualism relates to childrens' language experiences in group care and childrens' developmental outcomes over time. [7]

One common concern about multilingualism is that early exposure to multiple languages is confusing for children. Research does not support this concern. Young infants can perceive the difference between different languages within the first few days or months of life (Bosch & Sebastián-Gallés, 2001; Byers-Heinlein, Burns & Werker, 2010). Infancy and toddlerhood represent a sensitive period for language acquisition, when the brain is particularly receptive to the properties of language (Kuhl et al., 2005; Werker & Tees, 2005). For this reason, multilingual children exposed to their languages earlier in development become better at them, and will speak and process them in a more native-like manner (Bialystok, 2001; Zhao, Boorom, Kuhl & Gordon, 2021). [3]

Another common concern is that childhood multilingualism can cause language disorders and delays. Research does not support this concern. Language disorders and delays occur in multilingual children at the same rates as in monolingual children (Kohnert, Ebert & Pham, 2020; Peña et al., 2011). In fact, many children with various developmental disabilities also grow up multilingual, including children with specific language impairments (Paradis et al., 2011), children with Down Syndrome (Kay-Raining Bird et al., 2005), and children with autism spectrum disorder (Gonzalez-Barrero & Nadig, 2019). Importantly multilingual children with developmental disabilities should have difficulties across their languages, not just with one language (Kohnert, 2010; Peña, Iglesias & Lidz, 2001; Restrepo & Kruth, 2000). Multilingualism neither causes nor facilitates/aggravates a possible condition of dyslexia or any specific language disorders in general (Crescentini, Marini & Fabbro, 2012). To ensure accurate assessment of the language development of multilingual infants and toddlers, caregivers must assess all of the child's languages (Nayeb et al., 2021) [1] [3] [8]

14.5: How Multilingualism is Different

Uniqueness of Multilingualism

As the population of young multilingual children continues to increase across the U.S., there has been a corresponding explosion of research about their development. These research findings provide a scientific basis for designing child care program approaches, and assessment procedures. [7]

Some features of multilinguals' language development may look like speech or language delays (Sandhofer & Uchikoshi, 2013). The ongoing challenges of processing more than one language and frequently switching between languages results in a different set of language and cognitive strengths and needs for multilingual children than those of monolingual children (Francis, 2021). Young children who are learning through two languages initially make slower progress in each of their languages than monolingual children (Sandhofer & Uchikoshi, 2013). In addition, they typically have smaller vocabularies in each of their languages than monolingual children, but their total vocabulary size (the sum of what children know in all of their languages) is similar to monolingual children (Core, Hoff, Rumiche & Señor, 2013). Young multilinguals also take longer to recall words from memory and have lower scores on verbal fluency tasks, as their language processing is more complex than that of monolingual children (Petitto et al., 2011). Most often these differences are temporary and disappear as young multilinguals become more proficient in both of their languages (Conboy, 2013). It is important to remember that these early differences in the language development of young multilinguals are just that—differences and not delays! They are a byproduct of the challenges of hearing, processing, and making meaning from multiple language systems during the early childhood years. [1]

[1] Luo et al., (2021). Parental beliefs and knowledge, children's home language experiences, and school readiness: The dual language perspective. *Frontiers in Psychology*, *12*. CC by 4.0

14.6: The Science of Multilingualism Development

Language Discrimination

One potential challenge for infants growing up with regular exposure to multiple languages is in discriminating between languages. Being able to separate the languages from very early on seems crucial given that the child has to establish different linguistic systems for the languages. [1]

Early research on monolingual infants has demonstrated that newborns are able to discriminate between different languages but only if the languages belong to different rhythmic classes. For example, French newborns could discriminate English from Japanese, Spanish and Italian but not from Dutch (Nazzi, Bertoncini & Mehler, 1998; Ramus et al., 2000). The only study on multilingual exposure effects with newborns tested infants from multilingual English–Tagalog mothers who regularly used both languages during pregnancy (Byers-Heinlein, Burns & Werker, 2010). The experiment tested discrimination using a habituation paradigm in which infants were first exposed to either English or Tagalog sentences until their sucking rates to a special pacifier decreased below a predefined criterion (habituation) and then were presented with sentences from the other language. Results revealed that both monolingual and multilingual infants showed an increase in their sucking after the language change, demonstrating that multilingual newborns were able to discriminate between both languages, just like monolinguals. [1]

At the age of 4 months, monolingual infants begin to discriminate languages of the same rhythmical class from their native language (Bosch & Sebastián-Gallés, 2001; Chong, Vicenik & Sundara, 2018; Molnar, Gervain & Carreiras, 2014; Nazzi, Jusczyk & Johnson, 2000) suggesting that they have acquired some inventory of cues that help them separate their native language from other languages. Similar to monolinguals, multilinguals are able to discriminate between languages at the same age as monolinguals (Bosch & Sebastián-Gallés, 2001; Garcia, Guerrero-Mosquera, Colomer & Sebastian-Galles, 2018). For example, monolingual Basque and multilingual Spanish/Basque infants were first habituated with stimuli from one language, and then tested with stimuli from both languages. Results showed that both groups were able to discriminate between the two languages (Molnar, Gervain & Carreiras, 2014). This suggests that by the age of 4 months multilingual infants have detected some properties that separate their two languages and that they can assign these properties specifically to one of their languages. [1]

Figure 14.6.1: Caregiver holding infant in arms. ([2])

Growth of Word Learning

Word learning starts in the second half of the first year of life, with some evidence for knowledge of a limited number of words as early as 6 months (Bergelson & Swingley, 2012; Tincoff & Jusczyk, 1999, 2012). Word learning then increases, often with a sharp acceleration, in the second year of life (Fenson, Dale, Reznick, Bates, Thal & Pethick, 1994). This early development is characterized by extensive individual variability in the sizes of both receptive and productive vocabularies. [1]

Since multilingual infants' input is distributed over more than one language, they are likely to receive less input in each of their languages than monolinguals, which can have an impact on early lexical development. Moreover, since multilingual infants will vary in terms of the relative amount of input they receive in their languages, the languages might not develop at the same speed. Recent studies support these points. When multilinguals are evaluated on each of their languages separately, studies report that they lag behind monolinguals starting in the second year of life (Core, Hoff, Rumiche & Señor, 2013) and the relative amount of exposure for each language is related to the growth of that specific language (Grüter, Hurtado, Marchman & Fernald, 2014). [1]

One crucial aspect when comparing monolingual and multilingual infants' trajectories of word learning is in how vocabulary is counted. One is conceptual vocabulary: counting every referent for which a child has a word for in either language (a French–German child would get a 1 for knowing either chien, hund, or both); another approach is total vocabulary, counting every word known across both languages (the same child would get a 2 for knowing both chien and hund). Considering how to measure multilingual vocabulary growth, especially when comparing to monolinguals, is critical as the results can vary greatly (Hoff et al., 2012). For example, a study comparing English–German and English monolingual 24 to 27 month old toddlers found that the multilinguals' total vocabularies were significantly larger than both their conceptual vocabularies and the English vocabularies of English-learning children (Junker & Stockman, 2002). Evidence also suggests that vocabulary growth is influenced by language dominance, with higher vocabulary scores in the dominant as compared to the non-dominant language (Hoff et al., 2012). What is clear is that when multilinguals' vocabulary levels are evaluated using measures that take into account both of their languages, they fall within a similar range as monolingual infants. When assessing the language development of multilinguals, the development of all of their languages should always be considered (Nayeb et al., 2021). [1]

Figure 14.6.2: Toddler (1.5 years old) growing up in China. ([3])

Besides charting the growth trajectory of word learning through vocabulary knowledge, some studies have explored word learning by investigating the speed at which multilingual infants recognize words in each of their languages. Previous research with monolinguals has revealed that speed of language processing is related to later cognitive and language outcomes (Fernald, Perfors & Marchman, 2006; Hurtado, Marchman & Fernald, 2007; Marchman & Fernald, 2008). In a study with Spanish/English 30 month old multilinguals, results revealed that processing speed in each of the children's languages was related to their vocabulary in that specific language (Marchman, Fernald & Hurtado, 2010). Similar findings were also shown in another study with 16 to 22 month old Spanish/English multilinguals (DeAnda, Hendrickson, Zesiger, Poulin-Dubois & Friend, 2018). This research suggests that language processing speed and vocabulary acquisition are linked in multilinguals, as had been found in monolinguals, but that this link is language specific. [1]

[1] Höhle et al., (2020). Variability and stability in early language acquisition: Comparing monolingual and bilingual infants' speech perception and word recognition. Bilingualism: *Language and Cognition*, *23*(1), 56-71. CC by 4.0

[2] Image by Jonathan Borba on Unsplash

[3] Image by chen lei on Unsplash

14.7: Effects of Multilingualism on Development

Multilingual children grow to know and use multiple languages, and their development is not akin to “two monolinguals in one person” (Grosjean, 1989). One reason is that children’s experience is divided between their different languages. Moreover, multilingual children must engage in a constant “mental juggling” of their two languages (Kroll et al., 2011; Kroll & Bialystok, 2013; Bosworth, Binder, Tyler & Morford, 2021), which can present challenges and opportunities for cognition, language representation, and processing (Marian & Shook, 2012). The experience of being multilingual can have an impact on both brain and cognitive development. [1]

Brain Development

Research with multilingual infants indicates that the human brain is adept at acquiring multiple languages simultaneously (Ferjan Ramírez et al., 2016; Garcia-Sierra, Ramírez-Esparza, & Kuhl, 2016), and that infants who grow up multilingual, efficiently monitor and control their languages (Byers-Heinlein, Morin-Lessard, & Lew-Williams, 2017). Studies also show that acquiring multiple languages in infancy, compared to acquiring an additional language in later childhood or adolescence, results in more efficient neural language processing (Berken, Gracco & Klein, 2017; Klein, Mok, Chen & Watkins, 2014) and higher brain tissue density in regions supporting language, memory, and attention (Mechelli et al., 2004). [2]

Multilingualism sculpts the brain’s functional and structural organization (Arredondo, Aslin & Werker, 2021; Hayakawa & Marian, 2019; Pliatsikas, 2020). For example, multilingual infants show different brain responses to native and non-native speech sounds compared to monolingual infants (Conboy & Kuhl, 2011; Garcia-Sierra et al., 2011), and multilingual children recruit different brain areas during sentence processing (Jasinska & Petitto, 2013). Adult research shows that the age of acquisition of a second language affects the brain’s language networks (Berken, Gracco, & Klein, 2017), and functional connectivity (Kousaie, Chai, Sander, & Klein, 2017). Moreover, multilingualism also affects the structure of both gray (Andrea et al., 2004; Ressel et al., 2012) and white matter (Kuhl et al., 2016) in adults. Looking at the tissue in the brain, there are regions that predominantly contain neuron cell bodies and dendrites and regions that are largely composed of just axons. These two regions are often referred to as gray matter (the regions with many cell bodies and dendrites) or white matter (the regions with many myelinated axons). Patterns of structural differences appear to depend on whether the languages were acquired simultaneously from birth, or sequentially before age five (Berken, Gracco, Chen & Klein, 2015), suggesting that timing of multilingualism interacts with brain development. [1] [3]

Garcia et al., (2018) analyzed the brain activity of 4.5 month old monolingual and multilingual infants in their native language and two foreign languages. Figure 14.7.1 shows the event related potential (ERP) waveforms of monolingual (left side) and multilingual (right side) infants to native (blue), Italian (green) and German (red) languages. The ERP component they looked at was the P200. Most ERP components are referred to by a letter (usually N or P) indicating polarity (negative/positive), followed by a number indicating the latency or timing delay between the presentation of a stimulus and the specific brain response in milliseconds. So the P200 component refers to a positive spike around 200 milliseconds after the stimulus. [4]

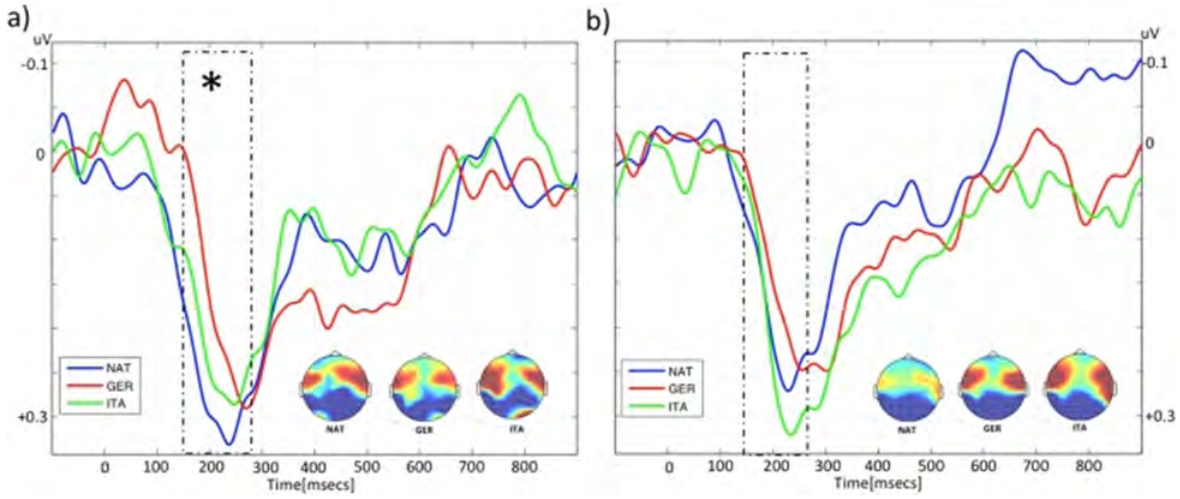


Figure 14.7.1: ERP waveforms to native and non-native languages in monolingual (a) and multilingual (b) four-month-old infants. ([5])

Although both groups of infants showed a P200 response to all languages, monolinguals showed shorter latencies (less processing time) of the P200 component for their native language compared to the language of the different rhythmic class (German). In other words, the P200 waveform for monolinguals listening to their native language occurred earlier than their responses for the non-native languages, especially German. This can be seen in Figure 14.7.1 by the early peaking of the waveform for their native language. In contrast, multilinguals did not show a statistically significant difference in the latency of the P200 component for any of the languages. This lack of differences may reflect multilinguals' reduced familiarity with each of their languages since multilinguals' speech input is split across multiple languages. Therefore, multilinguals' P200 response to their native language would be more similar to the one elicited by the unfamiliar languages for monolinguals. The results point in the direction of different language discrimination strategies for multilingual and monolingual infants. While only monolingual infants show early discrimination of their native language based on familiarity, multilinguals perform a later processing pattern which is compatible with an increase in attention to the speech signal. This is the earliest evidence found for unique brain specialization induced by multilingualism. [6]

Neuroimaging studies suggest that monolingual infants activate a left-lateralized brain network in response to spoken language, which is similar to the network involved in processing spoken and signed language in adulthood. Left-lateralization to language refers to the brain processing language primarily on the left side. How does language experience, like being multilingual, impact this left-lateralization process? To answer this question, researchers conducted a functional near-infrared spectroscopy (fNIRS) experiment with sixty infants between the ages of 4 to 8 months (Mercure et al., 2020), some infants were spoken language monolinguals and some were spoken language multilinguals, but neither of these two groups had ever been exposed to sign language. [7]

Figure 14.7.2: Infants participating in an fNIRS experiment. [8]

Functional near-infrared spectroscopy (fNIRS) measures hemodynamic (blood flow) responses elicited from neuronal activation by shining near-infrared light into the brain. Figure 14.7.2 shows an infant and a toddler wearing the fNIRS cap during an experiment. As this light passes through the head, some of it is absorbed by the blood flowing through the brain. When brains are active, they require oxygen from the bloodstream—the harder a particular area of the brain is working, the more oxygenated blood will be sent to that area and the more light will be absorbed there. Because the fNIRS cap measures how much light comes back out of the brain, the areas with less light shining through them are the most active. [7] [9]

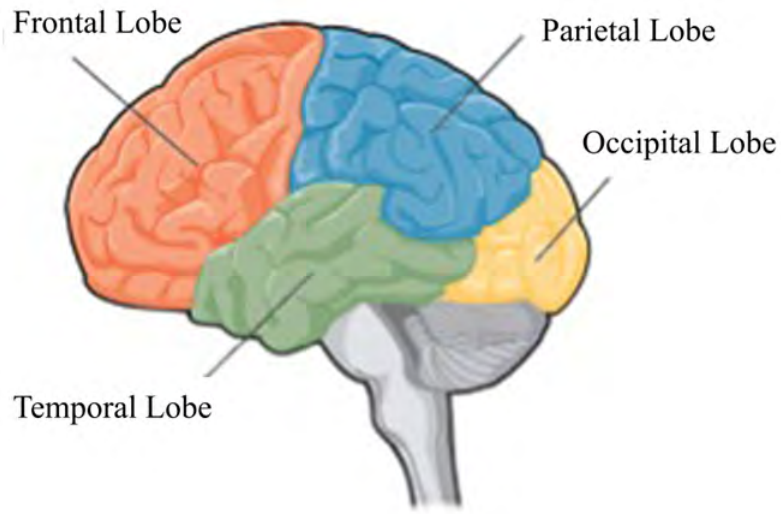


Figure 14.7.3: Lobes of the brain. ([10])

As shown in Figure 14.7.4, across all infants, viewing sign language elicited a significant increase in oxygenated blood mainly in the right temporoparietal area when all infants were considered together as a single group. In monolinguals, sign language elicited an increase in oxygenated blood in the temporoparietal area of both hemispheres. In multilinguals, a significant increase of oxygenated blood was observed in the right temporoparietal area. Results indicate that the neural tissue supporting language is plastic in infancy and influenced by language input and language modality (spoken modality versus signed modality), suggesting that there may be different neural paths to language development based on different language experiences. [17]

As shown in Figure 14.7.4, across all infants, viewing sign language elicited a significant increase in oxygenated blood mainly in the right temporoparietal area when all infants were considered together as a single group. In monolinguals, sign language elicited an increase in oxygenated blood in the temporoparietal area of both hemispheres. In multilinguals, a significant increase of oxygenated blood was observed in the right temporoparietal area. Results indicate that the neural tissue supporting language is plastic in infancy and influenced by language input and language modality (spoken modality versus signed modality), suggesting that there may be different neural paths to language development based on different language experiences. [7]

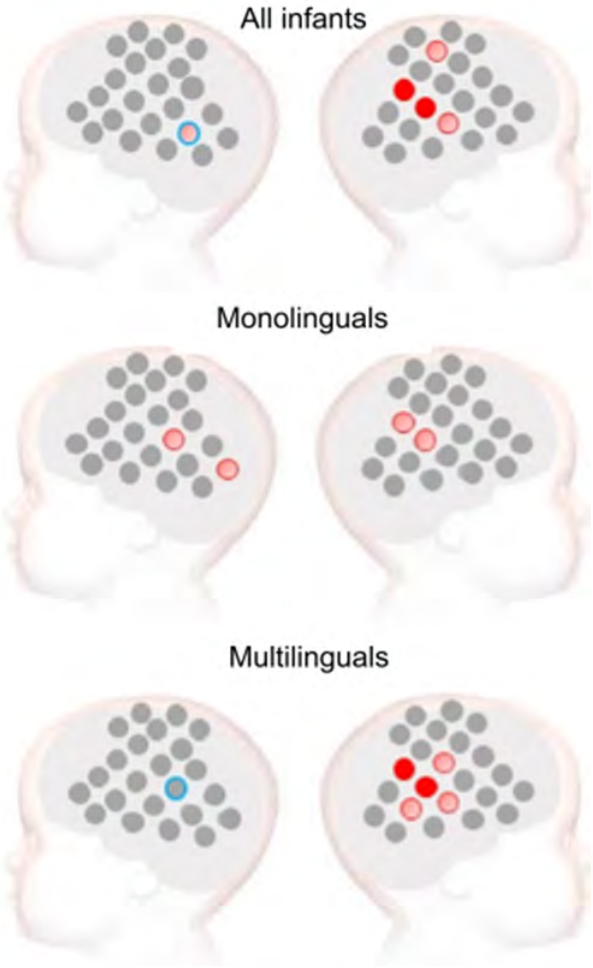


Figure 14.7.4: Activation for sign language in (A) all infants, (B) monolinguals and (C) spoken language multilinguals. ([8])

Although research on the brain development of infant and toddler multilingualism is a growing area with more questions than answers, the research so far seems to suggest that, like what behavior research has discovered, the development of multilinguals is somewhat unique and different from that of monolinguals.

Cognitive Development

Does being multilingual lead to enhanced cognitive abilities? Many claim that the experience of multilingualism leads to a cognitive advantage in executive functioning, a view that has gained substantial traction within the popular media. According to the prevailing multilingual advantage hypothesis, because the mental representations for each language are always "turned on", multilinguals become highly practiced at selecting and controlling attention after years of experience managing conflicts between competing phonological and lexical mental representations. Over the course of time, these practice effects generalize to problems outside the domain of language and contribute to a bilingual advantage in executive functioning (Bialystok, 2011, 2017; Bialystok, Craik & Luk, 2012; Kroll & Bialystok, 2013). Research suggests that potential cognitive advantages to being multilingual appear early, even within the first three years of life.[11]

The idea that each language known by a multiglinal is always "turned on" suggests that even when they are speaking, writing, listening or thinking in one language, mental representations for the other language(s) are simultaneously activated (Kroll, Bobb & Hoshino, 2014). For example, Figure 14.7.5 has three pictures in it: a piece of paper, cheese (wedges and slices) and a wrist watch. In an eye-tracking experiment, researchers showed participants arrays of stimuli containing multiple pictures (Shook & Marian, 2012), similar to this. As participants looked at the pictures, they heard a statement that named one specific picture in the array and all the participants needed to do was look at the picture named. So if a participant was looking at the array of pictures in Figure 14.7.5 and heard "cheese", all they would need to do was look at the picture of cheese. Quite simple, huh? The results however revealed something interesting.

Figure 14.7.5: Stimuli used to simultaneously activate multilinguals' mental language representations. ([12])

Some of the participants looked at another picture before looking at the named picture in every trail. To find out why, we need to look closer to the backgrounds of the participants. In this study, participants included hearing English monolinguals and hearing American Sign Language(ASL)/English multilinguals. The pictures were carefully selected to contain pictures with ASL translations that shared phonological features. The ASL signs for cheese and paper are phonologically similar. To illustrate, Figure 14.7.6 shows the ASL signs for 'cheese' and 'paper'. These two signs share the phonological feature of handshape. The findings from the study revealed that the ASL/English multilinguals spent more time looking at signs that were phonologically similar to the named picture (Shook & Marian, 2012). The results suggest that even though the study was conducted in English and did not involve ASL at all, ASL was simultaneously activated when English was activated. This study supports numerous others in finding that the mental representations of each language are always active in multilinguals (Kroll & Bialystok, 2013; Villwock, Wilkinson, Piñar & Morford, 2021).

Figure 14.7.6: ASL signs for cheese and paper. ([13])

Enhanced cognitive abilities, mainly related to executive function, appear early, even in infancy and toddlerhood (Barac, Bialystok, Castro & Sanchez, 2014). Bilingual toddlers between 24 and 31 months of age show enhanced inhibitory control, another executive function, compared to monolingual toddlers (Crivello et al., 2016). A study even found evidence of enhanced cognitive abilities in infancy! Seven month old infants have greater cognitive control, another executive function, compared to monolingual infants (Kovács & Mehler, 2009). [14]

It is important to note that not all studies have found cognitive advantages related to multilingualism (Giguere, Dickson, Tulloch & Hoff, 2022). A mounting number of large-scale comparisons of multilingual and monolingual adults (Lehtonen et al., 2018; Nichols et al., 2020; Paap et al., 2013, 2015), however, have cast doubt on the multilingual advantage account. Despite many studies claiming to show supportive evidence from sets of multilinguals tested across the lifespan, these multilingual effects are currently the subject of intense research debate. For example, in a study of over 11,000 people, when confounding variables were controlled for, multilinguals did not show any advantage in executive function (Nichols et al., 2020). As with adult studies, large meta-analyses on the overall research with multilingual children have found little support for a cognitive advantage (Gunnerud et al., 2020; Lowe, Cho, Goldsmith & Morton, 2021). [15]

[1] Byers-Heinlein et al., (2019). The case for measuring and reporting bilingualism in developmental research. *Collabra: Psychology, 5*(1). CC by 4.0

[2] Ramírez & Kuhl (2020). Early second language learning through SparkLing™: Scaling up a language intervention in infant education centers. *Mind, Brain, and Education, 14*(2), 94-103. CC by 4.0

[3] "Anatomy and Physiology" on OpenStax is licensed under CC by 4.0.

[4] "Event-related potential" from Wikipedia is licensed under CC by SA 3.0

[5] Image from Garcia et al., (2018). Evoked and oscillatory EEG activity differentiates language discrimination in young monolingual and bilingual infants. *Scientific Reports, 8*(1), 1-9. CC by 4.0

[6] Garcia et al., (2018). Evoked and oscillatory EEG activity differentiates language discrimination in young monolingual and bilingual infants. *Scientific Reports, 8*(1), 1-9. CC by 4.0

[7] Mercure et al., (2020). Language experience impacts brain activation for spoken and signed language in infancy: Insights from unimodal and bimodal bilinguals. *Neurobiology of Language, 1*(1), 9-32 CC by 4.0

[8] Images adapted from Mercure et al., (2020). Language experience impacts brain activation for spoken and signed language in infancy: Insights from unimodal and bimodal bilinguals. *Neurobiology of Language, 1*(1), 9-32 CC by 4.0 and Soltanlou & Artemenko (2020). Using light to understand how the brain works in the classroom. *Frontiers in Young Minds, 8*, 88. CC by 4.0

[9] Aanestad et al., (2021) What is happening in children's brains when they are playing pretend? *Frontiers in Young Minds, 9*, 644083.

[10] Image adapted from "The brain and spinal cord" on OpenStax is licensed under CC by 4.0

[11] Lowe et al., (2021). The bilingual advantage in children's executive functioning is not related to language status: A meta-analytic review. *Psychological Science, 32*(7), 1115-1146.

[12] Images adapted from Unsplash.

[13] Images adapted from Hochgesang, Crasborn, & Lillo-Martin (2022). ASL Signbank. New Haven, CT: Haskins Lab, Yale University. CC by NC SA 4.0

[14] Espinosa (2015). Challenges and benefits of early bilingualism in the US context. *Global Education Review, 2*(1). CC by 3.0 NC

[15] Leivada et al., (2021). On the phantom-like appearance of bilingualism effects on neurocognition: (How) should we proceed? *Bilingualism: Language and Cognition, 24*(1), 197-210. CC by 4.0

14.8: Strategies for Caregivers Working with Multilingual Infants and Toddlers

Caregivers play a key role in supporting the language development of multilingual infants and toddlers (Adamson et al., 2021; Grüter, Hurtado, Marchman & Fernald, 2014). Let's now take a look at various language strategies caregivers can implement with young multilinguals.

Supporting Heritage Languages

All young children in multilingual environments have the potential to learn multiple languages at the same time and develop a similar level of proficiency in each language (Albareda-Castellot, Pons, & Sebastián-Gallés, 2011; Pearson, Fernandez, Lewedeg, & Oller, 1997). Proficiency requires sufficient exposure and high quality learning opportunities in each language, however, in the U.S. this is rarely the case (Hoff et al., 2012), despite many parents expressing a preference for child care providers who speak the child's heritage language (Ward, Oldham LaChance, & Atkins, 2011). The term heritage language refers to a language that is spoken at home, but not by the majority of society which uses the societal language. In the U.S. multilingual infants and toddlers are more likely to be in multilingual care when they are 9 months old, less likely at 24 months and very unlikely to receive multilingual childcare services once they are 52 months of age and attending center-based childcare (Espinosa et al., 2017). Multilingual children are exposed to their heritage language in child care less and less as they get older, reflecting the change from care primarily provided by relatives during infancy and early toddlerhood to more center-based care during later toddlerhood and during the preschool years. Relatives were most likely, and caregivers in centers least likely, to use the family's heritage language. This research suggests that in the U.S. multilingual infants and toddlers who attend childcare programs have fewer opportunities to develop proficiency in both of their languages as English-only learning is most commonly offered in center-based programs. [1] [2] [3]

Figure 14.8.1: A caregiver interacting with infants. ([4])

Center-based caregivers can do a lot to support the multilingual development of infants and toddlers. Caregivers can adapt pedagogical practices to include use of children's heritage languages in simple ways, such as with posters hung on the wall, books and songs—all including heritage languages. Encourage active engagement with family and community members, who share the same heritage languages as children, as an integral part of the classroom. If possible, hiring staff that use the same languages with enrolled children can be emphasized in job searches. Caregivers can also take the time to learn common words and basic phrases in a child's heritage language. [1]

Language Quantity and Quality

Just like with monolingual children, the quantity and quality of language multilingual children are exposed to is important (Adamson et al., 2021; Grüter, Hurtado, Marchman & Fernald, 2014). Quantity refers to the amount of language and quality refers to how language is shared with children. Critically, the quantity and quality of the language environment provided by caregivers matters more than the language caregivers use (Song, Luo & Liang, 2021; Unsworth, 2016). Thus, caregivers should primarily communicate with infants and toddlers in the language(s) they are most proficient in so as to maximize the quality of their language input. [5]

Caregivers who expose children to more language, have children with greater language abilities (Hoff, 2006; Weisleder & Fernald, 2013). In one longitudinal study, Spanish/English multilingual toddlers were assessed at 30 months and then again at 36 months of

age (Hurtado, Grüter, Marchman & Fernald, 2014). The results revealed that toddlers who were exposed to more language showed greater language abilities. Importantly, the amount of exposure in a particular language was related to the level of growth in that language. So for Spanish/English multilingual toddlers, children who received a higher level of Spanish exposure relative to English, showed greater development in Spanish compared to English. Some research has also found a cross-language relationship with multilingual children, showing that a strong foundation of a heritage language can support the acquisition of an additional language, like English (Cha & Goldenberg, 2015; Kim, Curby & Winsler, 2014; Willard et al., 2021). Spanish/English multilingual toddlers who had stronger Spanish language processing skills at two years of age had stronger English language skills at 4 ½ years of age (Marchman, Bermúdez, Bang & Fernald, 2020). This research is especially important as it provides scientific validation for supporting heritage languages in English-based childcare programs.

Quality of language exposure can include various ways of sharing language with infants and toddlers. When children engage in more frequent and higher-quality language interactions with caregivers they demonstrate better long-term language and academic outcomes (Adamson et al., 2021; Hirsh-Pasek et al., 2015; Huttenlocher et al., 2010; Pace et al., 2019; Storch & Whitehurst, 2002). Although many studies focus on English-speaking families (Hirsh-Pasek et al., 2015; Masek et al., 2021), high-quality, early language interactions also support the communication skills of children from other cultural and linguistic backgrounds. For example, studies investigating Spanish-speaking caregivers' use of more complex, elaborative language, found that it promoted children's narrative skills (Escobar, Melzi & Tamis-LeMonda, 2017; Hammer & Sawyer, 2016; Luo et al., 2014; Tamis-LeMonda et al., 2014). Additionally, more frequent back-and-forth conversations in caregiver–child interactions when the children were 2.5 years of age predicted later language and literacy development in Spanish/English multilingual children (Adamson et al., 2021). [6]

Quality language exposure can occur during any and every interaction caregivers have with infants and toddlers. Let's now discuss several strategies caregivers can use to improve the quality of language they share with children.

Infant-directed Language

When caregivers interact with infants, their speech often takes on specific, distinguishing features known as infant-directed speech (Fernald et al., 1989). Infant-directed speech (IDS) is produced by caregivers of most (although not all) linguistic and cultural backgrounds and is typically characterized by a slow, melodic, high-pitched, and exaggerated cadence (Broesch & Bryant, 2015; Farran, Lee, Yoo & Oller, 2016; Fernald et al., 1989). From early in life, infants tune their attention to IDS, preferring to listen to IDS over adult-directed speech at birth (Cooper & Aslin, 1990), as well as later in infancy (Cooper & Aslin, 1994; Cooper et al., 1997; Fernald, 1985; Hayashi, Tamekawa & Kiritani, 2001; Kitamura & Lam, 2009; Newman & Hussain, 2006; Santesso et al., 2007; Werker & McLeod, 1989). [7]

Figure 14.8.2: Caregiver holding smiling infant up in arms. ([8])

Just like monolingual infants, multilingual infants prefer to listen to IDS compared to adult-directed speech (Byers-Heinlein et al., 2021). IDS is an important aspect of quality language exposure to infants not only because they prefer to listen to it, but also because it is related to greater language growth (García-Sierra, Ramírez-Esparza, Wig & Robertson, 2021). Caregivers who use more IDS have infants and toddlers with greater language abilities (Kalashnikova & Carreiras, 2021; Weisleder & Fernald, 2013). Multiple studies have found that greater exposure to IDS is related to a larger vocabulary size in multilingual infants (Ramírez-Esparza et al., 2017; Rosslund, Mayor, Óturai & Kartushina, 2021;). [7]

Reading

Reading with infants and toddlers is a powerful way to increase both the quantity and quality of language they are exposed to. Just reading one picture book every day can lead to an increase of approximately 78,000 words each year (Logan, Justice, Yumus & Chaparro-Moreno, 2019). Practices such as shared book reading, where a caregiver reads to a child, can support language acquisition (Dolean, 2021; Escobar, Melzi & Tamis-LeMonda, 2017; Tsybina & Eriks-Brophy, 2010) and literacy abilities (Rodriguez & Tamis-LeMonda, 2011; Sénéchal & LeFevre, 2002). However, some research suggests that caregivers may tend to emphasize one language over the other in their literacy practices, leading to unbalanced exposure to children's languages (Gonzalez-Barrero et al., 2021). Furthermore, caregivers often lack access to literacy materials in heritage languages and multilingual formats (Ahooja et al, 2021; Mosty, Lefever & Ragnarsdóttir, 2013; Zhang & Slaughter-Defoe, 2009). For example, Vietnamese families in Taiwan have very few children's books in Vietnamese at home (Yeh et al., 2015) and Chinese families living in San Francisco have very few resources in Chinese for young children at home (Lao, 2004). [9] [10]

Figure 14.8.3: Infant reading a book in Dutch. ([11])

To support the multilingual language development of infants and toddlers through reading, child care programs should have various age-appropriate multilingual books that represent the languages of the children enrolled. Multilingual caregivers who share a heritage language with children, should read in their shared language. Child care programs can invite multilingual family members and community members to come into the program to read with children in their heritage languages. To improve access to age-appropriate books, child care programs can consult enrolled families for quality books and even create multilingual books themselves!

Figure 14.8.4: Page from a multilingual book in English and American Sign Language (Copyright; author via source)

Reading with all children, but especially with infants and toddlers, should be about more than just simply reading the words on the pages. To improve the quality of shared reading, caregivers can implement dialogic reading strategies. Dialogic reading strategies help caregivers create an interaction with a child during shared reading. Dialogic reading typically involves recasts, expansions, and open-ended questions in an attempt to scaffold the interactive reading experience, all of which have been shown to have a positive impact on a child's language development (Baker & Nelson, 1984; Cleave et al., 2015; Girolametto & Weitzman, 2002; Huttenlocher et al., 2010; Opel, Ameer & Aboud, 2009). These strategies are known as the PEER sequence. By implementing the PEER sequence, the caregiver: [12]

- prompts the child to say something about the book,
- evaluates the child's response,

- expands the child's response, and
- repeats the prompt to help the child learn from the expansion.

A fundamental element of dialogic reading is the use of prompts to begin the PEER sequence while reading with a child. The acronym CROWD stands for five recommended prompts: [12]

- Completions
- Recalls
- Open questions
- Wh-questions
- Distancing questions

---

[1] Espinosa (2015). Challenges and benefits of early bilingualism in the US context. *Global Education Review*, *2*(1). CC by 3.0 NC

[2] Espinosa et al., (2017). Child care experiences among dual language learners in the United States: Analyses of the Early Childhood Longitudinal Study–Birth Cohort. *AERA Open*, *3*(2), 2332858417699380. CC by 4.0

[3] Meir & Janssen (2021). Child Heritage Language Development: An interplay between cross-linguistic influence and language-external factors. *Frontiers in Psychology*, *12*, 651730-651730. CC by 4.0

[4] Image from Ramírez & Kuhl (2020). Early second language learning through SparkLing™: Scaling up a language intervention in infant education centers. *Mind, Brain, and Education*, *14*(2), 94-103. CC by 4.0

[5] Luo et al., (2021). Parental beliefs and knowledge, Children's home language experiences, and school readiness: The dual language perspective. *Frontiers in Psychology*, *12*. CC by 4.0

[6] Rumper et al., (2021). Beyond translation: Caregiver collaboration in adapting an early language intervention. Frontiers in Education, 6.

[7] Byers-Heinlein et al., (2021). A multilab study of bilingual infants: Exploring the preference for infant-directed speech. *Advances in Methods and Practices in Psychological Science*, *4*(1), 2515245920974622. CC by 4.0

[8] Image by M.T ElGassier on Unsplash

[9] Fibla et al., (2021 preprint). Bilingual language development in infancy: What can we do to support bilingual families? CC by 4.0

[10] Ahooja et al., (2021, preprint). Family language policy among Québec-based parents raising multilingual infants and toddlers: A study of resources as a form of language management. CC by 4.0

[11] Image from Sven Brandsma on Unsplash

[12] Noble et al., (2020). The impact of interactive shared book reading on children's language skills: A randomized controlled trial. *Journal of Speech, Language, and Hearing Research*, *63*(6), 1878-1897. CC by 4.0

14.9: Conclusion

Conclusion for Multilingualism

Recognition of the value and benefits of raising multilingual children is growing here in the U.S. Unfortunately, many misconceptions about multilingualism continue to persist and most center-based child care programs are predominantly English-based. Nevertheless, there are many strategies caregivers can use to support the development of heritage languages and English that help establish a strong foundation for later language, literacy, cognitive and academic outcomes.

14.10: References

References for Multilingualism

- Adamson, L. B., Caughy, M. O. B., Bakeman, R., Rojas, R., Owen, M. T., Tamis-LeMonda, C. S., Pacheco, D., Pace, A. & Suma, K. (2021). The quality of mother-toddler communication predicts language and early literacy in Mexican American children from low-income households. *Early Childhood Research Quarterly, 56*, 167-179.
- Ahooja, A., Brouillard, M., Quirk, E., Ballinger, S., Polka, L., Byers-Heinlein, K., & Kircher, R. (2021, preprint). Family language policy among Québec-based parents raising multilingual infants and toddlers: A study of resources as a form of language management. https://doi.org/10.31234/osf.io/sa7h5
- Albareda-Castellot, B., Pons, F., & Sebastián-Gallés, N. (2011). The acquisition of phonetic categories in bilingual infants: New data from an anticipatory eye movement paradigm. *Developmental Science, 14*(2), 395-401.
- Anderson, J. A. E., Mak, L., Keyvani Chahi, A., Bialystok, E. (2018). The language and social background questionnaire: Assessing degree of bilingualism in a diverse population. *Behavior Research Methods*, *50*(1), 250–263.
- Arredondo, M. M., Aslin, R. N., & Werker, J. F. (2021). Bilingualism alters infants' cortical organization for attentional orienting mechanisms. *Developmental Science*.
- Baker, C. (2006). *Foundations of bilingual education and bilingualism* (4th Ed.). Clevedon: Multilingual Matters.
- Baker, N. D., & Nelson, K. E. (1984). Recasting and related conversational techniques for triggering syntactic advances by young children. *First Language, 5*(13), 3-21.
- Barac, R., Bialystok, E., Castro, D. C., & Sanchez, M. (2014). The cognitive development of young dual language learners: A critical review. *Early Childhood Research Quarterly, 29*(4), 699-714.
- Baum, S., Titone, D. (2014). Moving toward a neuroplasticity view of bilingualism, executive control, and aging. *Applied Psycholinguistics, 35*(5), 857–894.
- Bergelson, E., & Swingley, D. (2012). At 6–9 months, human infants know the meanings of many common nouns. *Proceedings of the National Academy of Sciences, 109*(9), 3253-3258.
- Berken, J. A., Gracco, V. L., Chen, J. K., & Klein, D. (2016). The timing of language learning shapes brain structure associated with articulation. *Brain Structure and Function, 221*(7), 3591-3600.
- Berken, J. A., Gracco, V. L., & Klein, D. (2017). Early bilingualism, language attainment, and brain development. *Neuropsychologia, 98*, 220-227.
- Bialystok, E. (2001). *Bilingualism in development: Language, literacy, and cognition*. Cambridge University Press.
- Bialystok, E. (2011). Coordination of executive functions in monolingual and bilingual children. J*ournal of Experimental Child Psychology, 110*(3), 461-468.
- Bialystok, E. (2017). The bilingual adaptation: How minds accommodate experience. *Psychological Bulletin, 143*(3), 233.
- Bialystok, E., Craik, F. I., & Luk, G. (2012). Bilingualism: consequences for mind and brain. *Trends in Cognitive Sciences, 16*(4), 240-250.
- Bosch, L., & Sebastián-Gallés, N. (2001). Evidence of early language discrimination abilities in infants from bilingual environments. *Infancy, 2*(1), 29-49.
- Bosworth, R. G., Binder, E. M., Tyler, S. C., & Morford, J. P. (2021). Automaticity of lexical access in deaf and hearing bilinguals: Cross-linguistic evidence from the color Stroop task across five languages. *Cognition, 212*, 104659.
- Broesch, T. L., & Bryant, G. A. (2015). Prosody in infant-directed speech is similar across western and traditional cultures. *Journal of Cognition and Development, 16*(1), 31-43.
- Byers-Heinlein, K., Burns, T. C., & Werker, J. F. (2010). The roots of bilingualism in newborns. *Psychological Science, 21*(3), 343-348.
- Byers-Heinlein, K., Morin-Lessard, E., & Lew-Williams, C. (2017). Bilingual infants control their languages as they listen. *Proceedings of the National Academy of Sciences, 114*(34), 9032-9037.
- Byers-Heinlein, K., Tsui, A. S. M., Bergmann, C., Black, A. K., Brown, A., Carbajal, M. J., Durrant, S., Fennell, C. T., Fiévet, A., Frank, M. C., Gampe, A., Gervain, J., Gonzalez-Gomez, N., Hamlin, J. K., Havron, N., Hernik, M., Kerr, S., Killam, H., Klassen, K., Kosie, J. E., Kovács, A. M., Lew-Williams, C., Liu, L. Mani, N., Marino, C., Mastroberardino, M. Mateu, V., Noble, C., Orena, A. J., Polka, L., Potter, C. E., Schreiner, M. S., Singh, L., Soderstrom, M., Sundara, M. Waddell, C., Werker, J. F., Wermelinger, S. & Wermelinger, S. (2021). A Multilab Study of Bilingual Infants: Exploring the Preference for Infant-Directed Speech. *Advances in Methods and Practices in Psychological Science, 4*(1), 2515245920974622.

- Cha, K., & Goldenberg, C. (2015). The complex relationship between bilingual home language input and kindergarten children's Spanish and English oral proficiencies. *Journal of Educational Psychology, 107*(4), 935.
- Chernoff, J. J., Keuter, S., Uchikoshi, Y., Quick, H., & Manship, K. (2021). *Challenges in assessing California's diverse dual language learners*. First 5 California. Available at: https://californiadllstudy.org/sites/default/files/2021-02/Challenges%20in%20Assessing%20California%E2%80%99s%20Diverse%20DLLs.pdf
- Chong, A. J., Vicenik, C., & Sundara, M. (2018). Intonation plays a role in language discrimination by infants. *Infancy, 23*(6), 795-819.
- Cleave, P. L., Becker, S. D., Curran, M. K., Van Horne, A. J. O., & Fey, M. E. (2015). The efficacy of recasts in language intervention: A systematic review and meta-analysis. *American Journal of Speech-Language Pathology, 24*(2), 237-255.
- Conboy, B. (2013). Neuroscience research: How experience with one or multiple languages affects the developing brain. In *California's best practices for young dual language learners: Research overview papers*, Child Development Division, California Department of Education (CDE). Available online at http://www.cde.ca.gov/sp/cd/ce/documents/dllresearchpapers.pdf
- Conboy, B. T., & Kuhl, P. K. (2011). Impact of second-language experience in infancy: Brain measures of first-and second-language speech perception. *Developmental Science, 14*(2), 242-248.
- Cooper, R. P., Aslin, R. N. (1990). Preference for infant-directed speech in the first month after birth. *Child Development, 61*(5), 1584–1595.
- Cooper, R. P., Aslin, R. N. (1994). Developmental differences in infant attention to the spectral properties of infant-directed speech. *Child Development, 65*(6), 1663–1677.
- Core, C., Hoff, E., Rumiche, R., & Señor, M. (2013). Total and conceptual vocabulary in Spanish–English bilinguals from 22 to 30 months: Implications for assessment. *Journal of Speech, Language, and Hearing Research, 56*, 1637–1649.
- Crescentini, C., Marini, A., and Fabbro, F. (2012). Competence and language disorders in multilingualism. *ELLE Language Education, 1*, 81–98.
- Crivello, C., Kuzyk, O., Rodrigues, M., Friend, M., Zesiger, P., & Poulin-Dubois, D. (2016). The effects of bilingual growth on toddlers' executive function. *Journal of Experimental Child Psychology, 141*, 121-132.
- DeAnda, S., Hendrickson, K., Zesiger, P., Poulin-Dubois, D., & Friend, M. (2018). Lexical access in the second year: a study of monolingual and bilingual vocabulary development. *Bilingualism: Language and Cognition, 21*(2), 314-327.
- de Bruin, A . (2019). Not all bilinguals are the same: A call for more detailed assessments and descriptions of bilingual experiences. *Behavioral Sciences, 9*(3), 33.
- Dolean, D. D. (2021). Home literacy practices that support language and literacy development in bilingual children: A longitudinal case study. International *Journal of Bilingual Education and Bilingualism*, 1-15.
- Escobar, K., Melzi, G., & Tamis-LeMonda, C. S. (2017). Mother and child narrative elaborations during booksharing in low-income Mexican-American dyads. *Infant and Child Development, 26*(6), e2029.
- Espinosa, L. M., LaForett, D. R., Burchinal, M., Winsler, A., Tien, H. C., Peisner-Feinberg, E. S., & Castro, D. C. (2017). Child care experiences among dual language learners in the United States: Analyses of the Early Childhood Longitudinal Study–Birth Cohort. *AERA Open, 3*(2), 2332858417699380.
- Farran, L. K., Lee, C. C., Yoo, H., & Oller, D. K. (2016). Cross-cultural register differences in infant-directed speech: An initial study. *PloS One, 11*(3), e0151518.
- Fenson, L., Dale, P. S., Reznick, J. S., Bates, E., Thal, D. J., Pethick, S. J., Tomasello, M., Mervis, C. B. & Stiles, J. (1994). Variability in early communicative development. *Monographs of the Society for Research in Child Development*, i-185.
- Ferjan Ramírez, N., Ramírez, R. R., Clarke, M., Taulu, S., & Kuhl, P. K. (2016). Speech discrimination in 11-month-old bilingual and monolingual infants: A magnetoencephalography study. *Developmental Science, 14*(2), 94-103.
- Fernald, A. (1985). Four-month-old infants prefer to listen to motherese. *Infant Behavior and Development, 8*(2), 181–195.
- Fernald, A., Perfors, A., & Marchman, V. A. (2006). Picking up speed in understanding: Speech processing efficiency and vocabulary growth across the 2nd year. *Developmental Psychology, 42*(1), 98.
- Fernald, A., Taeschner, T., Dunn, J., Papousek, M., de Boysson-Bardies, B., Fukui, I. (1989). A cross-language study of prosodic modifications in mothers' and fathers' speech to preverbal infants. *Journal of Child Language, 16*(3), 477–501.
- Francis, W. S. (Ed.). (2021). *Bilingualism across the lifespan: Opportunities and challenges for cognitive research in a global society*. New York: Routledge.
- García, E. E., & Frede, E. C. (Eds.). (2019). *Young English language learners: Current research and emerging directions for practice and policy*. New York: Teacher's College Press.

- Garcia, L. N., Guerrero-Mosquera, C., Colomer, M., & Sebastian-Galles, N. (2018). Evoked and oscillatory EEG activity differentiates language discrimination in young monolingual and bilingual infants. *Scientific Reports, 8*(1), 1-9.
- Garcia-Sierra, A., Ramírez-Esparza, N., & Kuhl, P. K. (2016). Relationships between quantity of language input and brain responses in bilingual and monolingual infants. *International Journal of Psychophysiology, 110*, 1-17.
- Garcia-Sierra, A., Rivera-Gaxiola, M., Percaccio, C. R., Conboy, B. T., Romo, H., Klarman, L., Ortiz, S. & Kuhl, P. K. (2011). Bilingual language learning: An ERP study relating early brain responses to speech, language input, and later word production. *Journal of Phonetics, 39*(4), 546-557.
- García-Sierra, A., Ramírez-Esparza, N., Wig, N., & Robertson, D. (2021). Language learning as a function of infant directed speech (IDS) in Spanish: Testing neural commitment using the positive-MMR. *Brain and Language, 212*, 104890.
- Giguere, D., Dickson, D. J., Tulloch, M. K., & Hoff, E. (2022). Majority language skill, not measures of bilingualism, predicts executive attention in bilingual children. *Journal of Experimental Child Psychology, 213*, 105256.
- Girolametto, L., & Weitzman, E. (2002). Responsiveness of child care providers in interactions with toddlers and preschoolers. *Language, Speech, and Hearing Services in Schools, 33*(4),
- 268–281.
- Gonzalez-Barrero, A. M., & Nadig, A. S. (2019). Can bilingualism mitigate set-shifting difficulties in children with autism spectrum disorders? *Child Development, 90*(4), 1043-1060.
- Gonzalez-Barrero, A. M., Salama-Siroishka, N., Dubé, D., Brouillard, M., & Byers-Heinlein, K. (2021). Effects of language dominance on home reading practices of bilingual families. *International Journal of Bilingualism, 25*(1), 77-99.
- Grosjean, F. (1989). Neurolinguists, beware! The bilingual is not two monolinguals in one person. *Brain and Language, 36*(1), 3–15.
- Grüter, T., Hurtado, N., Marchman, V. A., & Fernald, A. (2014). Language exposure and online processing efficiency in bilingual development: Relative versus absolute measures. In T. Grüter & J. Paradis (Eds.), *Input and experience in bilingual development* (pp. 15-36). John Benjamins Publishing Company.
- Gunnerud, H. L., Ten Braak, D., Reikerås, E. K. L., Donolato, E., & Melby-Lervåg, M. (2020). Is bilingualism related to a cognitive advantage in children? A systematic review and meta-analysis. *Psychological Bulletin, 146*(12), 1059.
- Hammer, C. S., & Sawyer, B. (2016). Effects of a culturally responsive interactive book-reading intervention on the language abilities of preschool dual language learners: A pilot study. *NHSA Dialog, 19*(2).
- Hayakawa, S., & Marian, V. (2019). Consequences of multilingualism for neural architecture. *Behavioral and Brain Functions, 15*(1), 1-24.
- Hayashi, A., Tamekawa, Y., Kiritani, S. (2001). Developmental change in auditory preferences for speech stimuli in Japanese infants. *Journal of Speech, Language, and Hearing Research, 44*(6), 1189–1200.
- Hernandez, D. J., & Napeirala, J. S. (2012). *Children in immigrant families: Essential to America's future*. *FCD Child and Youth Well-Being Index (CWI) Policy Brief*. New York, NY: Foundation for Child Development.
- Hirsh-Pasek, K., Adamson, L. B., Bakeman, R., Owen, M. T., Golinkoff, R. M., Pace, A., Yust, P. & Suma, K. (2015). The contribution of early communication quality to low-income children's language success. *Psychological Science, 26*(7), 1071-1083.
- Hoff, E. (2006). How social contexts support and shape language development. *Developmental Review, 26*(1), 55-88.
- Hoff, E., Core, C., Place, S., Rumiche, R., Señor, M., & Parra, M. (2012). Dual language exposure and early bilingual development. *Journal of Child Language, 39*(1), 1-27.
- Holtby, S., Lordi, N., Park, R., & Ponce, N. (2017). *Families with young children in California: Findings from the California Health Interview Survey, 2011-2014, by geography and home language. Policy brief (UCLA Center for Health Policy Research)*, (PB2017-3), 1-8.
- Hurtado, N., Grüter, T., Marchman, V. A., & Fernald, A. (2014). Relative language exposure, processing efficiency and vocabulary in Spanish–English bilingual toddlers. *Bilingualism: Language and Cognition, 17*(1), 189-202.
- Hurtado, N., Marchman, V. A., & Fernald, A. (2007). Spoken word recognition by Latino children learning Spanish as their first language. *Journal of Child Language, 34*(2), 227-249.
- Huttenlocher, J., Waterfall, H., Vasilyeva, M., Vevea, J., & Hedges, L. V. (2010). Sources of variability in children's language growth. *Cognitive Psychology, 61*(4), 343-365.
- Jasinska, K. K., & Petitto, L. A. (2013). How age of bilingual exposure can change the neural systems for language in the developing brain: A functional near infrared spectroscopy investigation of syntactic processing in monolingual and bilingual children. *Developmental Cognitive Neuroscience, 6*, 87-101.
- Jonak, J. (2015). Bilingual language development and language impairment in children. *Acta Neuropsychologica, 13*(1).

- Junker, D. A., & Stockman, I. J. (2002). Expressive vocabulary of German-English bilingual toddlers. *American Journal of Speech-Language Pathology, 11*, 381–394.
- Kalashnikova, M., & Carreiras, M. (2021). Input quality and speech perception development in bilingual infants' first year of life. *Child Development*.
- Kaushanskaya, M., Prior, A. (2015). Variability in the effects of bilingualism on cognition: It is not just about cognition, it is also about bilingualism. *Bilingualism: Language and Cognition*, *18*(1), 27–28.
- Kay-Raining Bird, E., Lamond, E., & Holden, J. (2012). Survey of bilingualism in autism spectrum disorders. *International Journal of Language & Communication Disorders*, *47*(1), 52-64.
- Kids Count Data Center. (2019). *Children who speak a language other than English at home*. Annie Casey Foundation. Available at: https://datacenter.kidscount.org/data/bar/81-children-who-speak-a-language-other-than-english-at-home?loc=1&loct=2#1/any/false/1729/any/397
- Kim, Y. K., Curby, T. W., & Winsler, A. (2014). Child, family, and school characteristics related to English proficiency development among low-income, dual language learners. *Developmental Psychology*, *50*(12), 2600.
- Kitamura, C., & Lam, C. (2009). Age-specific preferences for infant-directed affective intent. *Infancy*, *14*(1), 77-100.
- Klein, D., Mok, K., Chen, J. K., & Watkins, K. E. (2014). Age of language learning shapes brain structure: A cortical thickness study of bilingual and monolingual individuals. *Brain and language*, *131*, 20-24.
- Kohnert, K. (2010). Bilingual children with primary language impairment: Issues, evidence and implications for clinical actions. *Journal of Communication Disorders*, *43*(6), 456-473.
- Kohnert, K., Ebert, K. D., & Pham, G. T. (2020). *Language disorders in bilingual children and adults* (3rd ed.). Plural Publishing.
- Kovács, Á. M., & Mehler, J. (2009). Cognitive gains in 7-month-old bilingual infants. *Proceedings of the National Academy of Sciences*, *106*(16), 6556-6560.
- Kremin, L. V., & Byers-Heinlein, K. (2021). Why not both? Rethinking categorical and continuous approaches to bilingualism. *International Journal of Bilingualism*, *25*(6), 1560-1575.
- Kroll, J. F., & Bialystok, E. (2013). Understanding the consequences of bilingualism for language processing and cognition. *Journal of Cognitive Psychology*, *25*(5), 497-514.
- Kroll, J. F., Bobb, S. C., & Hoshino, N. (2014). Two languages in mind: Bilingualism as a tool to investigate language, cognition, and the brain. *Current Directions in Psychological Science*, *23*(3), 159-163.
- Kroll, J. F., Dussias, P. E., Bogulski, C. A., & Kroff, J. R. V. (2011). Juggling two languages in one mind: What bilinguals tell us about language processing and its consequences for cognition. *Psychology of Learning and Motivation*, *56*, 229–263.
- Kuhl, P. K., Conboy, B. T., Padden, D., Nelson, T., & Pruitt, J. (2005). Early speech perception and later language development: Implications for the" critical period". *Language learning and development*, *1*(3-4), 237-264.
- Kuhl, P. K., Stevens, E., Hayashi, A., Deguchi, T., Kiritani, S., & Iverson, P. (2006). Infants show a facilitation effect for native language phonetic perception between 6 and 12 months. *Developmental Science*, *9*(2), F13-F21.
- Kuhl, P. K., Stevenson, J., Corrigan, N. M., van den Bosch, J. J., Can, D. D., & Richards, T. (2016). Neuroimaging of the bilingual brain: Structural brain correlates of listening and speaking in a second language. *Brain and Language*, *162*, 1-9.
- Lambert, W. E., Havelka, J., Gardner, R. C. (1959). Linguistic manifestations of bilingualism. *The American Journal of Psychology*, *72*(1), 77–82.
- Lao, C. (2004). Parents' attitudes toward Chinese–English bilingual education and Chinese-language use. *Bilingual Research Journal*, *28*(1), 99-121.
- Lehtonen, M., Soveri, A., Laine, A., Järvenpää, J., De Bruin, A., & Antfolk, J. (2018). Is bilingualism associated with enhanced executive functioning in adults? A meta-analytic review. Psychological Bulletin, 144(4), 394.
- Li, P., Sepanski, S., Zhao, X. (2006). Language history questionnaire: A web-based interface for bilingual research. *Behavior Research Methods*, *38*(2), 202–210.
- Logan, J. A., Justice, L. M., Yumus, M., & Chaparro-Moreno, L. J. (2019). When children are not read to at home: The million word gap. *Journal of Developmental & Behavioral Pediatrics*, *40*(5), 383-386.
- Lowe, C. J., Cho, I., Goldsmith, S. F., & Morton, J. B. (2021). The bilingual advantage in children's executive functioning is not related to language status: A meta-analytic review. *Psychological Science*, *32*(7), 1115-1146.
- Luo, R., Song, L., Villacis, C., & Santiago-Bonilla, G. (2021). Parental beliefs and knowledge, children's home language experiences, and school readiness: The dual language perspective. *Frontiers in Psychology*, *12*.
- Luo, R., Tamis-LeMonda, C. S., Kuchirko, Y., F. Ng, F., & Liang, E. (2014). Mother–child book-sharing and children's storytelling skills in ethnically diverse, low-income families. *Infant and Child Development*, *23*(4), 402-425.

- Magnuson, K. A., & Waldfogel, J. (2005). Early childhood care and education: Effects on ethnic and racial gaps in school readiness. *The Future of Children*, 169-196.
- Marchman, V. A., & Fernald, A. (2008). Speed of word recognition and vocabulary knowledge in infancy predict cognitive and language outcomes in later childhood. *Developmental Science*, *11*(3), F9-F16.
- Marchman, V. A., Fernald, A., & Hurtado, N. (2010). How vocabulary size in two languages relates to efficiency in spoken word recognition by young Spanish–English bilinguals. *Journal of Child Language, 37*(4), 817-840.
- Marian, V., Blumenfeld, H. K., Kaushanskaya, M. (2007). The Language Experience and Proficiency Questionnaire (LEAP-Q): Assessing language profiles in bilinguals and multilinguals. *Journal of Speech Language and Hearing Research, 50*(4), 940–967.
- Marian, V., Hayakawa, S. (2020). Measuring bilingualism: The quest for a “bilingualism quotient.” *Applied Psycholinguistics*, *42*(2), 527–548.
- Marian, V., & Shook, A. (2012). The cognitive benefits of being bilingual. In *Cerebrum: the Dana forum on brain science* (Vol. 2012). Dana Foundation.
- Masek, L. R., Paterson, S. J., Golinkoff, R. M., Bakeman, R., Adamson, L. B., Owen, M. T., Pace, A. & Hirsh-Pasek, K. (2021). Beyond talk: Contributions of quantity and quality of communication to language success across socioeconomic strata. *Infancy, 26*(1), 123-147.
- Mechelli, A., Crinion, J. T., Noppeney, U., O'Doherty, J., Ashburner, J., Frackowiak, R. S., & Price, C. J. (2004). Neurolinguistics: Structural plasticity in the bilingual brain. *Nature*, *431*, 757.
- Mercure, E., Evans, S., Pirazzoli, L., Goldberg, L., Bowden-Howl, H., Coulson-Thaker, K., Beedie, I., Lloyd-Fox, S., Johnson, M. H. & MacSweeney, M. (2020). Language experience impacts brain activation for spoken and signed language in infancy: Insights from unimodal and bimodal bilinguals. *Neurobiology of Language, 1*(1), 9-32.
- Mistry, R. S., Biesanz, J., Chien, N., Howes, C., & Benner, A. D. (2008). Socioeconomic status, parental investments, and the cognitive and behavioral outcomes of low-income children from immigrant and native households. *Early Childhood Research Quarterly, 23*, 193-212.
- Molnar, M., Gervain, J., & Carreiras, M. (2014). Within-rhythm class native language discrimination abilities of Basque-Spanish monolingual and bilingual infants at 3.5 months of age. *Infancy, 19*(3), 326-337.
- Mosty, N. L., Lefever, S., & Ragnarsdóttir, H. (2013). Parents’ perspectives towards home language and bilingual development of preschool children. *Netla–Online Journal on Pedagogy and Educatio*n, 1–18.
- Nazzi, T., Bertoncini, J., & Mehler, J. (1998). Language discrimination by newborns: Toward an understanding of the role of rhythm. *Journal of Experimental Psychology, 24*(3), 756.
- Nayeb, L., Lagerberg, D., Sarkadi, A., Salameh, E. K., & Eriksson, M. (2021). Identifying language disorder in bilingual children aged 2.5 years requires screening in both languages. *Acta Paediatrica*, *110*(1), 265-272.
- Nazzi, T., Jusczyk, P. W., & Johnson, E. K. (2000). Language discrimination by English-learning 5-month-olds: Effects of rhythm and familiarity. *Journal of Memory and Language*, *43*(1), 1-19.
- Newman, R. S., Hussain, I. (2006). Changes in preference for infant-directed speech in low and moderate noise by 4.5- to 13-month-olds. *Infancy, 10*(1), 61–76.
- Nichols, E. S., Wild, C. J., Stojanoski, B., Battista, M. E., & Owen, A. M. (2020). Bilingualism affords no general cognitive advantages: A population study of executive function in 11,000 people. *Psychological Science*, *31*(5), 548-567.
- Opel, A., Ameer, S. S., & Aboud, F. E. (2009). The effect of preschool dialogic reading on vocabulary among rural Bangladeshi children. *International Journal of Educational Research, 48*(1), 12-20.
- Pace, A., Alper, R., Burchinal, M. R., Golinkoff, R. M., & Hirsh-Pasek, K. (2019). Measuring success: Within and cross-domain predictors of academic and social trajectories in elementary school. *Early Childhood Research Quarterly, 46*, 112-125.
- Paradis, J., Genesee, F., & Crago, M. B. (2011). Dual language development and disorders. *A handbook on bilingualism and second language learning*. Baltimore, MD: Brookes.
- Paap, K. R., & Greenberg, Z. I. (2013). There is no coherent evidence for a bilingual advantage in executive processing. *Cognitive Psychology, 66*(2), 232-258.
- Paap, K. R., Johnson, H. A., & Sawi, O. (2015). Bilingual advantages in executive functioning either do not exist or are restricted to very specific and undetermined circumstances. *Cortex, 69*, 265-278.
- Pearson, B. Z., Fernández, S. C., Lewedeg, V., & Oller, D. K. (1997). The relation of input factors to lexical learning by bilingual infants. *Applied Psycholinguistics, 18*(1), 41-58.
- Peña, E. D., Gutiérrez-Clellen, V. F., Iglesias, A., Goldstein, B. A., & Bedore, L. M. (2018). *Bilingual English Spanish Assessment (BESA)*. Baltimore, MD: Brookes.

- Peña, E., Iglesias, A., & Lidz, C. S. (2001). Reducing test bias through dynamic assessment of children's word learning ability. *American Journal of Speech Language Pathology, 10*, 138–154.
- Petitto, L. A., Berens, M. S., Kovelman, I., Dubins, M. H., Jasinska, K., & Shalinsky, M. (2012). The "Perceptual Wedge Hypothesis" as the basis for bilingual babies' phonetic processing advantage: New insights from fNIRS brain imaging. *Brain and Language, 121*(2), 130-143.
- Pliatsikas, C. (2020). Understanding structural plasticity in the bilingual brain: The dynamic restructuring model. *Bilingualism: Language and Cognition, 23*(2), 459-471.
- Place, S., & Hoff, E. (2011). Properties of dual language exposure that influence 2-year-olds' bilingual proficiency. *Child Development, 82*(6), 1834-1849.
- Ramírez-Esparza, N., García-Sierra, A., & Kuhl, P. K. (2017). The impact of early socialinteractions on later language development in Spanish–English bilingual infants. *Child Development, 88*(4), 1216-1234.
- Ramus, F., Hauser, M. D., Miller, C., Morris, D., & Mehler, J. (2000). Language discrimination by human newborns and by cotton-top tamarin monkeys. *Science, 288*(5464), 349-351.
- Restrepo, M. A., & Kruth, K. (2000). Grammatical characteristics of a Spanish-English bilingual child with specific language impairment. *Communication Disorders Quarterly, 21*(2), 66-76.
- Rodriguez, E. T., & Tamis-LeMonda, C. S. (2011). Trajectories of the home learning environment across the first 5 years: Associations with children's vocabulary and literacy skills at prekindergarten. *Child Development, 82*(4), 1058-1075.
- Rowe, M. L., & Weisleder, A. (2020). Language development in context. *Annual Review of*
- *Developmental Psychology, 2*, 201-223.
- Rosslund, A., Mayor, J., Óturai, G., & Kartushina, N. (2021, preprint). Parents' hyper-pitch and vowel category compactness in infant-directed speech are associated with 18-month-old toddlers' expressive vocabulary. https://doi.org/10.31234/osf.io/wrku5
- Santesso, D. L., Schmidt, L. A., Trainor, L. J. (2007). Frontal brain electrical activity (EEG) and heart rate in response to affective infant-directed (ID) speech in 9-month-old infants. *Brain and Cognition, 65*(1), 14–21.
- Sénéchal, M., & LeFevre, J. A. (2002). Parental involvement in the development of children's reading skill: A five-year longitudinal study. *Child Development, 73*(2), 445-460.
- Shook, A., & Marian, V. (2012). Bimodal bilinguals co-activate both languages during spoken comprehension. *Cognition, 124*(3), 314-324.
- Simons, G. F., and Fennig, C. D. (2018). *Ethnologue: Languages of the world* (21st ed). Dallas, TX: SIL International.
- Song, L., Luo, R., & Liang, E. (2021). Dual language development of Chinese 3-and 4-Year-Olds: Associations with the family context and teachers' language use. *Early Education and Development*, 1-24.
- Storch, S. A., & Whitehurst, G. J. (2002). Oral language and code-related precursors to reading: Evidence from a longitudinal structural model. *Developmental Psychology, 38*(6), 934.
- Takahesu Tabori, A. A., Mech, E. N., Atagi, N. (2018). Exploiting language variation to better understand the cognitive consequences of bilingualism. *Frontiers in Psychology, 9*, 1686.
- Tamis-LeMonda, C. S., Song, L., Luo, R., Kuchirko, Y., Kahana-Kalman, R., Yoshikawa, H., & Raufman, J. (2014). Children's vocabulary growth in English and Spanish across early development and associations with school readiness skills. *Developmental Neuropsychology, 39*(2), 69-87.
- Tincoff, R., & Jusczyk, P. W. (1999). Some beginnings of word comprehension in 6-month-olds. *Psychological Science, 10*(2), 172-175.
- Tincoff, R., & Jusczyk, P. W. (2012). Six-month-olds comprehend words that refer to parts of the body. *Infancy, 17*(4), 432-444.
- Unsworth, S. (2016). Quantity and quality of language input in bilingual language development. In *Bilingualism across the lifespan* (pp. 103-122). De Gruyter Mouton.
- U.S. Census, (2018). Special report: Supporting dual language learners in state-funded preschool. Available online at: http://nieer.org/wp-content/uploads/2018/04/YB2017_DLL-Special-Report.pdf
- Villwock, A., Wilkinson, E., Piñar, P., & Morford, J. P. (2021). Language development in deaf bilinguals: Deaf middle school students co-activate written English and American Sign Language during lexical processing. *Cognition, 211*, 104642.
- Ward, H., Oldham LaChance, E., Atkins, J. (2011). *New Americans: Child care decision-making of refugee and immigrant parents of English language learners*. Portland, ME: Muskie School of Public Service.
- Weisleder, A., & Fernald, A. (2013). Talking to children matters: Early language experience strengthens processing and builds vocabulary. *Psychological Science, 24*(11), 2143-2152.
- Werker, J. F., & McLeod, P. J. (1989). Infant preference for both male and female infant-directed talk: A developmental study of attentional and affective responsiveness. *Canadian Journal of Psychology, 43*(2), 230.

- Werker, J. F., & Tees, R. C. (2005). Speech perception as a window for understanding plasticity and commitment in language systems of the brain. *Developmental Psychobiology, 46*(3), 233-251.
- Willard, J. A., Kohl, K., Bihler, L. M., Agache, A., & Leyendecker, B. (2021). Family literacy activities and their interplay with family and preschool language environments: Links to gains in dual language learners' German vocabulary. *Early Education and Development, 32*(2), 189-208.
- Winsler, A., Burchinal, M. R., Tien, H. C., Peisner-Feinberg, E., Espinosa, L., Castro, D. C., LaForett, D., Kim, Y. K. & De Feyter, J. (2014). Early development among dual language learners: The roles of language use at home, maternal immigration, country of origin, and socio-demographic variables. *Early Childhood Research Quarterly, 29*(4), 750-764.
- Yeh, Y. C., Ho, H. J., & Chen, M. C. (2015). Learning Vietnamese as a heritage language in Taiwan. *Journal of Multilingual and Multicultural Development, 36*(3), 255-265.
- Zhang, D., & Slaughter-Defoe, D. T. (2009). Language attitudes and heritage language maintenance among Chinese immigrant families in the USA. *Language, Culture and Curriculum, 22*(2), 77-93.
- Zhao, T. C., Boorom, O., Kuhl, P. K., & Gordon, R. (2021). Infants' neural speech discrimination predicts individual differences in grammar ability at 6 years of age and their risk of developing speech-language disorders. *Developmental Cognitive Neuroscience, 48*, 100949.

CHAPTER OVERVIEW

15: Emotional Development

15.1: Introduction

Introduction to Emotional Development

It is impossible to imagine life without emotion. We treasure our feelings: the joy at a ball game, the pleasure of a loved one's touch, or the fun with friends on a night out. Even negative emotions are essential, such as the sadness when a loved one dies, anger when treated unfairly, fear that overcomes us in a scary or unknown situation, or guilt and shame when our wrongs are made public. Emotions invigorate life experiences and give those experiences meaning and flavor.[1]

Research and theory often divide emotions into 2 general categories: basic emotions (primary emotions) and self-conscious emotions (secondary emotions). Basic emotions appear first and include interest, happiness, anger, fear, surprise, sadness, and disgust. Self-conscious emotions include envy, pride, shame, guilt, doubt, and embarrassment. Unlike primary emotions, secondary emotions appear as children develop a self-concept and require social interactions to know when to feel such emotions (Akimoto & Sanbinmatsu, 1999) [1].

The core features of emotional development include the ability to identify and understand one's feelings, accurately read and comprehend emotional states in others, manage and express strong emotions constructively, regulate one's behavior, develop empathy for others, and establish and maintain relationships (National Scientific Council on the Developing Child, 2004). Infants experience, express, and perceive emotions before they fully understand them. In learning to recognize, label, manage, and communicate their emotions, and to perceive and attempt to understand the emotions of others, children build skills that connect them with family, peers, teachers, and the community[2] .

Figure 15.1.1: Displaying Emotions. ([3])

[1] Hwang, H. & Matsumoto, D. (2021). Functions of emotions is licensed CC-BY-SA

[2] California Department of Education (CDE Press). *Development Foundations: Social-Emotional Development* . Is used with permission

[1] Image by Nina Kuchkovskiy is licensed CC: BY-NC

15.2: Theories of Emotion

Exploring the Theories of Emotion

Our experiences, backgrounds, and cultures inform our emotions. Therefore, people may have different emotional experiences when confronting similar circumstances. Several theories of emotion try to explain how the various components of emotion interact with one another[1].

Below is a table of several theories surrounding emotional development. As an infant and toddler caregiver, it may not be necessary to understand each theory's details, but knowing multiple theories exist that explain the process of emotional development is important.

The theories outlined in the table come from[1]

Theories of Emotion

Theory	Major Components
James-Lange Theory	• Emotions arise from physiological arousal • You only experience a feeling of fear after physiological arousal takes place • Different arousal patterns are associated with different feelings
Cannon-Bard Theory	• Physiological arousal and emotional experience occur simultaneously yet independently (Lang, 1994) • Emotional reactions are separate and independent of the physiological arousal, even though they co-occur
Facial Feedback Hypothesis	• A person's facial expression affects emotional experience (Adelman & Zajonc, 1989; Boiger & Mesquita, 2012; Buck, 1980; Capella, 1993; Soussignan, 2002) • Suppression of facial expression lowers the intensity of some emotions experienced by participants (Davis, Senghas & Ochsner, 2009). • Intensities of facial expressions affect emotional reactions (Soussignan, 2002). • If something insignificant occurs and you smile as if you just won the lottery, you will be happier about the little things than you would be if you only had a tiny smile • If you walk around frowning all the time, it might cause you to have fewer positive emotions than you would if you had smiled
Schachter-Singer Two-Factor Theory	• Considers both physiological arousal and emotional experience • Physiological arousal is interpreted in context to produce the emotional experience • Depends on labeling the physiological experience, which is a type of cognitive appraisal
Cognitive-Mediational Theory	• Our appraisal of the stimulus determines our emotions • This appraisal mediates between the stimulus • and the emotional response, and it is immediate and often unconscious • The assessment precedes a cognitive label
Automatic Emotional Regulation (AER)	• Non-deliberate control of emotions influences the things you attend to, your appraisal, your choice to engage in an emotional experience, and your behaviors after the emotion is experienced (Mauss, Bunge & Gross, 2007; Mauss, Levenson, McCarter, Wilhelm & Gross, 2005) • People develop an automatic process that works like a script or schema, and the process does not require deliberate thought to regulate emotions • AER works like riding a bicycle. Once you develop the process, you just do it without thinking about it

Theory	Major Components
Constructivist Theory of Emotional Development	• Emotions are not built into the brain at birth, but instead, they are constructed based on your experiences • Emotions are predictions that create an understanding of the world • 2 identical physiological states can result in different emotional states depending on your predictions • Example: A brain predicting a churning stomach in a bakery could lead to a brain constructing hunger. However, a brain experiencing a churning stomach while waiting for medical test results could lead a brain to construct worry. Thus, a brain can construct 2 different emotions from the same physiological sensations
Appraisal Theory	• You have thoughts (a cognitive appraisal) before you experience an emotion • The emotion you experience depends on your thoughts (Frijda, 1988; Lazarus, 1991) • Appraisal theory explains the way 2 people can have 2 completely different emotions regarding the same event

[1] Emotion and Motivation is shared under a CC BY 4.0 license and was authored, remixed, and/or curated by OpenStax

[2] Stangor, C. and Walinga, J. (2014). Introduction to Psychology – 1st Canadian Edition – The BC Open Textbook Project (opentextbc.ca) is licensed CC BY-NC-SA 4.0

15.3: The Biology of Emotions

Diving into the Underlying Biology of Emotional Development

The limbic system, which is the area of the brain involved in emotion and memory Figure 15.3.1), includes the hypothalamus, thalamus, amygdala, and hippocampus. The hypothalamus activates the sympathetic nervous system of any emotional reaction. The thalamus serves as a sensory relay center whose neurons project to the amygdala and the higher cortical regions for further processing. The amygdala plays a role in processing emotional information (Fossati, 2012). The hippocampus is the area that integrates emotional experience with cognition (Femenía, Gómez-Galán, Lindskog, & Magara, 2012)[1].

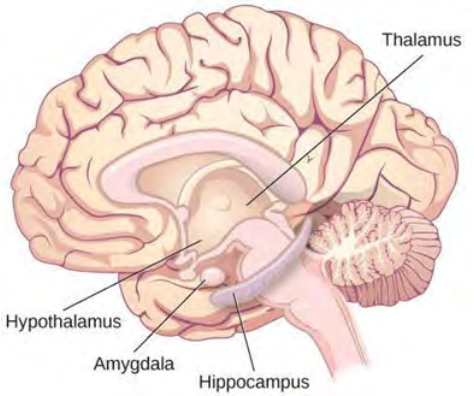


Figure 15.3.1: The limbic system, which includes the hypothalamus, thalamus, amygdala, and hippocampus, mediates emotional response and memory ([1]

Amygdala

The amygdala has received a great deal of attention from researchers in understanding the biological basis for emotions, especially fear and anxiety (Blackford & Pine, 2012; Goosens & Maren, 2002; Maren, Phan, & Liberzon, 2013).

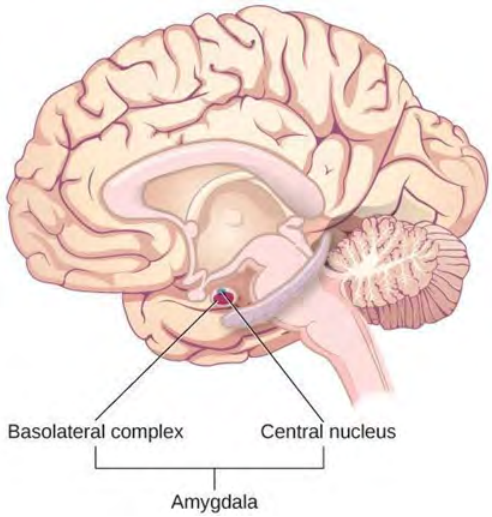


Figure 15.3.2: The diagram above illustrates the anatomy of the basolateral complex and central nucleus of the amygdala. Raineki, Cortés, Belnoue, and Sullivan (2012) demonstrated that, in rats, negative early life experiences could alter the function of the amygdala and result in adolescent patterns of behavior that mimic human mood disorders[1].

Hippocampus

The hippocampus is also involved in emotional processing. Like the amygdala, research demonstrates that hippocampal structure and function are linked to a variety of mood and anxiety disorders.[1]

15.4: Emotional Beginnings

Origins of Emotions

At birth, infants exhibit 2 emotional responses: attraction and withdrawal. They show interest in pleasant situations that bring comfort, stimulation, and pleasure, and they withdraw from unpleasant stimulation such as bitter flavors or physical discomfort. At around 2 months, infants exhibit social engagement in the form of social smiling as they respond with smiles to those who engage their positive attention (Lavelli & Fogel, 2005).

Social smiling becomes more stable and organized as infants learn to use their smiles to engage their parents and caregivers in interactions.

Figure 15.4.1: Infant smiling at grandparents [1]

Figure 15.4.1: Infant Smiling[2]

Figure 15.4.1: infant smiling [1]

[1] Image by Joy Poeng is licensed CC BY-NC

[2] Image by Rachel Klippenstein-Gutierrez is licensed CC BY-NC

[3] Image by Bethany Morgun is licensed CC BY-NC

15.5: Emotion and Self- Regulation

Self-Regulation

Emotional self-regulation refers to strategies we use to control our emotional states to attain goals (Thompson & Goodvin, 2007). As a construct, emotional regulation reflects the interrelationship of emotions, cognitions, and behaviors (Bell & Wolfe, 2004). This regulation requires effortful control of emotions and initially requires assistance from caregivers (Rothbart, Posner & Kieras, 2006).

The developing ability to regulate emotions has received increasing attention in research literature (Eisenberg, Champion & Ma, 2004). Researchers have generated various definitions of emotional regulation, and debate continues over the most valuable and appropriate way to define this concept (Eisenberg & Spinrad, 2004). Children's ability to regulate their emotions appropriately can contribute to perceptions of their overall social skills and the extent to which peers like them (Eisenberg et al., 1993). Poor emotional regulation can impair children's thinking, compromising their judgment and decision-making[1].

Figure 15.5.1: Working on Self-Regulation. Photo by George Pak)

[1] California Department of Education (CDE Press). *Development Foundations: Social-Emotional Development* . Is used with permission

15.6: Caregiver Role in Emotional Regulation

Caregivers and Regulating Emotions

Responsiveness to infants' signals contributes to their development of emotional regulation (Zaar, n.d). Young infants have minimal capacity to adjust their emotional states and depend on their caregivers to help soothe themselves. By 4 to 6 months, babies can begin to shift their attention away from upsetting stimuli (Rothbart et al., 2006). Older infants and toddlers can more effectively communicate their need for help and crawl or walk towards or away from various situations (Cole, Armstrong & Pemberton, 2010). This aids in their ability to self-regulate. Temperament also plays a role in children's ability to control their emotional states, and individual differences are noted in the emotional self-regulation of infants and toddlers (Rothbart & Bates, 2006)[1].

Figure 15.6.1: Standing toddler covering eyes. ([2])

[1] Child Growth and Development by Jean Zaar is licensed CC-BY-NC

[2] Image by Nina Kuchkovskiy is licensed CC: BY-NC

15.7: Emotional Competencies

Emotionally Compentent

Emotional competence refers to the emotion-related abilities an individual needs to deal with a changing environment (Saarni, 1999). Saarni (1999) specified 8 skills of emotional competence: (1) awareness of one's emotional state, (2) ability to discern others' emotions, (3) ability to use the express terms of emotion, (4) capacity for empathic and sympathetic involvement, (5) ability to discriminate inner and outer emotional states, (6) capacity for adaptive coping with emotions, (7) emotional communication within relationships, and (8) capacity for emotional self-efficacy.

Figure 15.7.1: All Smiles([2])

One critical outcome of developing emotional competence contributes to readiness for learning. Emotional competence also contributes to the development of social relationships, both with single individuals (friendships) and groups (peer-group entry).[1]

Theories of sociocultural development such as Vygotsky's (1986) argue that higher order psychological functions have social origins. Children's cognitive, communication, and language development are all influenced by skills acquired during joint activities (Vygotsky, 1986; Winsler, Carlton, & Barry, 2000). This framework values communication and language as socioculturals tool for thought, self-regulation, and development of competencies, including emotional competencies. Vygotsky's theory of private speech may be critical for supporting the development of Saarni's (1999) proposed skills. Private speech can help children identify and label emotions (Skills 1–5) and may function as a tool for planning, guiding, and monitoring problem-solving activity (Skills 6–8).

---

[1] Understand and empathise is shared under a CC BY-SA license and was authored, remixed, and/or curated by LibreTexts.

[2] Image by Marie Harris is licensed CC By-NC

15.8: Development of Sense of Self

Recognizing Self

Children begin to recognize themselves during the second year of life as they gain a sense of self separate from their primary caregiver. In a classic experiment by Lewis and Brooks (1978), children 9 to 24 months were placed in front of a mirror after a spot of rouge was placed on their nose and their mothers pretended to wipe something off the child's face. If the child reacted by touching their nose rather than the "baby" in the mirror, it suggested that the child recognized the reflection as him or herself. Lewis and Brooks found that somewhere between 15 and 24 months, most infants developed a sense of self-awareness.[1]

In 2003, after extensive analysis of existing research, Phillippe Rochat established a theory around The 5 Stages of Self-Awareness. These stages outline how children learn to identify themselves and the caregivers in their lives as separate, distinct entities. The 5 stages span from birth until age 5 (Rocat, 2003).

Figure 15.8.1: A young infant does not yet possess self-awareness. ([1])

Stages of acquiring self-awareness

Stage 1 – Differentiation (from birth)

Immediately after birth, infants demonstrate a sense of their own body as a differentiated entity: an entity among other entities in the environment (Rochan, 2003). They can differentiate the self from the non-self. A newborn knows there is a difference between his image and the background images in a mirror and between his or her environment. Another sign of differentiation occurs when infants contact objects by reaching for them. The infant recognizes the difference between himself and the environment and also gains a sense of how his body is situated relative to that environment (Krisch, 2021).

Stage 2 – Situation (by 2 months)

In addition to differentiation, infants at this stage can also situate themselves in relation to a person. In one experiment, infants imitated tongue orientation from an adult model.

Stage 3 – Identification (by 2 years)

At this stage, the more common definition of self-awareness comes into play, where infants can identify themselves in a mirror through the "rouge test" and begin to use language to refer to themselves. Between the ages of 18 months and 2 years, children learn that the image in the mirror is not only distinct from the rest of the environment (Level 1) and not only distinct from the in-mirror environment (Level 2), but a representation of themselves (Level 3, “identification”). At 18 months, an infant will reach for a mark painted on her body, using only the image in the mirror as an indication that something on herself is amiss (Kirsch, 2021).

Stage 4 – Permanence (2 - 3 years)

This stage occurs after infancy when children know that their sense of self exists across time and space. Rochan describes the permanence state as the “Me-But-Not-Me” dilemma. As toddlers journey towards full self-awareness, they identify the image in the mirror as “self” but still frequently revert to seeing the image as an odd third-person version of self. That can be hard to grasp (and a bit terrifying to imagine) (Kirsch, 2021). It is important to note that Stage 4 permanence develops slowly. Infants still oscillate between an awareness of the self and an awareness of seeing someone else facing them (Rochat 2003).

Stage 5 – (4 to 5 years) Self-consciousness or meta-self-awareness

In stage 5, the young child first realizes that the image in the mirror is not just “me” (Level 3) and not just “me” permanently (Level 4) but the “me” that everyone else sees. 4-year-olds often respond to this realization by becoming mirror-shy, hiding their faces whenever they see their reflections. Now that they know what everyone else sees, they are unsettled (Kirsch, 2021).

---

[1] Child Growth and Development by Jean Zaar is licensed CC-BY-NC

[2] Image by Rachel Klippenstein-Gutierrez is licensed CC BY-NC

15.9: Empathy

Developing Empathy

During the first 3 years of life, children begin to develop the capacity to experience another person's emotional or psychological state (ZahnWaxler & Radke-Yarrow, 1990). The following definitions of empathy are found in research literature: "knowing what another person is feeling," "feeling what another person is feeling," and "responding compassionately to another's distress" (Levenson & Ruef 1992, p. 234). The concept of empathy reflects the social nature of emotion, as it links the feelings of 2 or more people (Levenson & Ruef, 1992). Since human life is relationship-based, one vitally important function of empathy over the life span is to strengthen social bonds (Anderson & Keltner, 2002). Research has shown a correlation between empathy and prosocial behavior (Eisenberg, 2000). Prosocial behaviors such as helping, sharing, comforting, and showing concern for others illustrate the development of empathy (Zahn, Waxler, et al., 1992). The experience of empathy is thought to be related to the development of moral behavior (Eisenberg, 2000). Adults model prosocial/empathic behaviors for infants in various ways. The behaviors are modeled through caring interactions with others and by nurturing the infant. Quann and Wien (2006) suggest that one way to support the development of empathy in young children is to create a culture of caring in the early childhood environment. "Helping children understand the feelings of others is an integral aspect of the curriculum of living together. The relationships among teachers, between children and teachers, and among children are fostered with warm and caring interactions" (p.28).[1]

[1] California Department of Education (CDE Press). *Development Foundations: Social-Emotional Development* . Is used with permission

15.10: Emotions and Cognition

Relationship Between Emotions and Cognition

Brain research indicates that emotion and cognition are profoundly interrelated processes. Specifically, "recent cognitive neuroscience findings suggest that the neural mechanisms underlying emotion regulation may be the same as those underlying cognitive processes" (Bell & Wolfe, 2004, p. 366). Emotion and cognition work together, jointly informing the child's impressions of situations and influencing behavior. Most learning in the early years occurs in the context of emotional support (National Research Council and Institute of Medicine, 2000). "The rich interpenetrations of emotions and cognitions establish the major psychic scripts for each child's life" (Panksepp, 2001). Together, emotion and cognition contribute to attentional processes, decision making, and learning (Cacioppo & Berntson, 1999).

Cognitive processes like decision making are also affected by emotion (Barrett et al., 2007). The brain structures involved in the neural circuitry of cognition influence emotion and vice versa (Barrett et al., 2007). Emotions and social behaviors affect the young child's ability to persist in goal-oriented activity, seek help when needed, and participate in and benefit from relationships. Young children who exhibit healthy social, emotional, and behavioral adjustment are more likely to have good academic performance in elementary school (Cohen et al., 2005; Zero to Three, 2004). Historically, the sharp distinction between cognition and emotion may be more of an artifact of scholarship than a representation of how these processes occur in the brain (Barrett et al., 2007). Recent research strengthens the view that early childhood programs support later positive learning outcomes in all domains by promoting healthy social-emotional development (National Scientific Council on the Developing Child, 2004; Raver, 2002; Shonkoff, 2004;) [1] .

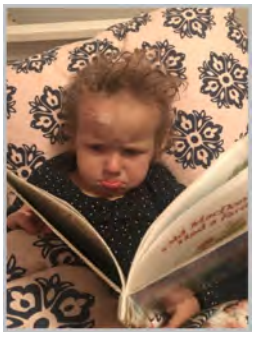


Figure 15.10.1: Toddler working to concentrate despite the presence of strong emotions. ([2])

[1] California Department of Education (CDE Press). *Development Foundations: Social-Emotional Development.* Is used with permission

[2] Image by Nina Kuchkovskiy is licensed CC: BY-NC

15.11: The Role of Language in Emotion

Exploring the Connection Between Language and Emotion

Young children's growing language skills are vital to their emotional development. Language opens new avenues for communicating and regulating emotions (Campos, Frankel, & Camras, 2004). It helps children more effectively negotiate acceptable outcomes in emotionally charged situations.[1]

Growing evidence from developmental and cognitive science demonstrates that knowing words helps infants and adults acquire and use language concepts throughout their lifespan; this evidence suggests that language is key to developing emotional structures. [2]

Practitioners have theorized that infants use the phonological sound as a cue for differentiating between environmental sensations. This is particularly relevant for emotion categories, where the word anger, for example, can tie together multiple modalities of sensorimotor experience (such as bodily sensations, situations, or behaviors). These emotion categories also serve as "glue" for different instances of anger that are not perceptually regular or consistent with one another. For example, being angry at one's computer may not look or feel the same as being angry about an insult. Emotion labels may be an important cue for helping infants and young children understand emotion categories and apply them to their own experiences and observations. No research has directly examined this hypothesis.[2]

Figure 15.11.1: Reading with Infants is an important part of Language and Emotional Development (Image at Piqsels)

2-year-olds use the straightforward emotion labels "angry" and "happy" in daily interactions, yet 2-year-olds cannot distinguish between more specific unpleasant emotion categories until they start reliably using additional negative emotion terms in daily interactions (Widen & Russell, 2008). As children acquire emotional words and start using them in everyday life with caregivers, they become increasingly competent at perceiving and labeling facial expressions in their culture's emotion categories. Just as words help infants generalize between otherwise perceptually distinct objects during learning, toddlers show a "language superiority effect" when categorizing facial expressions. Language superiority effect means 2- and 3-year-olds are better able to accurately place pictures of facial expressions in a box labeled with a word (e.g., anger) as compared to a box labeled with a face (e.g., an angry face), an effect that increases over early childhood (Russell & Widen, 2002). Studies also demonstrate a link between children's emotional understanding and linguistic development, which suggest that children's advances in emotional understanding develop at the same rate as their advances in language comprehension (Harris et al., 2005).[2]

Caregivers' conceptual knowledge about emotions and communication skills can transfer to their children. For instance, 2– to 4-year-old children's emotional utterances correlate with the emotion labels that their mothers know and use (Cervantes & Callanan, 1998). Children whose mothers used more emotion terms when they were 18 months old were able to produce more emotion words at 24 months (Dunn et al., 1987). Children whose caregivers discussed emotions more when children were 36 months old also had better emotional understanding at 6 years of age (Dunn et al., 1991). An adult's explanation of internal states and attributes (such as hungry, sad, or nice) scaffold children's abilities to identify and describe the same experiences in themselves and others (Saarni, 1999; Yehuda, 2005). Use of words helps children acquire complex information about an emotion category (Lindquist, 2015) By contrast, caregivers who lack conceptual knowledge about emotion or struggle to communicate this knowledge with words decrease the child's opportunities to develop a conceptual understanding of emotion.

---

[1] California Department of Education (CDE Press). *Development Foundations: Social-Emotional Development* . Is used with permission

[2] Lindquist, K. A., MacCormack, J. K., & Shablack, H. (2015). The role of language in emotion: predictions from psychological constructionism. *Frontiers in psychology*, *6*, 444. CC BY

15.12: Knowing What They Can Do

Self-Efficacy

An infant's developing sense of self-efficacy includes an emerging understanding that he has abilities and can make things happen. Self-efficacy is related to a sense of competency and identified as a basic human need (Connell, 1990). The development of a child's sense of self-efficacy may be seen in play or exploratory behaviors when they act on an object to produce a result. For example, a child pats a musical toy to make a sound come out. Older infants may demonstrate recognition of ability through "I" statements, such as "I did it" or "I'm good at drawing."[1]

Young children have little understanding of what they can and cannot do, so the development of realistic self-efficacy is a fundamental process:

…Very young children lack knowledge of their own capabilities and the demands and potential hazards of different courses of action. They would repeatedly get themselves into dangerous predicaments were it not for the guidance of others. They can climb to high places, wander into rivers or deep pools, and wield sharp knives before they develop the necessary skills for managing such situations safely…Adult watchfulness and guidance see young children through this early formative period until they gain sufficient knowledge of what they can do and what different situations require in the way of skills (Bandura, 1986, p. 414).

During infancy, the development of perceived causal efficacy (the perception that one affects the world by one's actions) appears to be an essential aspect of developing a sense of self. As the infant interacts with her environment, she can cause predictable events, such as the sound that accompanies shaking a rattle. The understanding that one's actions can influence the environment is something Alfred Bandura referred to as personal agency: the ability to act as an agent of change in one's world. The infant also begins to understand that certain events affect people differently than they affect the child. For example, if a model touches a hot stove, it does not hurt the infant, so the infant begins to recognize their uniqueness and actual existence as an individual. During this period, interactions with the physical environment may be more important than social interactions since the physical environment is more predictable and easier to learn about (Bandura, 1986, 1997). However, social interaction quickly becomes highly influential (Kelland, 2020).

Figure 15.12.1: Young infants learn they can make things happen by interacting with their environment ([2])

[1] California Department of Education (CDE Press). *Development Foundations: Social-Emotional Development* is used with permission.

[2] Image by Rachel Klippenstein-Gutierrez is licensed CC BY-NC

15.13: Impulse Control

Controlling Emotions and Impulses

Children's developing capacity to control impulses helps them adapt to social situations and follow rules. As infants grow, they become increasingly able to exercise voluntary control over behavior such as waiting for needs to be met, inhibiting potentially hurtful behavior, and acting according to social expectations, including safety rules. Group care settings provide many opportunities for children to practice their impulse control skills. Peer interactions often offer natural opportunities for young children to practice impulse control as they learn about cooperative play and sharing. Young children's understanding or ignorance of requests made of them contributes to their responses (Kaler & Kopp, 1990). [1]

Figure 15.13.1: Playing with peers allows opportunities to work on impulse control. (C[2])

[1] California Department of Education (CDE Press). *Development Foundations: Social-Emotional Development* . Is used with permission

[2] Image by Amanda Taintor is licensed CC BY-NC

15.14: Expression of Emotion

The Importance of Emotional Expressions

Children express their emotions early in infancy through facial expressions, vocalizations, and body language.

Figure 15.14.1: Infant crying. ([1])

Infants respond more positively to adult vocalizations containing a positive affective tone (Fernald, 1993). Tronick (1989) describes how the expression of emotion is related to emotional regulation and communication between mother and infant: “the emotional expressions of the infant and the caretaker function to allow them to mutually regulate their interactions . . . the infant and the adult are participants in an affective communication system.” (p.112). It appears the experience of positive emotions contributes significantly to emotional well-being and psychological health (Fredrickson, 2000, 2003; Panksepp, 2001). Neurophysiology and cognitive, social, and emotional factors play a part in the developmental process of social smiling (Messinger & Fogel, 2007). The ability to use words to express emotions gives young children a valuable tool in gaining assistance or social support (Saarni et al., 2006). Temperament may also play a role in children's expression of emotion. Young children's expressions of positive and negative emotions impact developing social relationships. Positive emotions appeal to social partners and enable relationships to form, while problematic management or expression of negative emotions leads to difficulty in social relationships (Denham & Weissberg, 2004). The use of emotion-related words appears to be associated with how likable preschoolers are to their peers: children who use emotion-related words are typically better liked by their classmates (Fabes at al., 2001).[2]

---

[1] Image by Joy Poeng is licensed CC BY-NC

[2] California Department of Education (CDE Press). *Development Foundations: Social-Emotional Development* . Is used with permission

---

15.15: Social Understanding and Self-Awareness

Understanding and Awareness

Emotions are expressed both verbally through words and nonverbally through facial expressions, voices, gestures, body postures, and movements. People constantly express emotions when interacting with others, and others can reliably judge those emotional expressions (Elfenbein & Ambady, 2002; Matsumoto, 2001). Emotions have signal value to others and influence those around us and our social interactions. Emotions and their expressions communicate information to others about our feelings, intentions, relationship with the target of the emotions, and the environment. Because emotions have this communicative signal value, they help solve social problems by evoking responses from others, signaling the nature of interpersonal relationships, and providing incentives for desired social behavior (Keltner, 2003). [1]

Figure 15.15.1: Infant signals their needs through crying. ([5])

A parent's belief that emotions are valuable rather than dangerous correlates to their child's ability to recognize their parents' emotional facial expressions (Castro et al., 2014). Avoiding emotional expression may create a more impoverished environment for the child to practice their developing emotion-relevant skills (Dunsmore et al., 2009). Additionally, families who avoid talking about emotions with their child (due to a belief that emotions are dangerous) do not help the child acquire the conceptual knowledge necessary for learning how to differentiate between different emotional facial expressions.[2]

Figure 15.15.1: As infants develop language they begin to express their emotions in different ways. ([6])

Remarkably, young children begin developing social understanding very early in life. Before the end of the first year, infants are aware that other people have perceptions, feelings, and other mental states that affect their behavior and are different from the infant's mental states.[3]

Emotion is displayed through a variety of mechanisms. In addition to facial expressions, tone of voice, behavior, and body language all communicate information about emotional states. Body language is the expression of emotion through body position or movement. Research suggests that we are sensitive to the emotional information communicated through body language, even when we're not consciously aware of it (de Gelder, 2006; Spielman, 2020; Tamietto et al., 2009).

Although developmental scientists once strongly believed infants are egocentric—focused on their own perceptions and experience—they now realize the opposite is true. Infants at an early stage are aware that people have different mental states (Wellman, 2011). This motivates them to figure out what others are feeling, intending, wanting, and thinking, as well as how these mental states affect others' behavior. Infants are beginning to develop a theory of mind, and although their understanding of mental states begins simply, it expands rapidly (Wellman, 2011). For example, suppose an 18-month-old watches an adult repeatedly try to drop a necklace into a cup but fail each time. In this case, the child will immediately put the necklace into the cup himself, completing

what the adult intended to do but failed to accomplish. In doing so, the child reveals his awareness of the intentions behind the adult's behavior (Meltzoff, 1995). Carefully designed experimental studies have shown that, by late preschool years, young children can understand that another's beliefs can be incorrect, memories can affect how you feel, and emotions can be hidden from others (Wellman, 2011). Social understanding grows significantly as children's theory of mind develops.4]

How do these achievements in social understanding occur? One answer is that young children are compassionate observers of other people. They make connections between their emotional expressions, words, and behavior to derive simple inferences about mental states (Gopnik, Meltzoff, & Kuhl, 2001). Some scientists believe that infants are biologically prepared to perceive people uniquely, as organisms with an inner mental life, which facilitates their interpretation of people's behavior regarding those mental states (Leslie, 1994; Thompson, 2021) This is especially likely to occur in relationships with people the child knows well, which supports the ideas of attachment theory. Growing language skills give young children words with which to represent these mental states, such as “mad” or “wants”, and talk about them with others. Thus, in conversation with their parents about everyday experiences, children learn much about people's mental states from how adults talk about them ("Your sister was sad because she thought Daddy was coming home.”) (Thompson, 2006b). Developing social understanding is based on children's everyday interactions with others and their careful interpretations of what they see and hear.[4]

Figure 15.15.1: Relationships are an important part of emotional development (Image 329 on NappyStock)

[1] Hwang, H. & Matsumoto, D. (2021). Functions of emotions is licensed CC BY-SA

[2] Lindquist, K. A., MacCormack, J. K., & Shablack, H. (2015). The role of language in emotion: predictions from psychological constructionism. *Frontiers in psychology*, *6*, 444. CC BY

[3] Thompson, R. (2021). Social and personality development in childhood is licensed under a CC BY-NC-SA

[4] **Social Understanding** by Paris, Ricardo, Raymond, & Johnson is licensed CC BY 4.0

[5] Image by Nina Kuchkovskiy is licensed CC BY-NC

[6] Image by Amanda Taintor is licensed CC BY-NC

15.16: Facial Expression and Recognition of Emotions

Recognizing Emotions

Despite different cultural emotional display rules, our ability to recognize and produce facial expressions of emotion appears to be universal. Even congenitally blind individuals make the same facial expressions of emotions, despite never having had the opportunity to observe these facial displays of emotion in other people. Research findings suggest patterns of activity in the facial muscles involved in generating emotional expressions: this was indicted in the late 19th century in Charles Darwin's (1872) book The Expression of Emotions in Man and Animals. Substantial evidence exists for 7 universal emotions associated with distinct facial expressions. These include happiness, surprise, sadness, fright, disgust, contempt, and anger (Figure 15.16.1 (Ekman & Keltner, 1997, Elkman et al., 1969, Ekman and Friesen, 1971). [1]

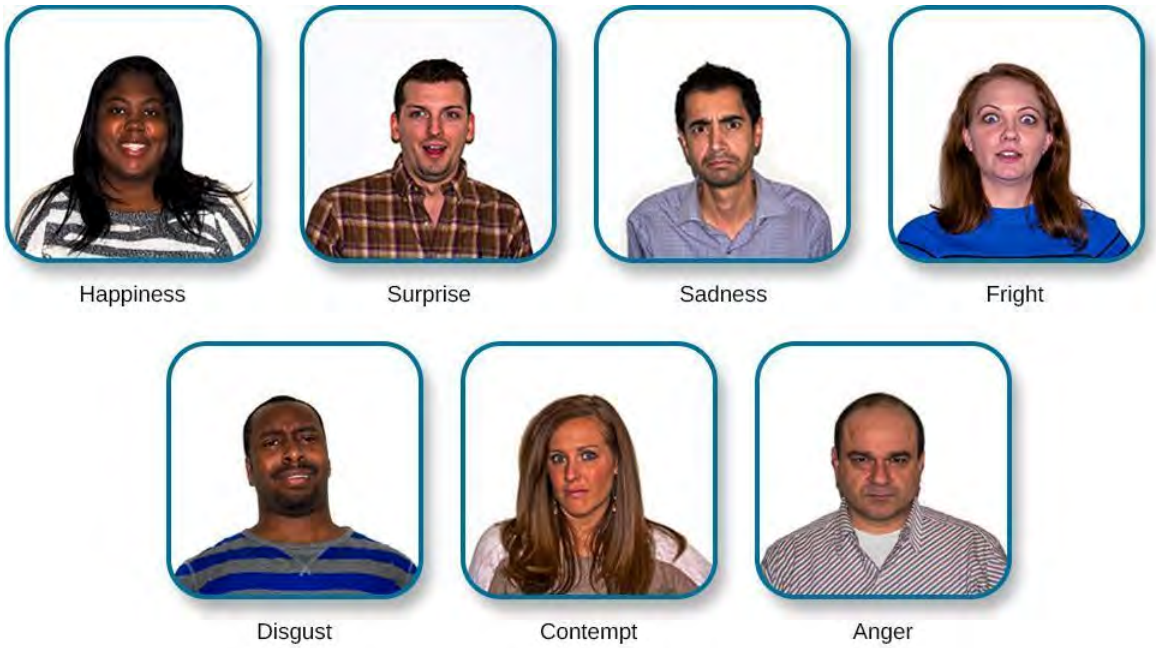


Figure 15.16.1: The 7 universal facial expressions of emotion (modification of work by Cory Zanker)

In terms of development, it appears that most of the facial components of human expression can be observed shortly after birth. Expressions like enjoyment and interest are present from the first days of life (Sullivan & Lewis, 2003). Researchers initially thought that infants' facial expressions corresponded to adults' facial expressions (see Differential emotion theory in Izard & Malatesta, 1987), but it's now known that facial expressions in infancy are not present like their adult-counterparts (Oster, 2005). Emotion in infancy cannot be compared to emotion in adulthood. Sroufe (1996) described precursor emotions in infancy. Precursor emotions do not have the same degree of cognitive evaluation as emotions of adults. Sroufe described how wariness and frustration can manifest as crying and distress. This observation agrees with the study of Camras et al. (2007) that does not find different facial expressions for fear and anger at 11 months.

Differences between adult and infant facial expressions can also be linked to the motor structure of infant faces. Camras et al. (1996) noted that infants may produce facial expressions in an unrelated situation because of an enlarged recruitment among facial muscles during movement. For example, infants 5 to 7 months raise their brows as they open their mouth, producing an expression of surprise.

Holodynski and Friedlmeier (2006) proposed that infants learned adult-like expressions from a sociocultural based internalization model: caregivers reproduced infant expressions in a selective and exaggerated form, allowing children to learn the connection between their emotion and a given facial expression.[1]

The appearance of adult-like expressions is not well understood (Oster, 2005). Bennett et al. (2005) showed that the organization of facial expressivity increases during infancy. 12-month-old infants showed more specific expression to a situation than 4-month-old infants. It seems that children keep learning how to produce facial expressions through late childhood. Ekman et al. (1980) demonstrated that the ability to produce facial expression improves between 5 and 13 years. However, young children do not

perfectly produce all facial expressions. The production of facial expression depends on age and the targeted emotion. Joy is well-produced at 3 years old while anger, sadness, and surprise are still not mastered at 6 years old. Field and Walden (1982) also found that positive emotions are easier to produce than negative emotions. However, Lobue and Thrasher (2014) asked children to imitate facial expressions of an adult and found no effects of age or emotion subtype on the production of facial expression for children between 2 and 8 years old.[2]

Figure 15.16.2: Imitation of Emotion has varied and mixed research results ([4])

Facial expressions of emotion are important regulators of social interaction. This concept has been investigated through social referencing (Klinnert, Campos & Sorce, 1983), the process whereby infants seek out information from others to clarify a situation and then use that information to act. The strongest demonstration of social referencing to date comes from work on the “visual cliff”. In the first study to investigate this concept, Campos and colleagues (Sorce, Emde, Campos, & Klinnert, 1985) placed mothers on the far end of a "cliff" from the infant. First, mothers smiled at their infants and placed a toy on top of the safety glass to attract them: infants invariably began crawling to their mothers. When the infants were in the center of the table, however, the mother then posed an expression of fear, sadness, anger, interest, or joy. The results varied according to the emotion expressed: no infant crossed the table when the mother showed fear, 6% crossed when the mother showed anger, 33% crossed when the mother showed sadness, and approximately 75% of the infants crossed when the mother showed joy or interest.

Other studies provide similar support for facial expressions as regulators of social interaction. In one study (Bradshaw, 1986), experimenters posed facial expressions of neutrality, anger, or disgust toward babies as they moved toward an object and measured the amount of inhibition the babies showed in touching the object. The results for 10- and 15-month-olds were the same: anger produced the greatest inhibition, followed by disgust, then neutrality. This study was later replicated (Hertenstein & Campos, 2004) using joy and disgust expressions, altering the method so that the infants were not allowed to touch the toy (compared with a distractor object) until 1 hour after exposure to the expression. At 14 months of age, significantly more infants touched the toy when they saw joyful expressions, but fewer touched the toy when the infants saw disgust.[3]

[1] Thompson, R. (2021). Social and personality development in childhood is licensed under a CC BY-NC-SA

[2] Grossard et. al. (2018) Children Facial Expression Production: Influence of Age, Gender, Emotion Subtype, Elicitation Condition and Culture. is licensed under the **Creative Commons Attribution License (CC BY)**.

[3] Hwang, H. & Matsumoto, D. (2021). Functions of emotions is licensed CC BY-SA

[4] Image by Molly Ram is licensed CC BY-NC

15.17: Pulling the Pieces Together

Emotional Intelligence

Emotional intelligence, as defined by Salovey and Mayer in Emotional Intelligence (2020), is a "subset of social intelligence that involves the ability to monitor one's own emotions and others' emotions, to discriminate among them, and to use this information to guide one's own thinking and actions" (Bechtoldt, 2008). Emotional intelligence is the capacity to acknowledge emotions in self and others, then leverage emotional information to adapt thinking and behavior to the environment and achieve one’s goal.[1]

Figure 15.17.1: Infant and Caregiver both displaying emotions. ([1])

Emotional Intelligence: The Goleman Theory

While Salovey and Mayer were the first to publish an article on emotional intelligence, true popularity of the term and concept of EI didn't occur until Dan Goleman published "Emotional Intelligence: Why It Can Matter More than IQ" (Bechtoldt, 2008). Goleman claims that EI is more critical than Intelligence Quotient (IQ) for enjoyment of a successful life and maintaining fruitful, secure relationships with others (Karafyllis & Ulshofer, 2008). Goleman proposed a new definition of intelligence which includes qualities such as optimism, self-control, and moral character. He suggests that, unlike general intelligence, which is viewed as stable over time, EI can be learned and increased at any time during one's life (Karafyllis & Ulshofer, 2008). Goleman also proposed that EI has a moral dimension, stating that "emotional literacy goes hand in hand with education for character and moral development and citizenship" (Karafyllis & Ulshofer, 2008, p.135).[2]

The image below illustrates the key competencies of emotional intelligence and demonstrates the connection between elements of emotional development in infants and toddlers and emotional intelligence.

Figure 15.17.2: Emotional Intelligence, as described by Daniel Goleman, ([2])

[1] Image by Marie Harris is licensed CC By-NC

[2] Eric. (n.d.). Emotional Intelligence at work by Daniel Goleman: Self-Master - Part 1 is licensed CC BY-SA

15.18: Cultural Elements of Emotional Development

Culture and Emotions

Because culture impacts how people display emotion, people from varying cultural backgrounds can have very different cultural display rules of emotion. A cultural display rule is one of a collection of culturally specific standards that governs the types and frequencies of acceptable emotional displays (Malatesta & Haviland, 1982). Some cultural groups appear to express certain emotions more often than other cultural groups (Tsai, Levenson, & McCoy, 2006). Cultural groups also vary by the emotions and emotional states they value (Tsai, Knutson, & Fung, 2006). For example, research has shown that individuals from the United States express negative emotions like fear, anger, and disgust both alone and in the presence of others. In contrast, individuals from Japan only do so while alone (Matsumoto, 1990). Furthermore, individuals from cultures that tend to emphasize social cohesion are more likely to suppress emotional reactions so they can evaluate which response is most appropriate in each context (Matsumoto, Yoo, & Nakagawa, 2008). One study suggests that cultural differences in exposure to specific emotions through storybooks may contribute to young children's preferences for particular emotional states (such as excited or calm) (Tsai et al., 2007).[1]

Figure 15.18.1: Expression of sadness can be culturally based. ([2])

Cultures also inform us about what to do with our emotions—how to manage or modify them—when we experience them. This often occurs by managing our emotional expressions through cultural display rules (Friesen, 1972). These cultural rules are learned early in life and specify the management and modification of our emotional expressions according to social circumstances. Some are taught to laugh at their boss's jokes even when they are not funny; others learn that "big boys don't cry". Culture affects how individuals express their emotions and how people experience them. Emotional regulation is also influenced by culture and the historical era in which a person lives. This cultural variability in regulation processes is significant (Mesquita & Frijda, 1992). "Cultures vary in terms of what one is expected to feel, and when, where, and with whom one may express different feelings" (Cheah & Rubin 2003, p. 3).[3]

Figure 15.18.2: Expressing happiness together. ([3])

A crucial aspect of culture comes from the transmission of emotional meaning to its members: one way this occurs is through the development of worldviews (including attitudes, values, beliefs, and norms) related to emotions (Matsumoto & Hwang, 2013; Matsumoto et al., 2008). Emotion-related worldviews provide guidelines for desirable emotions, which facilitate norms for regulating individual behaviors and interpersonal relationships. Cultural backgrounds tell us which emotions are ideal and which are not (Tsai, Knutson, & Fung, 2006). The cultural transmission of information related to emotions occurs in many ways, not the least of which is from caregivers to children (Schönpflug, 2009; Tsai, Louie, Chen, & Uchida, 2007). As a caregiver for infants and toddlers, how might your culture's emotional norms conflict at times with the emotional/cultural norms of the children in your care?[4]

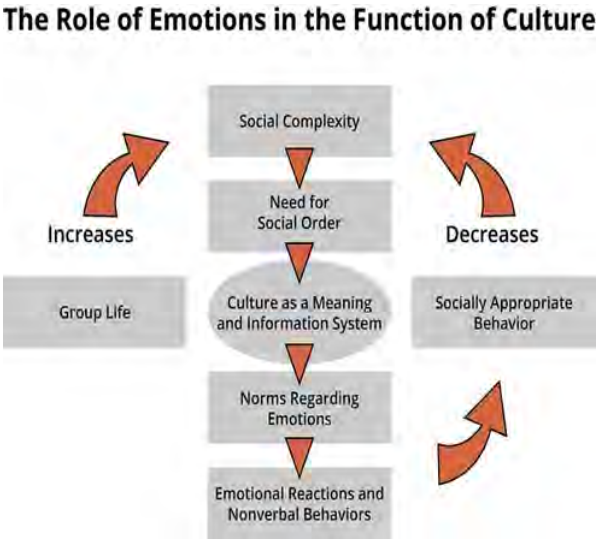


Figure 15.18.1: The role of emotions in the function of culture. Social complexity to Need for social order to culture as a meaning and information system to norms regarding emotions to emotional reactions and nonverbal behaviors which contributes to socially appropriate behavior which then decreases social complexity. . (5])

---

[1] California Department of Education (CDE Press). *Development Foundations: Social-Emotional Development* . Is used with permission

[2] Image by David_Miram is in the public domain

[3] Image by *@ablissfulbirth is in the public domain*

[4] Hwang, H. & Matsumoto, D. (2021). Functions of emotions is licensed CC-BY-SA

15.19: Emotional Competence and Self-Regulation- A Strategy to Support Emotional Development

A Strategy to Support Emotional Development

Emotional Competence and Self-Regulation, ECSEL, is based on the emotional foundations of learning and cognition. ECSEL aims to help young children develop emotional competence on their path toward effective self-regulation. It teaches emotional competence to children as young as infants, helping enhance emotion regulation, self-regulation, and promote a positive sense of self, mental health, and well-being .[1]

Promoting the growth of self-regulation development and co-regulation from birth through age 2[1]

Developmental Stage	Characteristics of Self-Regulation in Infants	How Caregivers Can Provide Co-Regulation
Infancy (birth to age 1)	• Orient attention away from stressors • Engage caregivers as resources for comfort • Begin to self-soothe	• Interact in warm, responsive ways • Anticipate and respond quickly to child's needs • Provide physical and emotional comfort when a child is stressed • Modify environment to decrease demands/stress
Toddlerhood (ages 1–2, approximately)	• Begin to select and shift attention (attentional control) • Adjust behavior to achieve simple goals • Delay gratification and inhibit responses for short periods when there is structure and support • Emotions are stronger than cognitive regulation • Feelings of attachment support prosocial goals	• Reassure/calm the child when upset by removing the child from situations or speaking calmly and giving affection • Model self-calming strategies • Teach rules and redirecting to regulate behavior

Caregivers of infants and toddlers must pay attention to and document children's feelings and emotional responses: suggest words for and help children name their feelings rather than telling children what they feel. This strategy gives children a vocabulary for feelings and communicates that they are the ones who know their feelings best. Emotional language support helps children understand what causes their feelings. Offer children, rather than tell them, possible explanations to help determine the cause of their emotion. Pay attention to your own emotional responses as young children are keenly sensitive to tone of voice and facial expressions. Model respectful, appropriate expressions of emotion, facial expressions, and tone of voice that matches feelings. Loud or intensely angry tones can be overwhelming and frightening for children.[2]

Caregivers support regulation of emotions by learning each child's preferred way of being comforted. Identify or name for children what helps them feel comforted. Acknowledge when children seek comfort or comfort themselves. Collaborate with children in providing comfort for them. Keep in mind children are able to comfort themselves. Demonstrate acceptance for all of the feelings children express. Young children use social referencing, meaning they look to adults to "read" how things are going throughout the day. When someone is crying, a teacher can provide a calm, accepting, and empathic tone to help children learn that crying is natural and related to feelings of sadness, frustration, fear, and anger. Likewise, a teacher who responds calmly when angry or afraid helps children learn that such feelings are valid and appropriate.[2]

Definition: Social Referencing

The process by which one individual consults another's emotional expressions to determine how to evaluate and respond to circumstances that are ambiguous or uncertain.

[1] Housman, D.K. The importance of emotional competence and self-regulation from birth: a case for the evidence-based emotional cognitive social early learning approach is licensed CC BY

[2] California Department of Education (CDE Press). *Development Foundations: Social-Emotional Development* . Is used with permission

15.20: Conclusion

Conclusion to Emotional Development

Understanding the function and origin of emotional development provides a caregiver with foundational knowledge to support development in holistic ways. A caregiver's focus often falls to physical development, neglecting the critical support of healthy emotional development. However, evidence demonstrates that communication with family members and caregivers about emotions during early childhood is essential for children to develop healthy emotions.

15.21: References

References for Emotional Development

- Akimoto, S. A., & Sanbonmatsu, D. M. (1999). Differences in self-effacing behavior between European and Japanese Americans: Effect on competence evaluations. *Journal of Cross-Cultural Psychology, 30*(2), 159–177. https://doi.org/10.1177/0022022199030002002
- Anderson, C., & Keltner, D. (2002). The role of empathy in the formation and maintenance of social bonds. *Behavioral and Brain Sciences, 25*(1), 21–22. https://doi.org/10.1017/S0140525X02230010
- Adelmann PK, Zajonc RB. Facial efference and the experience of emotion. *Annual Review of Psychology.* 1989;40:249–280.
- Ayre, K., & Krishnamoorthy, G. (2020). Understand and empathise. In *Trauma Informed Behaviour Support: A Practical Guide to Developing Resilient Learners*. essay, University of Southern Queensland. "Understand and empathise" byA is licensed under CC BY-SA
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191–215. https://doi.org/10.1037/0033-295X.84.2.191
- Bandura, A. (1997). ***Self-efficacy: The exercise of control***. New York: Freeman
- Bandura, A., & Walters, R.H. (1963). *Social learning and personality development.* Holt Rinehart and Winston: New York.
- Bandura, A. (1986). ***Social foundations of thought and action: A social cognitive theory***. Englewood Cliffs, NJ: Prentice-Hall.
- Barrett, L. F. (2017). The theory of constructed emotion: An active inference account of interoception and categorization. *Social Cognitive and Affective Neuroscience, 12*, 1–23. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5691871/
- Barrett, L., and others. 2007. "The Experience of Emotion," *Annual Review of Psychology,* Vol.58, 373–403.
- Bell, M., and C. Wolfe. 2004. "Emotion and Cognition: An Intricately Bound Developmental Process," *Child Development*, Vol. 75, No. 2, 366–70.
- Bell MA, Wolfe CD. Emotion and cognition: an intricately bound developmental process. Child Dev. 2004 Mar-Apr;75(2):366-70. doi: 10.1111/j.1467-8624.2004.00679.x. PMID: 15056192.
- Bennett, D. S., Bendersky, M., and Lewis, M. (2005). Does the organization of emotional expression change over time? Facial expressivity from 4 to 12 months. *Infancy* 8, 167–187. doi: 10.1207/s15327078in0802_4
- Blackford, J. U., & Pine, D. S. (2012). Neural substrates of childhood anxiety disorders: A review of neuroimaging findings. *Child and Adolescent Psychiatric Clinics of North America, 21*, 501–525.
- Boiger, M., & Mesquita, B. (2012). The construction of emotion in interactions, relationships, and cultures. *Emotion Review, 4*, 221–229. https://journals.sagepub.com/doi/10.1177/1754073912439765
- Bradley MM, Lang PJ. Measuring emotion: the Self-Assessment Manikin and the Semantic Differential. J Behav Ther Exp Psychiatry. 1994 Mar;25(1):49-59. doi: 10.1016/0005-7916(94)90063-9. PMID: 7962581.
- Braungart-Rieker JM, Hill-Soderlund AL, Karrass J. Fear and anger reactivity trajectories from 4 to 16 months: the roles of temperament, regulation, and maternal sensitivity. Dev Psychol. 2010 Jul;46(4):791-804. doi: 10.1037/a0019673. PMID: 20604602.
- Buck, R. (1980). Nonverbal behavior and the theory of emotion: The facial feedback hypothesis. *Journal of Personality and Social Psychology, 38*, 811–824
- Cacioppo, J., and G. Berntson. 1999. "The Affect System: Architecture and Operating Characteristics," *Current Directions in Psychological Science*, Vol. 8, No. 5, 133–37
- The California Infant/Toddler Curriculum Framework by the California Department of Education is used with permission (2012)
- Campos, J.; C. Frankel; and L. Camras. 2004. "On the Nature of Emotion Regulation," *Child Development*, Vol. 75, No. 2, 377–94.
- Camras, L. A., Lambrecht, L., and Michel, G. F. (1996). Infant “surprise” expressions as coordinative motor structures. *J. Nonverbal Behav.* 20, 183–195. doi: 10.1007/BF02281955
- Camras, L. A., Oster, H., Ujiie, T., Campos, J. J., Bakeman, R., and Meng, Z. (2007). Do infants show distinct negative facial expressions for fear and anger? Emotional expression in 11-month-old European American, Chinese, and Japanese infants. *Infancy* 11, 131–155. doi: 10.1111/j.1532-7078.2007.tb00219.x
- *Development Foundations: Social-Emotional Development* . Sacramento: California Department of Education (CDE Press). Is used with permission

- Capella JN. The facial feedback hypothesis in human interaction: Review and speculation. *Journal of Language and Social Psychology.* 1993;12(12):13–29. [Google Scholar]
- Cornelius, R. R. (1991). Gregorio Marañon's two-factor theory of emotion. *Personality and Social Psychology Bulletin*, *17*(1), 65–69. https://psycnet.apa.org/doi/10.1177/0146167291171010
- Castro, V. L., Halberstadt, A. G., Lozada, F. T., and Craig, A. B. (2014). Parents' emotion-related beliefs, behaviours, and skills predict children's recognition of emotion. *Infant Child Dev.* 24, 1–22. doi: 10.1002/icd.1868
- Cervantes, C., and Callanan, M. A. (1998). Labels and explanations in mother-child emotion talk: age and gender differentiation. *Dev. Psychol.* 34, 88–98. doi: 10.1037/0012-1649.34.1.88
- Cole, P. M., Armstrong, L. M., & Pemberton, C. K. (2010). The role of language in the development of emotion regulation. In S. D. Calkins & M. A. Bell (Eds.), *Child development at the intersection of emotion and cognition* (pp. 59–77). American Psychological Association. https://doi.org/10.1037/12059-004
- Cohen, J., and others. 2005. *Helping Young Children Succeed: Strategies to Promote Early Childhood Social and Emotional Development* External link opens in new window or tab. (accessed on December 7, 2006) Washington, DC: National Conference of State Legislatures and Zero to Three.
- Connell, J. P. 1990. "Context, Self, and Action: A Motivational Analysis of SelfSystem Processes Across the Lifespan," in The Self in Transition: Infancy to Childhood. Edited by D. Cicchetti and M. Beeghly. Chicago: The University of Chicago Press
- CNXPsych. (n.d.). Emotion and Motivation. In *Psychology*. essay, OSCRiceuniversity. is licensed Creative Commons Attribution 4.0 International License, except where otherwise noted.
- Darwin, C. (1872). *The expression of the emotions in man and animals*. John Murray.de Gelder, B. (2006). Towards the neurobiology of emotional body language. *Nature Revie ws Neuroscience*, *7*, 242–249.
- Dunsmore, J. C., Her, P., Halberstadt, A. G., and Perez-Rivera, M. B. (2009). Parents' beliefs about emotions and children's recognition of parents' emotions. *J. Nonverbal Behav.* 33, 121–140. doi: 10.1007/s10919-008-0066-6
- Davis, J. I., Senghas, A., & Ochsner, K. N. (2009). How does facial feedback modulate emotional experience? *Journal of Research in Personality, 43*, 822–829.
- Denham, Susanne & Weissberg, Roger. (2004). Social-emotional learning in early childhood: What we know and where to go from here. A Blueprint for the Promotion of Prosocial Behavior in Early Childhood. 13-50.
- Dunn, J., Bretherton, I., and Munn, P. (1987). Conversations about feeling states between mothers and their young children. *Dev. Psychol.* 23, 132–139. doi: 10.1037/0012-1649.23.1.132
- Dunn, J., Brown, J., Slomkowski, C., Tesla, C., and Youngblade, L. (1991). Young children's understanding of other people's feelings and beliefs: individual differences and their antecedents. *Child Dev.* 62, 1352–1366. doi: 10.2307/1130811
- Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., and Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: a meta-analysis of school-based universal interventions. *Child Dev.* 82, 405–432. doi: 10.1111/j.1467-8624.2010.01564.
- Eisenberg, N., Champion, C., & Ma, Y. (2004). Emotion-related regulation: An emerging construct. *Merrill-Palmer Quarterly, 50*(3), 236–259. https://doi.org/10.1353/mpq.2004.001
- Eisenberg, N., & Spinrad, T. L. (2004). Emotion-Related Regulation: Sharpening the Definition. Child Development, 75, 334-339.http://dx.doi.org/10.1111/j.1467- 8624.2004.00674.x
- Eisenberg, Nancy. (2000). Emotion, Regulation, and Moral Development. Annual review of psychology. 51. 665-97. 10.1146/annurev.psych.51.1.665.
- Eisenberg, N., Fabes, R. A., Bernzweig, J., Karbon, M., Poulin, R., & Hanish, L. (1993). The Relations of Emotionality and Regulation to Preschoolers' Social Skills and Sociometric Status. *Child Development*, *64*(5), 1418–1438. https://doi.org/10.2307/1131543
- Ekman, P., & Keltner, D. (1997). Universal facial expressions of emotion: An old controversy and new findings. In U. Segerstråle & P. Molnár (Eds.), *Nonverbal communication: Where nature meets culture* (pp. 27–46). Lawrence Erlbaum.
- Ekman, P., Sorenson, E. R., and Friesen, W. V. (1969). Pan-cultural elements in facial displays of emotion. *Science* 164, 86–88. doi: 10.1126/science.164.3875.86
- Ekman, P., and Friesen, W. V. (1971). Constants across cultures in the face and emotion. *J. Pers. Soc. Psychol.* 17, 124–129. doi: 10.1037/h0030377
- Ekman, P., Roper, G., and Hager, J. C. (1980). Deliberate facial movement. *Child Dev.* 51, 886–891. doi: 10.2307/1129478
- Emotion and Motivation is shared under a CC BY 4.0 license and was authored, remixed, and/or curated by OpenStax.
- Emotion by OSCRiceUniversity is licensed under a Creative Commons Attribution 4.0 International License, except where otherwise noted.

- Eric. (n.d.). Emotional Intelligence at work by Daniel Goleman: Self-Master - Part 1 [web log]. Retrieved January 23, 2022, from https://wind4change.com/category/agile-leadership-host-leader-psychological-safety-autonomy-mastery-purpose/. This work is licensed under a Creative Commons-non-commercial-ShareAlike 4.0
- Fabes, R., and others. 2001. “Preschoolers’ Spontaneous Emotion Vocabulary: Relations to Likability,” *Early Education & Development*, Vol. 12, No. 1, 11–27
- Femenía, T., Gómez-Galán, M., Lindskog, M., & Magara, S. (2012). Dysfunctional hippocampal activity affects emotion and cognition in mood disorders. *Brain Research, 1476*, 58–70.
- Fernald, A. (1993). Approval and disapproval: Infant responsiveness to vocal affect in familiar and unfamiliar languages. *Child Development, 64*(3), 657–674. https://doi.org/10.2307/1131209
- Fredrickson, B. L., Tugade, M. M., Waugh, C. E., & Larkin, G. R. (2003). What good are positive emotions in crisis? A prospective study of resilience and emotions following the terrorist attacks on the United States on September 11th, 2001. *Journal of Personality and Social Psychology, 84*(2), 365–376. https://doi.org/10.1037/0022-3514.84.2.365
- Feinman, S. (Ed.). (1992). *Social referencing and the social construction of reality in infancy.* Plenum Press. https://doi.org/10.1007/978-1-4899-2462-9
- Frijda, N. H. (1988). The laws of emotion. *American Psychologist, 43*, 349–358. https://psycnet.apa.org/record/1988-28577-001
- Fossati, P. (2012). Neural correlates of emotion processing: From emotional to social brain. *European Neuropsychopharmacology, 22*, S487–S491.
- Fournier, J. C., Keener, M. T., Almeida, J., Kronhaus, D. M., & Phillips, M. L. (2013). Amygdala and whole-brain activity to emotional faces distinguishes major depressive disorder and bipolar disorder. *Bipolar Disorders.* Advance online publication. doi:10.1111/bdi.12106
- Goldsmith, H. H., Bradshaw, D. L., & Rieser-Danner, L. A. (1986). Temperament as a potential developmental influence on attachment. New Directions for Child and Adolescent Development, 1986(31), 5–34. https://doi.org/10.1002/CD.23219863103
- Gopnik, A., Meltzoff, A. N., & Kuhl, P. K. (2001). *The scientist in the crib*. New York, NY: HarperCollins.
- Gosselin, P., Maassarani, R., Younger, A., and Perron, M. (2011). Children’s deliberate control of facial action units involved in sad and happy expressions. *J. Nonverbal Behav.* 35, 225–242. doi: 10.1007/s10919-011-0110-9
- Gulec, M. Y., Altintas, M., Inanc, L., Bezgin, C. H., Koca, E. K., and Gulec, H. (2013). Effects of childhood trauma on somatization in major depressive disorder: the role of alexithymia. *J. Affect. Disord.* 146, 137–141. doi: 10.1016/j.jad.2012.06.03
- Grossard C, Chaby L, Hun S, Pellerin H, Bourgeois J, Dapogny A, Ding H, Serret S, Foulon P, Chetouani M, Chen L, Bailly K, Grynszpan O and Cohen D (2018) Children Facial Expression Production: Influence of Age, Gender, Emotion Subtype, Elicitation Condition and Culture. *Front. Psychol.* 9:446. doi: 10.3389/fpsyg.2018.00446 is licensed under the **Creative Commons Attribution License (CC BY)**.
- Halberstadt, A. G., and Lozada, F. T. (2011). Emotional development in infancy through the lens of culture. *Emot. Rev.* 3, 158–168. doi: 10.1177/175407391038794
- Havas, D. A., Glenberg, A. M., Gutowski, K. A., Lucarelli, M. J., & Davidson, R. J. (2010). Cosmetic use of botulinum toxin-A affects processing of emotional language. *Psychological Science, 21*, 895–900.
- Hart, S., & Carrington, H. (2002). Jealousy in 6-month-old infants. *Infancy, 3*(3), 395–402. https://doi.org/10.1207/S15327078IN0303_6
- Harris, P., de Rosnay, M., and Pons, F. (2005). Language and children's understanding of mental states. *Curr. Dir. Psychol. Sci.* 14, 69–73. doi: 10.1111/j.0963-7214.2005.00337.x
- Hopp, H., Troy, A. S., & Mauss, I. B. (2011). The unconscious pursuit of emotion regulation: Implications for psychological health. *Cognition and Emotion, 25*, 532–545. https://www.ocf.berkeley.edu/~eerlab/pdf/papers/2011_Hopp_unconscious_pursuit_of_emotion_regulation.pdf
- Halberstadt, A. G., Denham, S. A., and Dunsmore, J. C. (2001). Affective social competence. *Soc. Dev.* 10, 79–119. doi: 10.1111/1467-9507.00150
- Halberstadt, A. G., Parker, A. E., and Castro, V. L. (2013). "Nonverbal communication: development perspectives," in *Handbook of Communication Science*, eds J. A. Hall and M. L. Knapp (Berlin: Springer).
- Hertenstein MJ, Campos JJ. The retention effects of an adult's emotional displays on infant behavior. Child Dev. 2004 Mar-Apr;75(2):595-613. doi: 10.1111/j.1467-8624.2004.00695.x. PMID: 15056208
- Housman, D.K. The importance of emotional competence and self-regulation from birth: a case for the evidence-based emotional cognitive social early learning approach. *ICEP* **11,** 13 (2017). his article is distributed under the terms of the Creative Commons Attribution 4.0 International License (http://creativecommons.org/licenses/by/4.0/)

- Hwang, H. & Matsumoto, D. (2021). Functions of emotions. In R. Biswas-Diener & E. Diener (Eds), *Noba textbook series: Psychology.* Champaign, IL: DEF publishers. Retrieved from http://noba.to/w64szjxu: Functions of Emotions by Hyisung Hwang and David Matsumoto is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License. Permissions beyond the scope of this license may be available in our Licensing Agreement.
- Holodynski, M., and Friedlmeier, W. (2006). *Development of Emotions and Their Regulation: A Socioculturally Based Internalization Model*. Boston, MA: Kluwer Academic.
- Izard, C. E., and Malatesta, C. Z. (1987). "Perspectives on emotional development I: differential emotions theory of early emotional development," in *The First Draft of This Paper was Based on an Invited Address to the Eastern Psychological Association.* New York, NY: Wiley-Interscience.
- Kaler, S. R., & Kopp, C. B. (1990). Compliance and comprehension in very young toddlers. *Child Development, 61*(6), 1997–2003. https://doi.org/10.2307/1130853
- Krisch, J. A. (2021, October 27). *Yes, that's me - but why is she wearing my shirt?* Fatherly. Retrieved January 22, 2022, from https://www.fatherly.com/health-scie...-mirror-tests/
- Lally, J. R. (Ed.). (2011). Infant/toddler caregiving: A guide to social-emotional growth and socialization (2nd ed.). Sacramento, CA: California Department of Education.
- Lavelli, M., & Fogel, A. (2005). Developmental Changes in the Relationship Between the Infant's Attention and Emotion During Early Face-to-Face Communication: The 2-Month Transition. *Developmental Psychology, 41*(1), 265–280. https://doi.org/10.1037/0012-1649.41.1.26
- Lindquist, K. A., MacCormack, J. K., & Shablack, H. (2015). The role of language in emotion: predictions from psychological constructionism. *Frontiers in psychology*, *6*, 444. CC BY
- Lazarus, R. S. (1991). *Emotion and adaptation*. Oxford University Press.
- Leslie, A. M. (1994). ToMM, ToBy, and agency: Core architecture and domain specificity in cognition and culture. In L. Hirschfeld & S. Gelman (Eds.), *Mapping the mind: Domain specificity in cognition and culture* (pp. 119-148). New York, NY: Cambridge University Press.
- Levenson, R. W., & Ruef, A. M. (1992). Empathy: A physiological substrate. *Journal of Personality and Social Psychology, 63*(2), 234–246. https://doi.org/10.1037/0022-3514.63.2.234
- Lindquist, K. A., and Barrett, L. F. (2008b). "Emotional complexity," in *Handbook of Emotions*, 3rd Edn, eds M. Lewis, J. M. Haviland-Jones, and L. F. Barrett (New York: Guilford).
- Matsumoto, D. Cultural similarities and differences in display rules. *Motiv Emot* **14,** 195–214 (1990). https://doi.org/10.1007/BF00995569
- Matsumoto, D., Yoo, S. H., Nakagawa, S., & Multinational Study of Cultural Display Rules. (2008). Culture, emotion regulation, and adjustment. *Journal of Personality and Social Psychology, 94*(6), 925–937. https://doi.org/10.1037/0022-3514.94.6.925
- Mauss, I. B., Bunge, S. A., & Gross, J. J. (2007). Automatic emotion regulation. *Social and Personality Psychology Compass, 1*, 146–167. https://www.ocf.berkeley.edu/~eerlab...Regulation.pdf
- Mauss, I. B., Levenson, R. W., McCarter, L., Wilhelm, F. H., & Gross, J. J. (2005). The tie that binds? Coherence among emotion experience, behavior, and physiology. *Emotion, 5*, 175–190. https://www.ncbi.nlm.nih.gov/pubmed/15982083
- Mauss, I. B., & Robinson, M. D. (2009). Measures of emotion: A review. *Cognition and Emotion, 23*, 209–237. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2756702/
- Malatesta, C. Z., & Haviland, J. M. (1982). Learning display rules: The socialization of emotion expression in infancy. *Child Development, 53*(4), 991–1003. https://doi.org/10.2307/1129139
- Mauss, I. B., Cook, C. L., Cheng, J. Y. J., & Gross, J. J. (2007). Individual differences in cognitive reappraisal: Experiential and physiological responses to an anger provocation. *International Journal of Psychophysiology, 66*, 116–124. https://www.ncbi.nlm.nih.gov/pubmed/17543404
- McRae, K., Ochsner, K. N., Mauss, I. B., Gabrieli, J. J. D., & Gross, J. J. (2008). Gender differences in emotion regulation: An fMRI study of cognitive reappraisal. *Group Processes & Intergroup Relations, 11*(2), 143–162. https://doi.org/10.1177/1368430207088035
- Miguel-Hidalgo, J. J. (2013). Brain structural and functional changes in adolescents with psychiatric disorders. *International Journal of Adolescent Medicine and Health, 25*, 245–256.
- Messinger, Daniel & Fogel, Alan. (2007). The Interactive Development Of Social Smiling. Advances in child development and behavior. 35. 327-66. 10.1016/B978-0-12-009735-7.50014-1.

- Meltzoff, A. N. (1995). Understanding the intentions of others: Re-enactment of intended acts by 18-month-old children. *Developmental Psychology, 31*, 838-850.
- National Research Council and Institute of Medicine. 2000. *From Neurons to Neighborhoods: The Science of Early Childhood Development.* Committee on Integrating the Science of Early Childhood Development. Edited by J. P. Shonkoff and D. A. Phillips. Board on Children, Youth and Families, Commission on Behavioral and Social Sciences and Education. Washington, DC: National Academies Press.
- National Research Council (US) Division of Behavioral and Social Sciences and Education. Early Childhood Development and Learning: New Knowledge for Policy. Washington (DC): National Academies Press (US); 2001. From Neurons to Neighborhoods, The Science of Early Childhood Development. Available from: https://www.ncbi.nlm.nih.gov/books/NBK223297/
- National Scientific Council on the Developing Child. Winter, 2004. "Children's Emotional Development Is Built into the Architecture of Their Brains" Working Paper No. 2. (accessed on December 20, 2021
- Nook, E. C., Lindquist, K. A., & Zaki, J. (2015). A new look at emotion perception: Concepts speed and shape facial emotion recognition. *Emotion*, *15*(5), 569–578. https://doi.org/10.1037/a0039166
- National Scientific Council on the Developing Child, Children's emotional development is built into the architecture of their brains. (2004), Working Paper No. 2.
- Oster, H. (2005). The repertoire of infant facial expressions: an ontogenetic perspective. *Emot. Dev.* 261–292.
- Papoušek, M. (2007). Communication in early infancy: An arena of intersubjective learning. *Infant Behavior & Development*, *30*(2), 258–266. https://doi.org/10.1016/j.infbeh.2007.02.003
- Paris, J., Raymond, P., Ricardo, & Johnson. (2021, January 4). Infant Emotions. College of the Canyons. https://socialsci.libretexts.org/@go/page/24626
- Panksepp, J. 2001. The Long-Term Psychobiological Consequences of Infant Emotions: Prescriptions for the Twenty-First Century," *Infant Mental Health Journal*, Vol. 22, No. 1–2, 132–73.
- Qin, S., Young, C. B., Duan, X., Chen, T., Supekar, K., & Menon, V. (2013). Amygdala subregional structure and intrinsic functional connectivity predicts individual differences in anxiety during early childhood. *Biological Psychiatry.* Advance online publication. doi:10.1016/j.biopsych.2013.10.006
- Quann, V., and C. Wien. 2006. "The Visible Empathy of Infants and Toddlers," *Young Children*, Vol. 61, No. 4, 22–29.
- Raineki, C., Cortés, M. R., Belnoue, L., & Sullivan, R. M. (2012). Effects of early-life abuse differ across development: Infant social behavior deficits are followed by adolescent depressive-like behaviors mediated by the amygdala. *The Journal of Neuroscience*, *32*, 7758–7765.
- Rochat, P. (2003). Five levels of self-awareness as they unfold early in life. *Consciousness and Cognition*, *12*(4), 717–731. https://doi.org/10.1016/s1053-8100(03)00081-3
- Rochat, P. (2015). Layers of awareness in development. *Developmental Review*, *38*, 122–145. https://doi.org/10.1016/j.dr.2015.07.009
- Rothbart, M. K., Posner, M. I., & Kieras, J. (2006). Temperament, Attention, and the Development of Self-Regulation. In K. McCartney & D. Phillips (Eds.), *Blackwell handbook of early childhood development* (pp. 338–357). Blackwell Publishing. https://doi.org/10.1002/9780470757703.ch17
- Rothbart, M. K., & Bates, J. E. (2006). Temperament. In N. Eisenberg, W. Damon, & R. M. Lerner (Eds.), *Handbook of child psychology: Social, emotional, and personality development* (pp. 99–166). John Wiley & Sons, Inc..
- Raver, C. 2002. "Emotions Matter: Making the Case for the Role of Young Children's Emotional Development for Early School Readiness," *SRCD Social Policy Report*, Vol. 16, No. 3.
- Russell, J. A., and Widen, S. C. (2002). A label superiority effect in children's categorization of facial expressions. *Soc. Dev.* 11, 30–52. doi: 10.1111/1467-9507.00185
- Rieffe, C., Meerum Terwogt, M., Petrides, K. V., Cowan, R., Miers, A. C., and Tolland, A. (2007). Psychometric properties of the emotion awareness questionnaire for children. *Pers. Individ. Dif.* 43, 95–105. doi: 10.1016/j.paid.2006.11.015
- Roseman, I. J., and Smith, C. A. (2001). Appraisal theory: Overview, assumptions, varieties, controversies. In K. R. Scherer, A. Schorr, & T. Johnstone (Eds.), *Appraisal processes in emotion: Theory, methods, research*, (pp. 3–19). Oxford University Press.
- Salovey, P., & Mayer, J. D. (1990). Emotional intelligence. *Imagination, Cognition, and Personality, 9*, 185–211.
- Sorce, J. F., Emde, R. N., Campos, J. J., & Klinnert, M. D. (1985). Maternal emotional signaling: Its effect on the visual cliff behavior of 1-year-olds. *Developmental Psychology, 21*(1), 195–200. https://doi.org/10.1037/0012-1649.21.1.195
- Self-Regulation and Self-Efficacy. (2020, August 16). Lansing Commnunity College. https://socialsci.libretexts.org/@go/page/12295

- Saarni, C., Campos, J. J., Camras, L. A., & Witherington, D. (2006). Emotional Development: Action, Communication, and Understanding. In N. Eisenberg, W. Damon, & R. M. Lerner (Eds.), *Handbook of child psychology: Social, emotional, and personality development* (pp. 226–299). John Wiley & Sons, Inc..
- Saarni, C. (1999). *The Development of Emotional Competence*. New York: Guilford
- Shonkoff, J. P. 2004. *Science, Policy and the Developing Child: Closing the Gap Between What We Know and What We Do.* Washington, DC: Ounce of Prevention Fund. http://www.ounceofprevention.org/dow...honkoffweb.pdf (accessed on December 7, 2006) Note, the preceding Web address is no longer valid.
- Sroufe, L. A. (1996). *Emotional Development.* New York, NY: Cambridge University Press. doi: 10.1017/CBO9780511527661
- Soussignan, R. (2002). Duchenne smile, emotional experience, and autonomic reactivity: A test of the facial feedback hypothesis. *Emotion, 2*, 52–74. https://psycnet.apa.org/record/2002-18343-004
- Stangor, C. and Walinga, J. (2014). *Introduction to Psychology – 1st Canadian Edition.* Victoria, B.C.: BCcampus. Retrieved from Introduction to Psychology – 1st Canadian Edition – The BC Open Textbook Project (opentextbc.ca) is licensed CC BY-NC-SA 4.0 Licence.
- Sullivan, M. W., and Lewis, M. (2003). Emotional expressions of young infants and children: a practitioner's primer. *Infants Young Child.* 16, 120–142. doi: 10.1097/00001163-200304000-00005
- Troy, A. S., Wilhelm, F. H., Shallcross, A. J., & Mauss, I. B. (2010). Seeing the silver lining: Cognitive reappraisal ability moderates the relationship between stress and depression. *Emotion, 10*, 783–795. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3278301/
- Tamietto, M., Castelli, L., Vighetti, S., Perozzo, P., Geminiani, G.,
- Thompson, R. A., & Goodvin, R. (2007). Taming the tempest in the teapot: Emotion regulation in toddlers. In C. A. Brownell & C. B. Kopp (Eds.), *Socioemotional development in the toddler years: Transitions and transformations* (pp. 320–341). The Guilford Press.
- Thompson, R. (2021). Social and personality development in childhood. In R. Biswas-Diener & E. Diener (Eds), *Noba textbook series: Psychology.* Champaign, IL: DEF publishers. Retrieved from http://noba.to/gdqm6zvc licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License.
- Thompson, R. A. (2006b). The development of the person: Social understanding, relationships, self, conscience. In W. Damon & R. M. Lerner (Series Eds.) & N. Eisenberg (Vol. Ed.), *Handbook of child psychology: Vol. 3. Social, emotional, and personality development* (6th ed., pp. 24–98). New York, NY: Wiley.
- Thompson, R. A., & Goodvin, R. (2005). The Individual Child: Temperament, Emotion, Self, and Personality. In M. H. Bornstein & M. E. Lamb (Eds.), *Developmental science: An advanced textbook* (pp. 391–428). Lawrence Erlbaum Associates Publishers.
- Tronick, E. Z. (1989). Emotions and emotional communication in infants. *American Psychologist*, *44*(2), 112–119. https://doi.org/10.1037/0003-066X.44.2.11
- Tsai, J.; R. Levenson; and K. McCoy. 2006. "Cultural and Temperamental Variation in Emotional Response," *Emotion*, Vol. 6, No. 3, 484–97.
- Tsai, J.; B. Knutson; and H. Fung. 2006. "Cultural Variation in Affect Valuation," *Journal of Personality and Social Psychology*, Vol. 90, No. 2, 288–307.
- Tsai, J., and others. 2007. "Learning What Feelings to Desire: Socialization of Ideal Affect Through Children's Storybooks," *Personality and Social Psychology Bulletin*, Vol. 33, No. 1, 17–30.
- Tominaga, T., Choi, H., Nagoshi, Y., Wada, Y., and Fukui, K. (2014). Relationship between alexithymia and coping strategies in patients with somatoform disorder. *Neuropsychiatr. Dis. Treat.* 10, 55–62. doi: 10.2147/NDT.S55956
- Understand and empathise. (2021, January 17). https://socialsci.libretexts.org/@go/page/85573 is licensed under CC BY-SA
- Vygotsky, L. S. (1986). Thought and language. Cambridge, MA: MIT Press.
- Weiskrantz, L., & de Gelder, B. (2009). Unseen facial and bodily expressions trigger fast emotional reactions. *Proceedings of the National Academy of Sciences,USA, 106*, 17661–17666.
- Wellman, H. M. (2011). Developing a theory of mind. In U. Goswami (Ed.), *Wiley-Blackwell handbook of childhood cognitive development* (2nd ed., pp. 258–284). New York, NY: Wiley-Blackwell
- Widen, S. C., and Russell, J. A. (2008). Children acquire emotion categories gradually. *Cogn. Dev.* 23, 291–312. doi: 10.1016/j.cogdev.2008.01.002
- Widen, S. C. (2013). Children's interpretation of facial expressions: the long path from valence-based to specific discrete categories. *Emot. Rev.* 5, 72–77. doi: 10.1177/1754073912451492

- Winsler A, Carlton MP, Barry MJ. Age-related changes in preschool children's systematic use of private speech in a natural setting. J Child Lang. 2000 Oct;27(3):665-87. doi: 10.1017/s0305000900004402. PMID: 11089343.
- Yehuda, N. (2005). The language of dissociation. *J. Trauma Dissociation* 6, 9–29. doi: 10.1300/J229v06n01_02
- Child Growth and Development by Jean Zaar is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License, except where otherwise noted.
- Zahn-Waxler, C., & Radke-Yarrow, M. (1990). The origins of empathic concern. *Motivation and Emotion*, *14*(2), 107–130. https://doi.org/10.1007/BF0099163
- Zahn-Waxler, C., Radke-Yarrow, M., Wagner, E., & Chapman, M. (1992). Development of concern for others. *Developmental psychology*, *28*(1), 126

Glossary

Details

Offer the details a user needs to know about the definition, parameters, and so on. Tables are extremely useful for looking up information and organizing the details that readers want to know.

Definition

```
void print(String message)
```

Parameters

message

Type: String
Message to print.

Response

Upon successful invocation, this feature returns ...

Exceptions

Exception	Condition
ArgumentNullException	message is null.

Remarks

Additional points to consider are ...

Examples

Example 1:

First example shows ...

Example 2:

Second example shows ...

Considerations

Give some considerations such as system requirements or "gotchas" for this setting or control or programming syntax.

CHAPTER OVERVIEW

16: Social Development

16.1: Introduction

Introduction to Social Development

"How have I become the kind of person I am today?" Every adult ponders this question from time to time. Answers may include the influences of parents, peers, temperament, a moral compass, a strong sense of self, and critical life experiences such as parental divorce. Social development encompasses many influences and addresses questions about how people uniquely develop. Are humans a product of nature or nurture? How enduring are the influences of early experiences? Social development refers to the long-term changes in relationships and interactions involving self, peers, and family. It includes positive changes, such as how friendships develop, and negative changes, such as aggression or bullying. The study of social development offers perspective on these and other issues, demonstrating the complexity of external impacts on developing infants and toddlers. [1]

[1] Thompson, P. (2019). Foundations of Educational Technology is licensed CC BY

16.2: What is Social Development?

Defining Social Development

In childhood, social development emerges through social influences, biological maturation, and the child's representations of the social world and the self. Understanding social development requires looking at children from 3 perspectives that interact to shape development. The first is the social context where each child lives, especially the relationships that provide security, guidance, and knowledge. The second is biological maturation which includes developing social and emotional competencies and underlying differences of individual temperament. The third is a child's growing representations of who they are and the social world around them. Social development is best understood as the continuous interaction between these social, biological, and representational aspects of psychological development.[1]

Figure 16.2.1: Social Development is an important part of forming peer relationships. ([2])

[1] Thompson, R. (2022). Social and personality development in childhood Is licensed CC BY-NC-SA

[2] Image by *@pixabay is in the public domain*

16.3: Theories of Social Development

Erikson and Psychosocial Theory

One of the best-known theories of social development is the Eight Psychosocial Crises described by Erik Erikson.[1] Erik Erikson (1902-1994) believed we know what motivates us throughout life. We make conscious choices in life, focusing on meeting particular social and cultural needs rather than purely biological ones. For instance, humans are driven by the need to experience the world as a trustworthy place, feel we are capable individuals, believe we can contribute to society, and possess confidence in having lived a meaningful life. These are all psychosocial problems. Erikson divided the lifespan into 8 crises, usually called stages. Each stage or crisis consists of psychosocial tasks to accomplish. Erikson believed that an individual's personality takes shape throughout his lifespan in the face of life's challenges. According to Erikson, successful development involves positively dealing with and resolving the goals and demands of each crisis. If a person does not resolve a crisis successfully, it may hinder his ability to deal with later crises.

Definition: Psychosocial development

Erikson's theory that emphasizes the social relationships that are important at each stage of personality development. The lifespan is broken into eight stages, each with a major psychosocial task to accomplish or crisis to overcome.

Psychosocial Stages

1. Trust vs. mistrust (0-1 year): the infant must have basic needs met consistently to feel that the world is a trustworthy place.
2. Autonomy vs. shame and doubt (1 -2 years): mobile toddlers have newfound freedom they like to exercise, and they learn some essential independence by being allowed to do so.
3. Initiative vs. guilt (3 -5 years): preschoolers like to initiate activities and emphasize doing things "all by myself."
4. Industry vs. inferiority (6-11 years): school-aged children focus on accomplishments and begin making comparisons between themselves and their classmates.
5. Identity vs. role confusion (adolescence): teenagers try to gain a sense of identity by experimenting with various roles, beliefs, and ideas.
6. Intimacy vs. isolation (young adulthood): in our 20s and 30s, we make some of our first long-term commitments in intimate relationships.
7. Generativity vs. stagnation (middle adulthood): In our 40s through the early 60s, we focus on being productive at work and home and are motivated to feel that we've contributed to society.
8. Integrity vs. despair (late adulthood): we look back on our lives and hope to see that we have lived well and have a sense of integrity because we lived according to our beliefs.

The first 3 stages form a foundation for discussions on emotional and social development during the lifespan. These stages or crises can occur more than once: for instance, a person may struggle with a lack of trust beyond infancy under certain circumstances.

Definition: eight stages of psychosocial development

Erikson's stages of trust vs. mistrust, autonomy vs. shame/doubt, initiative vs. guilt, industry vs. inferiority, identity vs. role confusion, intimacy vs. isolation, generativity vs. stagnation, and integrity vs. despair

Crises of Infants and Preschoolers: Trust, Autonomy, and Initiative

From the day they are born, infants face a crisis (in Erikson's paradigm) about trust and mistrust. They are happiest if they can eat, sleep, and excrete according to their schedules, regardless of whether their schedules are convenient for their caregiver. Unfortunately, a young infant is in no position to control or influence a caregiver's scheduling needs, so the infant faces a dilemma about how much to trust or mistrust the caregiver's helpfulness. It is as if the infant asks "If I demand food (or sleep, or a clean diaper, etc.) now, will my caregiver be able to help me meet this need?" Hopefully, between the 2 of them, caregiver and child resolve this choice in favor of the infant's trust: the caregiver proves to be adequate in attentiveness, and the infant risks trusting the caregiver's motivation and skill.[1]

Caregivers who are consistently and appropriately responsive and sensitive to their infant's needs help the infant develop a sense of trust; the infant will see the world as a safe, predictable place. Unresponsive or inconsistent caregivers who do not meet their

infant's needs can elicit feelings of anxiety, fear, and mistrust; the infant may see the world as unpredictable and unsafe. If infants are treated cruelly, or their needs are not met appropriately, they will likely grow up with a sense of mistrust for people in the world.[2]

As soon as the first crisis resolves, a new one develops over autonomy and shame. The child (now a toddler) may trust their caregiver, but their trust contributes to the desire to assert autonomy by taking care of basic personal needs, such as feeding, toileting, or dressing. At this stage of development, you will often hear toddlers say things like “me-do-it” as they exert their autonomy. Given the child's lack of experience in these activities, self-care is risky at first: the toddler may feed (or use the toilet, dress themselves, etc.) clumsily and ineffectively. The child's caregiver risks overprotecting the child by criticizing their early efforts unnecessarily, causing the child to feel shame for even trying.[1] Erikson believed that toddlers should be allowed to explore their environment as freely as safety permits, fostering their understanding of independence that later grows self-esteem, initiative, and overall confidence. If denied the opportunity to act on their environment (within developmentally appropriate measures), toddlers may begin to doubt their abilities, leading to low self-esteem and feelings of shame (Berger, 2005). Hopefully, the new crisis resolves in favor of autonomy through the combined efforts of the child to assert independence and of the caregiver to support the child.

About the time a child is of preschool age (3-5 years old) the autonomy exercised during the previous period becomes more elaborate, extended, and focused on objects and people other than the child. The child at an early education center, for example, may now undertake to build the "biggest city in the world" out of all available unit blocks, even if other children want some of the blocks for themselves. The child's projects and desires create a new crisis of initiative and guilt because the child soon realizes that acting on impulses or desires can sometimes negatively affect others: more blocks for one child may mean fewer for someone else. As with the crisis over autonomy, caregivers must support the child's initiatives whenever possible without making the child feel guilty for desiring to have or do something that affects others' welfare. By limiting behavior where necessary—but not limiting internal feelings—caregivers demonstrate support of this newfound ability to take the initiative. Expressed in Erikson's terms, the crisis resolves in favor of initiative.[1]

Criticisms of Erickson's Theory

Criticisms of Erikson's theory stem from his focus on stages and his assumption that completing one stage is a prerequisite for the subsequent development crisis (Marcia, 1980). His theory also focuses on the social expectations found in certain cultures, but not in all. For instance, the idea that adolescence is a time of searching for identity might translate well in the middle-class culture of the United States, but not as well in cultures where the transition into adulthood coincides with puberty through rites of passage and where adult roles offer fewer choices.[2]

---

[1] Thompson, P. (2019). Foundations of Educational Technology is licensed CC BY

[2] Child Abuse, Neglect, and Foster Care is shared under a not declared license and was authored, remixed, and/or curated by Diana Lang

---

16.4: Overview of Social Cognitive Learning Theory

Social Cognitive Learning Theory

Social Learning Theory, or learning by watching others, was developed by Albert Bandura (1977). Social Learning Theory holds that portions of an individual's knowledge acquisition can be directly related to observing others within the context of social interactions, experiences, and outside media influences. Young children frequently learn behaviors through imitation: they learn by modeling or copying the behavior of others, especially when they do not know what else to do.[1] This is called observational learning. Bandura theorized that the observational learning process consists of 4 parts. The first is attention. To learn, one must pay attention to what one is observing. The second part is retention: one must retain the observed behavior in one's memory. The third part of observational learning, initiation, acknowledges that the learner must be able to execute or initiate the learned behavior. Lastly, the observer must be motivated to engage in observational learning (Bouton & Lang, 1960). Bandura's theory states that when people observe a model performing a behavior and experiencing its consequences, they remember the sequence of events and use this information to guide subsequent behaviors. Watching a model can also prompt the viewer to engage in previously learned behavior (Bandura, 1986, 2002).[2]

Figure 16.4.1: Modeling behavior is a part of social development. ([3])

Do Parents Socialize Children or Do Children Socialize Parents?

Bandura (1986) suggests an interplay between environment and individual. People are not merely the product of their surroundings; instead, people influence their surroundings. There is also an interplay between personalities and how events are interpreted. This concept is called reciprocal determinism. An example of this might be the interaction between parents and children. Parents influence their child's environment, and children influence parents as well. Parents may respond differently with their first child than with their fourth. Perhaps they try to be the perfect parents with their firstborn, but by the time their last child comes along, they have very different expectations of themselves and their child. Our environment creates us, and we make our environment.[4]

Criticism of Social Cognitive Theory

One of the main criticisms of social cognitive theory is that it lacks unification: the different aspects of the theory appear disconnected. The theory is also so broad that not all its parts are fully understood or integrated into a single explanation of learning. It is limited because not all social learning can be directly observed, and it ignores maturation. Understanding how a child learns through observation and how an adult learns through observation is not differentiated, and developmental factors are not acknowledged.[2]

---

[1] Contemporary Theories on Development is shared under a CC BY-NC-SA license and was authored, remixed, and/or curated by Martha Lally & Suzanne Valentine-French

[2] Zhou, Molly and Brown, David, "Educational Learning Theories: 2nd Edition" (2015). Education Open Textbooks. CC BY-NC-SA

[3] Image by Rebekah Creasy is licensed CC: BY-NC

[4] Psyc 200 Lifespan Psychology by Laura Overstreet is **Licensed** *CC BY: Attribution*

16.5: The Early Months of Social Development

Early Social Development

Young infants seek relationships. They actively explore what they can do with their bodies, people close to them, and the environment. They are not empty vessels waiting to be filled with information, but rather "active participants in their development, reflecting the intrinsic human drive to explore and master one's environment" (National Research Council and Institute of Medicine, 2000 Core Concepts of Development). As seen in Figure 16.5.1, their active engagement with the social and physical world works hand in hand with the care they receive from adults, especially when the adults are responsive to them.

Figure 16.5.1: Actively engaging with the environment helps support social development. ([1])

Infants develop quickly by extending their abilities in all domains and creating more complex ways of relating to people and things. They send messages to adults in various ways and expect responses from adults. For example, when looking into the faces of adults, infants may see enlarged dilated pupils—a common sign of interest and pleasure—and, in response, they smile more (Hess, 1975). Children in the 3-to-4-month range show highly differentiated social-emotional behavior. By 3 months, infants learn to alter responses to adults according to how the adults respond to them: infants increase vocalizations when adults acknowledge these vocalizations with a smile, a vocal response, or light touch. The interest of others stimulates the infant's interest (Crick, 1984). [2]

[1] Image by Rebekah Creasy is licensed CC: BY-NC

[2] California Infant/Toddler Learning and Development Foundations, 2009 by the California Department of Education is used with permission

16.6: Relationships

Relationships and Social Development

Children's experiences of relationships contribute to their expanding repertoire of social skills and broadened social understanding. In these relationships, children develop expectations for specific people (for example, experiences that lead to secure or insecure attachments to parents), acquire knowledge of how to interact with adults and peers, and create a self-concept based on how others respond to them.[1] Relationships with parents, other family members, and caregivers provide critical context for infants' social development. Parents and caregivers are an infant's initial social partner, and the quality of this early caregiver-infant relationship has been linked to many different positive outcomes. Establishing close relationships with adults is related to children's emotional security, sense of self, and evolving understanding of the world around them. Interactions with adults are a frequent and regular part of infants' daily lives, and infants as young as 3 months of age have demonstrated the ability to discriminate between the faces of unfamiliar adults (Barrera & Maurer, 1981). By 4 months of age, a child's power in relationships, along with the impact of these relationships, is evident. Infants become more skilled at reading others' behavior and adapting their own behavior. They also gain skills to make themselves more engaging and effective socially. 4-month-olds will send clear messages, become quiet in anticipation as someone comes near to care for them, seek adults' attention with smiles and laughter, participate in extended back and forth interaction with others, and engage in simple social imitation.[2]

Close relationships with adults who provide consistent nurturance strengthen a child's capacity to learn and develop. These special relationships influence the infant's emerging sense of self and understanding of others. Infants use relationships with adults in many ways: for reassurance that they are safe, for assistance in alleviating distress, for help with emotion regulation, and for social approval or encouragement. These relationships play a crucial part in development across all domains. For example, parental responses to the infant's vocalizations support language development (see Tamis-LeMonda et al., 2014 for reviews) and direct gaze sharing between a parent and infant promotes connections and communication (Leong et al., 2017).[3]

Social Understanding

Remarkably, young children begin developing social understanding very early in life. Before the end of the first year, infants are aware that other people have perceptions, feelings, and other mental states that affect their behavior and that differ from their own mental states.[1]

Children begin to understand other people's responses, communication, emotional expression, and actions during the infant and toddler years. These developments include an infant's understanding of what to expect from others, how to act, and which social scripts are used for specific social situations. Recent research suggests that infants' and toddlers' social understanding is related to how often they experience adult communication about the thoughts and emotions of others (Taumoepeau & Ruffman, 2008).[2]

"At each age, social cognitive understanding contributes to social competence, interpersonal sensitivity, and an awareness of how the self relates to other individuals and groups in a complex social world" (Thompson, 2006, pg.26). Even in early infancy, social understanding is critical because of the social nature of humans (Wellman & Lagattuta, 2000).[2]

Responding to Infants' Cues as Part of Social Development Through Joint Attention and Social Referencing

Humans can actively engage with other people's mental states, such as when they enter situations of joint attention (Malle, 2022). Joint attention is described as the ability to coordinate visual attention with another person and then shift the gaze toward an object or event (Mundy, 1998); it does not require the gazer to be aware of the follower's reaction (Emery, 2000). The definition sounds more complicated than it is. If you point to an object around a 3-year-old, notice how you both check in, ensuring that you are *jointly* engaging with the object. Such shared engagement is critical for children to learn the meaning of objects: both their value (is it safe and rewarding to approach?) and the words that refer to them (what do you call this?). When I hold up my keyboard and show it to you, we are jointly attending to it, and if I say it's called "Tastatur" in German, you know that I am referring to the keyboard and not to the table on which it had been resting.[4]

Literature reports 2 main components of joint attention: (1) response to joint attention and (2) initiation of joint attention.

Responding to joint attention is the ability to shift visual attention following another's social cues such as gaze or pointing, whereas initiating joint attention is the ability to direct another person's attention through gaze or gestures with the aim of sharing an experience (Seibert & Mundy, 1982). Responding to joint attention and initiating joint attention are considered interrelated aspects of joint attention, emerging at different times during development (Mundy et al., 2007). Responding to joint attention usually

develops between 6 and 9 months of age, whereas initiating joint attention starts approximately at 9 months of age with significant variability across individuals.[5]

Figure 16.6.1: Example of joint attention as both man and infant look at the same object. ([11])

Social Referencing

Young children begin developing social understanding very early in life. Before the end of the first year, an infant is aware that other people have perceptions, feelings, and different mental states affecting their behavior.[1] An understanding that other mental states differ from the infant's own can be readily observed in the phenomena of social referencing. [1] Social referencing is the tendency of an infant to gather information from a caregiver to regulate his behavior in an ambiguous situation (in which the infant does not have enough information to decide how to react) (Fawcett & Liszkowski, 2015; Schieler et al., 2018; Stenberg, 2009; Striano et al., 2006; Walden and Kim, 2005; Zarbatany and Lamb, 1985). Social referencing emerges around 7 to 10 months of age and forms a foundation for social learning and social appraisal in adulthood (Walle et al., 2017).[1]

In social referencing, an infant looks to a trusted caregiver's face when confronted with an unfamiliar person or situation (Feinman, 1992). If the caregiver seems calm and reassuring, the infant responds positively as if the situation is safe. If the caregiver looks fearful or distressed, the infant is likely to react with wariness or distress because the caregiver's expression signals danger. Infants display remarkable insight and awareness: even though they are uncertain about the unfamiliar situation, the caregiver is not. By "reading" the emotion in the caregiver's face, infants can learn about whether the circumstance is safe or dangerous, and how to respond. [1]

In the past, developmental scientists believed infants were egocentric—focused on their perceptions and experience—but research now indicates the opposite is true. From an early age, infants are aware that people have different mental states, which motivates them to figure out what others are feeling, intending, wanting, and thinking, and how these mental states affect their behavior. Infants are beginning to develop a theory of mind, and although their understanding of mental states begins very simply, it expands rapidly (Wellman, 2011)Social understanding grows significantly as children's theory of mind develops.[1]

How do these achievements in social understanding occur? Young children are remarkably sensitive observers of other people. They make connections between their emotional expressions, words, and behavior to derive simple inferences about mental states (e.g., concluding that what Mommy is looking at is in her mind) (Gopnik, Meltzoff, & Kuhl, 2001). This connection is especially likely to occur in relationships with people the child knows well, consistent with the ideas of attachment theory. Growing language skills give young children words with which to represent these mental states (e.g., "mad," "wants") and talk about them with others. Through conversation with their caregivers about everyday experiences, children learn much about people's mental states from how adults talk about them ("Your sister was sad because she thought Daddy was coming home.") (Thompson, 2006). Developing social understanding depends heavily upon children's everyday interactions with others and their careful interpretations of what they see and hear.[1]

Disturbances in Infant-Caregiver Relationships: Maternal Depression and Infant and Toddler Social Development

Infants repeatedly participate in daily, interactive routines with their primary caregivers, most often their mothers. An infant is typically in tune with the emotional signals in their caregivers' voices, gestures, movements, and facial expressions. Maternal depression compromises the infant and mother's ability to mutually regulate the interaction. Most commonly, depression impacts the relationship through 2 interactive patterns observed in depressed mothers: intrusiveness or withdrawal. Intrusive mothers display a negative affect and disrupt the infant's activity. The infant experiences anger, turns away from the mother to limit her intrusiveness, and internalizes an angry and protective coping style. Withdrawn mothers are disengaged, unresponsive, affectively flat and do little to support the infant's activity. Infants cannot cope with or self-regulate this negative state and develop passivity, withdrawal, and self-regulatory behaviors (e.g., looking away or sucking on the thumb) (Hart et al., 1998; Tronick, 1989).

Infants and toddlers of depressed mothers can develop serious emotional disorders such as infant depression and attachment disorders (Luby, 2000). Early mental health disorders might be reflected by delayed development, inconsolable crying, or sleep problems. Older toddlers may exhibit aggressive or impulsive behavior. In early care and education settings, children with social and emotional problems tend to have a hard time relating to others, trusting adults, being motivated to learn, and calming themselves to tune into teaching—all necessary skills to benefit from early educational experiences. Studies reveal the long-lasting effects of maternal depression. Older children of mothers depressed during infancy show poor self-control, aggression, poor peer relationships, and difficulty in school (Embry & Dawson, 2002). These problems increase the likelihood that the child will be placed in special education, held back to repeat a grade, or drop out of school. Each of these problems can prevent a child from reaching optimal development, result in missed opportunities for success over the child's lifespan, and impose increased costs to society (Onunaku, 2005).

When Relationships Cause Damage: Abuse and Neglect

It is challenging to know how much child abuse occurs. Infants cannot talk, and toddlers and older children who are abused usually do not tell anyone about the abuse. They might not define it as abuse, they might be scared to tell a trusted adult, they might blame themselves for being abused, or they might not know with whom they could talk about their abuse. Whatever the reason, children usually remain silent, making it very difficult to know how much abuse occurs. Up-to-date statistics on the different types of child abuse in the United States can be found at the U.S. Children's Bureau website .[7]

All types of abuse are complex issues, especially within families. There are many reasons people may become abusers- poverty, stress, and substance abuse are common characteristics shared by abusers, although abuse can happen in any family.

Children who experience abuse or neglect are at risk of developing lifelong social, emotional, and health problems, particularly if neglected before the age of 2. However, it is essential to note that not all children who experience abuse and neglect will have the same outcomes. There are many ways to foster stable, permanent, safe, secure, nurturing, loving care for children affected by adverse childhood experiences.

Trauma-Informed Care

Traumatic experiences can significantly alter a person's perception of themselves, their environment, and the people around them. As traumatic experiences accumulate, responses become more intense and have a greater impact on functioning. Ongoing exposure to traumatic stress can impact all areas of people's lives, including biological, cognitive, and emotional functioning, as well as social interactions, relationships and identity formation. Because people who have experienced multiple traumas do not relate to the world in the same way as those who have not had these experiences, they require services and responses that are sensitive to their unique experiences and needs.[9]

Figure 16.6.1: An infant is held and comforted by adults([12])

Toxic stresses, such as abuse and neglect, are strongly linked to poor health outcomes across one's lifespan and trauma-informed care is one approach to caregiving based on these effects. Caregivers in trauma-informed care strive to understand children's behavior in the context of previous traumas they have experienced. Trauma-informed care for infants and toddlers begins with first recognizing the prevalence and potential impact these stresses can have during the first 3 years. Caregivers also provide supportive care, enhancing children's feelings of safety and security, to prevent their re-traumatization in a current situation that may potentially overwhelm their coping skills.[10]

---

[1] Thompson, R. (2022). Social and personality development in childhood Is licensed CC BY-NC-SA

[2] California Infant/Toddler Learning and Development Foundations, 2009 by the California Department of Education is used with permission

[3] Zosh J.M. et. al., (2018) Accessing the Inaccessible: Redefining Play as a Spectrum **Licensed (CC BY)**

[4] Malle, B. (2022). Theory of mind. licensed under a CC BY-NC-SA

[5] Billeci, L., Narzisi, A., Campatelli, G. *et al.* Disentangling the initiation from the response in joint attention: an eye-tracking study in toddlers with autism spectrum disorders. *Is licensed CC BY*

[6] Ehli S, Wolf J, Newen A, Schneider S and Voigt B (2020) Determining the Function of Social Referencing: The Role of Familiarity and Situational Threat. **(CC BY)**.

[7] Child Abuse, Neglect, and Foster Care is shared under a not declared license and was authored, remixed, and/or curated by Diana Lang

[8] Child, Family, and Community (Laff and Ruiz) is shared under a CC BY license and was authored, remixed, and/or curated by Rebecca Laff and Wendy Ruiz

[9] Ayre, K., & Krishnamoorthy, G. (2020). Understand and empathise is licensed under CC BY-SA.

[10] Sanders & Hall (2018). Trauma-informed care in the newborn intensive care unit: Promoting safety, security and connectedness.CC by NC SA 4.0

[11] Image by Joy Poeng is licensed CC BY-NC

[12] Image by Rachel Klippenstein-Gutierrez is licensed CC BY-NC

16.7: Social Development Through Play

Play and Social Development

Play is a valued process, not only for enjoyment and leisure but also for learning. Through play, children develop a sense of identity and an understanding of their social and cultural worlds. Children use play to explore and understand cultures, communities, and friendships (Paris, Beeve, & Springer, 2021). We gain a lot through playing, not just as children but also as adults. Play involves the mutual, sometimes complex, coordination of goals, actions, and understanding. For example, as infants, children get their first encounter with sharing (of each other's toys). Through these experiences, children develop friendships that provide additional security and support to those offered by their parents.[1]

Different Theories of Play

Cognitive theories presented a significant shift in theorizing about play by directing research toward the development of children's thinking processes and intellectual development. Piaget's (Piaget, 1962) developmental theory suggests that children progress through a series of distinct phases in their thought processes. According to his theory, children engage in types of play that mirror their current level of cognitive development. The role of play is to help them consolidate and practice recently acquired concepts and skills to prepare the child for the next spurt in learning and development. Vygotsky (1978) also believed that play has several roles in cognitive development. However, he differed from Piaget in maintaining that, when children play before they become actualized in real-life situations, they reveal potential new abilities. By creating their own scaffolding, children stretch themselves in areas like self-control, cooperation, memory, language use, and literacy by using private speech to direct, control, and structure their play interactions (Bodrova & Leong, 1996). According to Vygotsky (Vygotsky, 1978), play promotes development by serving as a scaffold within the child's proximal development zone, helping them attain higher levels of functioning. Bruner (Bruner, 1972) focused on how childhood play contributes to problem-solving abilities that are important later in life. He argued that the means are more important than the ends when playing; children do not worry about accomplishing goals, which allows them to experiment with novel combinations of objects and behaviors that they are unlikely to try if under pressure to achieve a goal. Therefore, play promotes flexible problem solving, making it adaptively advantageous in human development and evolution.[2]

Stuart Brown (2010) argues that play is evolutionary and has the following properties:

- Purposeless/done for its own sake
- Voluntary
- Inherent attraction
- Freedom from time
- Diminished consciousness of self
- Improvisational potential
- Continuation desire

Gray (2013) also provides a list of features to describe play (with some overlap of Brown’s list). His conceptualization maintains that play:

- Is directed and chosen by the child
- Is as an activity in which the focus is not the end-state or a goal, but the means itself
- Consists of a structure that comes from the minds of the players and not external constraints
- Is imaginative and separate from real life
- Involves mental non-stressed activity.[3]

Figure 16.7.1:Play of all kinds is beneficial ([8])

Parten's Stages of Play

Mildred Parten (1932) observed 2 to 5-year-old children and noted 6 types of play. She labeled 3 types as non-social (unoccupied, solitary, and onlooker) and 3 types as social play (parallel, associative, and cooperative). The list below describes each type of play. Younger children engage in non-social play more than older children; by age 5, associative and cooperative play are the most common forms of play (Dyer & Moneta, 2006).[1]

This list explains how children's play changes as they grow and develop social skills.

Unoccupied Play (Birth-3 Months): At this stage, an infant is making many movements with their arms, legs, hands, feet, etc. They are learning about and discovering how their body moves.

Figure 16.7.1: Newborn exhibits Unoccupied Play ([9])

Solitary Play (3 Months-2 Years): This is the stage when a child plays alone. They are not interested in playing with others quite yet.

Figure 16.7.1: Example of Solitary Play ([10]

Spectator/Onlooker Behavior (2 Years): During this stage, a child begins to watch other children playing but does not play with them.

Figure 16.7.1: Example of spectator/onlooker play. ([1])

Parallel play (2+Years): A child plays alongside or near others but does not play with them.

Figure 16.7.1: Example of Parallel Play ([10])

Associative play (3-4 Years): When a child starts to interact with others during play, but there is not a large amount of interaction at this stage.

Cooperative Play (4+ years): When a child plays together with others and has an interest in both the activity and other children involved in playing.

Figure 16.7.1: Example of Cooperative Play ([11])

Regardless of the differences in approaches and definitions, what contemporary theories have in common is the belief that play mirrors development. As the child grows and matures, play's appearance, function, and implications may change.

Infants gradually learn to identify commonalities with others and engage in social interactions. The development of such abilities relies on the personal experiences shared between people in specific contexts (Liebal et al., 2013). Social play may offer vibrant

opportunities for children to acquire joint attention skills. Throughout the first year of life, during play especially, together infants and their caregivers begin to construct social games, such as peek-a-boo (Bruner & Sherwood, 1976; Fantasia et al., 2014; Gustafson et al., 1979;). Social attention is a crucial ability for the emergence of play situations. Social attention allows children to focus on other

people's characteristics such as facial expressions, gaze direction, gestures, and vocalizations. When the direction of another's attention has been identified (for example, through gaze following or point following), we can shift our attention to focus simultaneously on the same external object or event as our partner (Bourjade, 2017).[5]

Play as Interaction with Peers: Building Friendships

Interactions with peers provide the context for social learning and problem solving, including the experiences of social exchanges, cooperation, turn-taking, and the demonstration of the beginning of empathy.[6] In peer relationships, children learn to initiate and maintain social interactions with other children. They also develop skills for managing conflicts, such as turn-taking, compromise, and bargaining. Before the age of 1, infants not only react emotionally to their peers' emotional states but also engage with them in simple forms of interaction involving behaviors within their motor abilities. For example, Vandell and Wilson (Vandell, 1987) showed that interactions between infants become increasingly reciprocated from 6- to 9-months, as reflected by the presence of turn-taking.[7]

In order to foster adaptive social development, it is important to understand the factors contributing to establishing relationships with peers, such as empathy and prosocial behaviors (Howes, 1992; Sebanc, 2007; Vandell, 1980). Evidence suggests that before their first birthday, infants are sensitive and respond to their peers' emotions, which could represent potential precursors of empathy and prosocial behaviors (Decety, 2010; Decety, 2012; Geangu).[7]

Social interactions with peers also allow older infants to experiment with varying roles in small groups and in different situations, such as relating to familiar versus unfamiliar children. Interactions are stepping stones to relationships.[6] Over time, infants develop close relationships with children they know, such as other children in the family, childcare setting, or neighborhood. Relationships with peers provide young children with the opportunity to develop strong social connections.

Toddlers' relationships with their peers have many positive developmental outcomes later on, including higher levels of emotional mental health and school success (Ladd, 1987; Tomada, 2005; Taylor, 1994; Vandell , 2000). A toddler's ability to empathize with her peers, to comfort and to share toys with them, increases her chances of becoming a friend or preferred play partner.

Young children's expression of positive and negative emotions may play a significant role in developing social relationships. Positive emotions appeal to social partners and enable connections to form, while problematic management or expression of negative emotions leads to difficulty in social relationships (Denham & Weissberg, 2004). In Fabes' 2001 study, children who used emotion-related words were better liked by their classmates (Fabes et al., 2001).[6]

---

[1] Thompson, R. (2022). Social and personality development in childhood Is licensed CC BY-NC-SA

[2] Lynn A. Barnett, "Children's Perceptions of Their Play: Scale Development and Validation", is licensed CC BY

[3] Zosh J.M. et. al., (2018) Accessing the Inaccessible: Redefining Play as a Spectrum **Licensed (CC BY)**

[4] Contemporary Theories on Development is shared under a CC BY-NC-SA license and was authored, remixed, and/or curated by Martha Lally & Suzanne Valentine-French

[5] Cochet H and Guidetti M (2018) Contribution of Developmental Psychology to the Study of Social Interactions: Some Factors in Play, Joint Attention and Joint Action and Implications for Robotics **is Licensed (CC BY)**

[6] California Infant/Toddler Learning and Development Foundations, 2009 by the California Department of Education is used with permission

[7] Crespo-Llado, M.M., Vanderwert, R., Roberti, E. *et al.* Eight-month-old infants' behavioral responses to peers' emotions as related to the asymmetric frontal cortex activity. **is Licensed (CC BY)**

[8] Image by Nina Kuchkovskiy is licensed CC: BY-NC

[9] Image by Anonymous is licensed CC: BY-NC

[10] Image by Amanda Taintor is licensed CC BY-NC

16.8: Conclusion

Conclusion to Social Development

Although closely linked with emotional development in most infant/toddler development discussions, social development is worthy of its own exploration: significant milestones in social development occur for infants and toddlers. A caregiver's understanding of the foundations of social development plays a critical role in supporting and developing each social milestone.

16.9: References

References for Social Development

- *Advances in Applied Developmental Psychology: Mastery Motivation: Origins, Conceptualizations, and Applications* (Vol. 12). 1995. Edited by R. H. MacTurk and G. A. Morgan. Norwood, NJ: Greenwood Publishing Group.
- Ayre, K., & Krishnamoorthy, G. (2020). Understand and empathise. In *Trauma Informed Behaviour Support: A Practical Guide to Developing Resilient Learners*. essay, University of Southern Queensland. "Understand and empathise" byA is licensed under CC BY-SA.
- Bandura, A. (2002). Social cognitive theory of mass communication. In J. Bryant & D. Zillmann (Eds.), *Media effects: Advances in theory and research* (pp. 121–153). Lawrence Erlbaum Associates Publishers.
- Bandura, A., & National Inst of Mental Health. (1986). *Social foundations of thought and action: A social cognitive theory.* Prentice-Hall, Inc.
- Lynn A. Barnett, "Children's Perceptions of Their Play: Scale Development and Validation", *Child Development Research*, vol. 2013, Article ID 284741, 18 pages, 2013. This is an open access article distributed under the Creative Commons Attribution License
- Barrera, M. E., & Maurer, D. (1981). The perception of facial expressions by the three-month-old. *Child Development, 52*(1), 203–206. https://doi.org/10.2307/1129231
- Berger, K. S. (2005). The developing person through the life span (6th ed.). New York: Worth.
- Billeci, L., Narzisi, A., Campatelli, G. *et al.* Disentangling the initiation from the response in joint attention: an eye-tracking study in toddlers with autism spectrum disorders. *Transl Psychiatry* **6,** e808 (2016). licensed under a Creative Commons Attribution 4.0 International License.
- Bruner, J. S., and Sherwood, V. (1976). "Early rule structure: the case of "Peekaboo"," in *Play: Its Role in Evolution and Development*, eds J. S. Bruner, A. Jolly, and K. Sylva (Harmondsworth: Penguin).
- J. Bruner, "The nature and uses of immaturity," *American Psychologist*, vol. 27, pp. 687–708, 1972.
- E. Bodrova and D. Leong, *Tools of the Mind: The Vygotskian Approach to Early Childhood Education*, Prentice-Hall, Englewood Cliffs, NJ, USA, 1996.
- 1960s: Bandura by Mark E. Bouton and Diana Lang is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License, except where otherwise noted.
- Bourjade, M. (2017). "Social attention," in *The International Encyclopedia of Primatology*, ed. A. Fuentes (New York, NY: John Wiley and Sons).
- Burk, D. I. 1996. "Understanding Friendship and Social Interaction," *Childhood Education*, Vol. 72, No. 5, 282–85.
- California Infant/Toddler Learning and Development Foundations, 2009 by the California Department of Education is used with permission
- Cohn JF, Tronick E. Specificity of infants' response to mothers' affective behavior. *J Am Acad Child Adolesc Psychiatry.* 1989;28:242–8.
- Cochet H and Guidetti M (2018) Contribution of Developmental Psychology to the Study of Social Interactions: Some Factors in Play, Joint Attention and Joint Action and Implications for Robotics. *Front. Psychol.* 9:1992. This is an open-access article distributed under the terms of the **Creative Commons Attribution License (CC BY)**
- Crespo-Llado, M. M., Vanderwert, R. E. & Geangu, E. Individual differences in infants' neural responses to their peers' cry and laughter. *Biol. Psychol.* 135, 117–127 (2018)
- Crespo-Llado, M.M., Vanderwert, R., Roberti, E. *et al.* Eight-month-old infants' behavioral responses to peers' emotions as related to the asymmetric frontal cortex activity. *Sci Rep* 8, 17152 (2018). **Creative Commons Attribution License (CC BY)**
- Crick, F. 1984. "Function of the Thalamic Reticular Complex: The Searchlight Hypothesis," *Proceedings of the National Academy of Sciences of the United States of America*, Vol. 81, 4586–90.
- Curby, T. W., and L. L. Brock. 2013. "Teachers' Emotional Consistency Matters for Preschool Children." University of Virginia.
- Decety, J. & Svetlova, M. Putting together phylogenetic and ontogenetic perspectives on empathy. *Dev. Cogn. Neurosci.* 2, 1–24 (2012).
- Decety, J. & Michalska, K. J. Neurodevelopmental changes in the circuits underlying empathy and sympathy from childhood to adulthood. *Dev. Sci.* 13, 886–99 (2010).
- Dyer, S., & Moneta, G. B. (2006). Frequency of parallel, associative, and cooperative Play in British children of different socioeconomic status. *Social Behavior and Personality, 34(5),* 587-592.

- Denham, S., and R. Weissberg. 2003. "Social-Emotional Learning in Early Childhood: What We Know and Where to Go From Here," in *A Blueprint for the Promotion of Prosocial Behavior in Early Childhood.* Edited by E. Chesebrough and others. New York: Kluwer Academic/Plenum Publishers.
- Early Childhood Learning and Knowledge Center, Episode 4Can we be friends? Peer Interactions and your curriculum (2018). Head Start
- Ehli S, Wolf J, Newen A, Schneider S and Voigt B (2020) Determining the Function of Social Referencing: The Role of Familiarity and Situational Threat. *Front. Psychol*. This is an open-access article distributed under the terms of the **Creative Commons Attribution License (CC BY)**.
- Embry, L. and Dawson, G. (2002). Disruptions in parenting behavior related to maternal depression: Influences on children's behavioral and psychobiological development. In J. Borkowski, S., Ramey, C. & Bristol-Powers, M. (Eds.), Parenting and the young child's world (pp. 203-214). Mahwah, NJ: Erlbaum.
- Emde, R. N. 1988. "Development Terminable and Interminable. I. Innate and Motivational Factors from Infancy," *International Journal of Psychoanalysis*, Vol. 69, 23–42.
- Emery NJ . The eyes have it: the neuroethology, function and evolution of social gaze. *Neurosci Biobehav Rev* 2000; **24**: 581–604.
- Fabes, R., and others. 2001. "Preschoolers' Spontaneous Emotion Vocabulary: Relations to Likability," *Early Education & Development*, Vol. 12, No. 1, 11–27.
- Fawcett, C., and Liszkowski, U. (2015). "Social referencing during infancy and early childhood across cultures" in *International encyclopedia of the social & behavioral sciences*. 2nd Edn. Vol. 22. eds. N. J. Smelser, P. B. Baltes, and J. D. Wright (Amsterdam: Elsevier).
- Feinman, S. (Ed.) (1992). Social referencing and the social construction of reality in infancy. New York, NY: Plenum.
- Fernald, A. 1993. "Approval and Disapproval: Infant Responsiveness to Vocal Affect in Familiar and Unfamiliar Languages," *Child Development*, Vol. 64, No. 3, 657–74.
- S. Freud, *Beyond the Pleasure Principle*, Norton, New York, NY, USA, 1961.
- Foundations of Educational Technology by Penny Thompson is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License, except where otherwise noted.
- Geangu, E. In *International Encyclopedia of the Social and Behavioral Sciences* (ed. Wright, J. D.) 7, 549–553 (Elsevier, 2015).
- Gopnik, A., Meltzoff, A. N., & Kuhl, P. K. (2001). *The scientist in the crib*. New York, NY: HarperCollins.
- Gray, P. (2013). *Free to Learn: Why Unleashing the Instinct to Play will make our Children Happier, More Self-Reliant, and Better Students for Life.* New York, NY: Basic Books.
- Hart S, Field T, del Valle C, Pelaez-Nogueras M. Depressed mothers' interactions with their one-year-old infants. *Infant Behav Dev.* 1998;21:519–25
- Hess, E. H. 1975. "The Role of Pupil Size in Communication," *Scientific American*, Vol. 233,110–19.
- Howes, C. 1983. "Patterns of Friendship," *Child Development*, Vol. 54, No. 4, 1041–53.
- Howes, C. & Phillipsen, L. Gender and friendship: relationships within peer groups of young children. *Soc. Dev.* 1, 230–242 (1992).
- *Interactions matter: What research says and what you can do! (better kid care)*. Better Kid Care (Penn State Extension). (2016, June 9). Retrieved January 24, 2022, from https://extension.psu.edu/programs/b...actions-matter
- Jarvis, M. (2020, April 14). *Responsive Caregiving as an Effective Practice to Support Children's Social and Emotional Development*. other, Head Start ECLKC: Early Childhood Learning and Knowledge center. Retrieved January 24, 2022, from https://eclkc.ohs.acf.hhs.gov/video/...al-development.
- Ladd, G. W. & Price, J. M. Predicting children's social and school adjustment following the transition from preschool to kindergarten. *Child Dev.* 58, 1168–1189 (1987).
- Lally, M., & Valentine-French, S. (2019, September 24). Contemporary Theories on Development. College of Lake County. Is licensed CC BY-NC-SA
- Lally, M., & Valentine-French, S. (2021, May 20). Play. College of Lake County. https://socialsci.libretexts.org/@go/page/94506 is licensed CC: BY-NC-SA
- Child Abuse, Neglect, and Foster Care by Diana Lang and Wikimedia contributors is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License, except where otherwise noted.
- Child, Family, and Community (Laff and Ruiz) is shared under a CC BY license and was authored, remixed, and/or curated by Rebecca Laff and Wendy Ruiz

- Lifespan Development by Julie Lazzara is licensed under a Creative Commons Attribution 4.0 International License, except where otherwise noted.
- 1960s: Erikson is shared under a not declared license and was authored, remixed, and/or curated by Diana Lang
- Leslie, A. M. (1994). ToMM, ToBy, and agency: Core architecture and domain specificity in cognition and culture. In L. Hirschfeld & S. Gelman (Eds.), *Mapping the mind: Domain specificity in cognition and culture* (pp. 119-148). New York, NY: Cambridge University Press.
- Liebal, K., Carpenter, M., and Tomasello, M. (2013). Young children's understanding of cultural common ground. *Br. J. Dev. Psychol.* 31, 88–96. doi: 10.1111/j.2044-835X.2012.02080.x
- Luby, J. (2000). Depression. In C. Zeanah (Ed.), Handbook of Infant Mental Health (pp. 296-382). New York: Guilford Press.
- Malle, B. (2022). Theory of mind. In R. Biswas-Diener & E. Diener (Eds), *Noba textbook series: Psychology.* Champaign, IL: DEF publishers. licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License.
- Marcia, J. E. (1980). Identity in adolescence. In J. Adelson, (Ed.), *Handbook of adolescent psychology* (pp. 159-187). John Wiley & Sons. ↵
- Mayo Foundation for Medical Education and Research. (2020, June 25). *Infant development: Birth to 3 months*. Mayo Clinic. Retrieved January 23, 2022, from https://www.mayoclinic.org/healthy-l...t/art-20048012
- Maternal depression and child development. (2004). *Paediatrics & child health*, *9*(8), 575–598. https://doi.org/10.1093/pch/9.8.575
- Middlebrooks, J. S., & Audage, N. C. (2008). The Effects of Childhood Stress on Health Across the Lifespan. *Centers for Disease Control and Prevention*, *National Center for Injury Prevention and Control.* Atlanta, GA. ↵
- Morse, M. (1991). Visual gaze behaviors: considerations in working with visually impaired multiply handicapped children. *RE:view*, 23, 5-15.
- Mundy P, Gomes A . Individual differences in joint attention skill development in the second year. *Infant Behav Dev* 1998; **21**: 469–482.
- Mundy P, Block J, Delgado C, Pomares Y, Van Hecke AV, Parlade MV . Individual differences and the development of joint attention in infancy. *Child Dev* 2007; **78**: 938–954.
- National Research Council and Institute of Medicine. 2000. *From Neurons to Neighborhoods: The Science of Early Childhood Development*. Committee on Integrating the Science of Early Childhood. Edited by J. Shonkoff and D. Phillips. Washington, DC: National Academies Press.
- Psyc 200 Lifespan Psychology by Laura Overstreet is **Licensed** *CC BY: Attribution*
- Onunaku N. Improving Maternal and Infant Mental Health: Focus on Maternal Depression. Los Angeles, CA: National Center for Infant and Early Childhood Health Policy at UCLA; 2005.
- Paris, Beeve and Springer 2021 Why Play? (2021, January 4). College of the Canyons. https://socialsci.libretexts.org/@go/page/39262 "Why Play?" by LibreTexts is licensed under CC BY.
- " 1960s: Erikson by Jennifer Paris, Antoinette Ricardo, Dawn Rymond, Lumen Learning, and Diana Lang is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License, except where otherwise noted.
- Sections adapted from: Play. (2021, August 26). https://socialsci.libretexts.org/@go/page/118234
- Sections adapted from: Play- The Vehicle for Development and Learning. (2021, May 27). Retrieved October 5, 2021, from https://socialsci.libretexts.org/@go/page/9875
- Sections adapted from: Why Play? (2021, January 4). Retrieved October 5, 2021, from https://socialsci.libretexts.org/@go/page/39262
- RAISE Infant Program, Joint Attention and Social Referencing, Valley CoPA (Community of Practice in Autism) – November 2007.
- Sanders & Hall (2018). Trauma-informed care in the newborn intensive care unit: Promoting safety, security and connectedness. *Journal of Perinatology*, *38*(1), 3-10. CC by NC SA 4.0
- Schieler, A., Koenig, M., and Buttelmann, D. (2018). Fourteen-month-olds selectively search for and use information depending on the familiarity of the informant in both laboratory and home contexts. *J. Exp. Child Psychol.* 174, 112–129. doi: 10.1016/j.jecp.2018.05.010
- Seibert JM, Hogan AE, Mundy P . Assessing interactional competencies: the early social-communication scales. *Infant Ment Health J* 1982; **3**: 244–258.
- Sebanc, A. M., Kearns, K. T., Hernandez, M. D. & Galvin, K. B. Predicting Having a Best Friend in Young Children: Individual Characteristics and Friendship Features. *J. Genet. Psychol.* 168, 81–95 (2007).

- Spitz, R. A., and K. M. Wolfe. 1946. "The Smiling Response: A Contribution to the Ontogenesis of Social Relation," *Genetic Psychology Monographs*, Vol. 34, 57–125.
- Slomian, Justine et al. "Consequences of maternal postpartum depression: A systematic review of maternal and infant outcomes." *Women's health (London, England)* vol. 15 (2019): 1745506519844044. doi:10.1177/1745506519844044
- Stenberg, G. (2009). Selectivity in infant social referencing. *Infancy* 14, 457–473. doi: 10.1080/15250000902994115
- Stern, D. N. 1977. *The First Relationship: Infant and Mother*. Cambridge, UK: Harvard University Press.
- Striano, T., Vaish, A., and Benigno, J. P. (2006). The meaning of infants' looks: information seeking and comfort seeking? *Br. J. Dev. Psychol.* 24, 615–630. doi: 10.1348/026151005X67566Stuart Brown, L. (2010).
- *Play: How it Shapes the Brain, Opens the Imagination, and Invigorates the Soul*. New York, NY: Penguin Group.
- Tamis-LeMonda, C. S., Kuchirko, Y., & Song, L. (2014). Why Is Infant Language Learning Facilitated by Parental Responsiveness? *Current Directions in Psychological Science*, *23*(2), 121–126. https://doi.org/10.1177/0963721414522813
- Taumoepeau M, Ruffman T. Stepping stones to others' minds: maternal talk relates to child mental state language and emotion understanding at 15, 24, and 33 months. Child Dev. 2008 Mar-Apr;79(2):284-302. doi: 10.1111/j.1467-8624.2007.01126.x. PMID: 18366424.
- Taylor, A. R. & Machida, S. The contribution of parent and peer support to head start children's early school adjustment. *Early Child. Res. Q.* 9, 387–405 (1994).
- Thompson, P. (2019). Foundations of Educational Technology Oklahoma State University Libraries is licensed CC:BY, except where otherwise noted.
- Thompson, R. A. (2006a). Conversation and developing understanding: Introduction to the special issue. *Merrill-Palmer Quarterly, 52*, 1–16.
- Thompson, R. A. (2006b). The development of the person: Social understanding, relationships, self, conscience. In W. Damon & R. M. Lerner (Series Eds.) & N. Eisenberg (Vol. Ed.), *Handbook of child psychology: Vol. 3. Social, emotional, and personality development* (6th ed., pp. 24–98). New York, NY: Wiley.
- Thompson, R. (2022). Social and personality development in childhood. In R. Biswas Diener & E. Diener (Eds), *Noba textbook series: Psychology.* Champaign, IL: DEF publishers. Is licensed CC BY-NC-SA
- Tomada, G., Schneider, B. H., De Domini, P., Greenman, P. S. & Fonzi, A. Friendship as a predictor of adjustment following a transition to formal academic instruction and evaluation. *Int. J. Behav. Dev.* 29, 314–322 (2005).
- Vandell, D. L. Parents, peer groups, and other socializing influences. *Dev. Psychol.* 36, 699–710 (2000).
- Vandell, D. L., Wilson, K. S. & Buchanan, N. R. Peer interaction in the first year of life: an examination of its structure, content, and sensitivity to toys. *Child Dev.* 51, 481–488 (1980).
- Vandell, D. L. & Wilson, K. S. Infants' Interactions with Mother, Sibling, and Peer: Contrasts and Relations between Interaction Systems. *Child Dev.* 58, 176–186 (1987)
- L. Vygotsky, *Mind in Society*, Harvard University Press, Cambridge, Mass, USA, 1978.
- Vygotsky, L. S. (1967). Play and its role in the mental development of the child. *Sov. Psychol.* 5, 6–18. doi: 10.2753/RPO1061-040505036
- Walden, T., and Kim, G. (2005). Infants' social looking toward mothers and strangers. *Int. J. Behav. Dev.* 29, 356–360. doi: 10.1177/01650250500166824
- Walle, E. A., Reschke, P. J., and Knothe, J. M. (2017). Social referencing: defining and delineating a basic process of emotion. *Emot. Rev.* 9, 245–252. doi: 10.1177/1754073916669594
- Walker S. Gender differences in the relationship between young children's peer-related social competence and individual differences in theory of mind. J Genet Psychol. 2005 Sep;166(3):297-312. doi: 10.3200/GNTP.166.3.297-312. PMID: 16173673.
- Wellman, H. M. (2011). Developing a theory of mind. In U. Goswami (Ed.), *Wiley-Blackwell handbook of childhood cognitive development* (2nd ed., pp. 258–284). New York, NY: Wiley-Blackwell
- Wellman, H. M., & Lagattuta, K. H. (2000). Developing understandings of mind. In S. Baron-Cohen, H. Tager-Flusberg, & D. J. Cohen (Eds.), *Understanding other minds: Perspectives* from developmental cognitive neuroscience (pp. 21–49). Oxford University Press.
- Zarbatany, L., and Lamb, M. E. (1985). Social referencing as a function of information source: mothers versus strangers. *Infant Behav. Dev.* 8, 25–33. doi: 10.1016/S0163-6383(85)80014-X
- Zhou, Molly and Brown, David, "Educational Learning Theories: 2nd Edition" (2015). Education Open Textbooks. CC BY-NC-SA

- Zosh JM, Hirsh-Pasek K, Hopkins EJ, Jensen H, Liu C, Neale D, Solis SL and Whitebread D (2018) Accessing the Inaccessible: Redefining Play as a Spectrum. *Front. Psychol.* 9:1124. doi: 10.3389/fpsyg.2018.01124 This is an open-access article distributed under the terms of the **Creative Commons Attribution License (CC BY)**

CHAPTER OVERVIEW

17: Supporting Social and Emotional Development in Group Care

---

17.1: Introduction

Introduction to Supporting Social and Emotional Development in Group Care

Today's infants spend more time in care than any other time in history. Caregivers must spend time intentionally supporting the social-emotional development of infants and toddlers. Research indicates that the ways teachers interact with children is crucial in determining how they develop. (Curby and Brock, 2013) Early relationships are essential for healthy social-emotional development in infants. The most fundamental need of infants and toddlers is to have close, nurturing relationships that help them build a sense of emotional security.[1] Because of the social and relationship-based nature of young children's learning, responsive caregiving supports the foundation for most other learning in young children. (Jarvis, 2020).

[1] California Department of Education, 2019 Infant/Toddler Learning and Development Program Guidelines, Second Edition by the California Department of Education is used with permission

17.2: Overall Influence of Care on Development

The Research

Previous research shows that children's early experiences in outside-home care promote the development of both disadvantageous and favorable developmental outcomes, depending on the total amount, the quality, and the timing of the childcare exposure (Maccoby and Lewis, 2003; Belsky, 2006; Vandell et al., 2010; Huston et al., 2015; Brownell and Drummond, 2018). Conclusions from the prior evidence in early childhood education and care tend to vary depending on the age of the child. For children aged 0–3 years, the research evidence is mixed, with some studies indicating benefits for outside-home care, some reporting negative effects, and some studies finding no effects at all (Melhuish, 2015). Several studies have shown that a high level of cumulative time spent in outside-home childcare, especially before the age of 4.5 years, is related to elevated levels of aggression, assertiveness, and disobedience in adolescence (Belsky, 2006; Vandell et al., 2010; Huston et al., 2015). By contrast, some studies have found that center-based childcare in the infant and toddler years may contribute to the development of social competence and prosocial behavior (Brownell and Drummond, 2018) or lower levels of later emotional or behavioral difficulties compared to informal childcare (Gomajee et al., 2017). Numerous studies have explored the benefits of center-based childcare, preschool and other forms of group-based care for children 3 years and older (Melhuish, 2015). Overall, previous findings suggest that the effects of early childcare depend on the child's developmental preparedness for outside-home care (e.g., metacognition and 'theory of mind' in the early years; Wellman et al., 2001; Chatzipanteli et al., 2014), as well as the characteristics of the care environment (such as quality of care). At age 3, children typically have not developed sufficient knowledge or skills to engage in social interaction without constant adult guidance (Rubin and Pepler, 1995; Huston et al., 2015). High quality, structural features in an early care environment (e.g., group size and/or child-to-staff ratio, and training, permanence, sensitivity and responsiveness of caretakers) have been raised as one major explanation for findings where center-based childcare may be beneficial even when the child is less than 3 years old (Brownell and Drummond, 2018).[1]However, high quality, center-based childcare can be challenging to achieve and maintain, which places more pressure on the child's developmental preparedness to cope in the care environment.

Most often, center-based care from ages 0 to 3 (or even up to 4.5 years) has been seen as a risk for a child's later social development (Belsky, 2006; Vandell et al., 2010). Yet some studies have shown that if center-based daycare is of sufficient quality, it may do no harm or even be beneficial for the socio-emotional development of children under the age of 3 (Gomajee et al., 2017; Brownell and Drummond, 2018). It is possible that due to the limited self-control, theory of mind, and language capabilities of a young child, the quality of childcare (e.g., peer group sizes and adult-to-child ratio) tends to matter more in the toddler years than in the preschool years, regardless of the form of care. This may explain why previous findings with children aged 0–3 years vary more than with older children: the benefits of group-based outside-home care for later development is more evident (Melhuish, 2015). Children closer to preschool age can cope in groups more independently than toddlers, likely making them less dependent on the quality of care.[1

[1] Oksman E, et.al.,(2019) Associations Between Early Childcare Environment and Different Aspects of Adulthood Sociability: The 32-Year Prospective Young Finns Study. *CC BY*.

17.3: Practices Supporting Social-Emotional Development

Supporting Social-Emotional Development

During the first 4 months of life, babies begin to engage with the world and its people (Advances in Applied Developmental Psychology 1995). Infants' motivation to seek relationships and build knowledge drives them to move their bodies, focus their attention, and send and receive signals (the basis for development and learning in all domains). Their active engagement with the social and physical world works hand in hand with the care they receive from adults, especially when the adults are responsive to them.[1]

Noticing and responding during this rapid developmental period can be challenging for caregivers. To be in tune with young infants, adults need to know when an infant wants a social response and when an infant is making a discovery through individual exploration and observation.[1]

Figure 17.3.1: Caregivers should spend time closely observing infants to help support their Social-Emotional Development. [1]

Early care centers must establish policies and practices to support responsive caregiving, so infants learn to regulate their emotions and to develop a sense of predictability, safety, and responsiveness in their social environments. The importance is so great that research experts have broadly concluded that, in the early years, "nurturing, stable and consistent relationships are the social-emotional development key to healthy growth, development, and learning" (National Research Council and Institute of Medicine 2000, p. 412). High-quality relationships increase the likelihood of positive outcomes for young children. Professionals working in childcare settings can support the social–emotional development of infants and toddlers in various ways: interacting directly with young children, communicating with families, arranging the physical space in the care environment, and planning and implementing curriculum.

Emotions drive early learning. Infants and toddlers are active, curious learners who experience pleasure when receiving a positive response from a nurturing adult or when making a discovery. This pleasure motivates children to continue engaging in positive interactions, exploring, and learning. The emotional responses of infants and toddlers communicate their interests and needs. It is important for caregivers to read infant and toddler cues to pick up on learning interests and meet needs. By reading emotional cues, caregivers determine whether to engage in interaction with a child or wait quietly to see what the child will do next. Emotional cues let teachers know if children are ready for more interaction, want more complexity added to their play, or are tired and need quiet time. Responsiveness to a child's emotional cues strengthens the teacher–child relationship and creates new possibilities for the child's learning in the social–emotional domain and in all other developmental domains.[2]

Children are learning from their interactions with caregivers every moment of every day. Through relationships with children, educators provide an environment in which children can learn and thrive in the company of a trusted adult. Caregiving routines offer essential social experiences and support for infants and toddlers because they happen regularly and consistently. By experiencing and participating in these routines, children learn what it means to be nurtured in a caring way. Children also learn to engage in reciprocal, responsive interactions in supportive relationships with adults.

Figure 17.3.1: Routine care, such as diaper changes, are great ways to build relationships and support social-emotional development. [3]

Caregivers should understand how important adults are for modeling, demonstrating affection and responsiveness to the needs of young children, and teaching interaction attitudes and skills.[1]

- Consider what is culturally appropriate for the child and include non-verbal gestures (such as a warm smile, a wave hello, a reassuring touch, and eye contact) that convey "you are welcome here."
- Notice and acknowledge prosocial behavior.
- Create a prosocial environment: model prosocial interactions, create cozy areas for 2, provide opportunities for children to cooperate and help others, and create small groups for stories and meals.
- Recognize children's signals, cues, unique temperaments, likes and dislikes. (Early Childhood Learning and Knowledge Center, 2018; *Interactions matter,* 2016)
- Create a program with predictable daily routines.
- Model behavior, attitudes and healthy emotional responses in interactions with children and other adults.
- Establish developmentally and culturally appropriate expectations for children's behavior, especially concerning self-control and self-regulation.
- Narrate for children what they are observed doing and expressing, providing language to describe their thoughts and feelings and to clarify others' feelings.
- Provide specific feedback to children about their efforts, reinforcing their choices that support learning and linking their actions to outcomes.
- Coach and guide children's behavior by using positive, respectful phrasing and tone to prompt problem solving and to give brief instructions and reminders.
- Help infants and toddlers understand emotional cues (facial expressions, body language, tone of voice). This can be fostered by allowing the children to play freely with their peers (learning through experience), or by modeling your own thought processes by thinking out loud ("I wonder what it means when Hayden is crying?") (Paris et.al., 2021)
- Create a positive environment that allows infants and toddlers to explore freely, in which they often hear "yes" and seldom hear "no."
- Provide materials that relate to feelings and emotional expressions such as books, stories and songs about feelings.

[1] Image by Anonymous is licensed CC: BY-NC

[2] California Department of Education, 2019 Infant/Toddler Learning and Development Program Guidelines, Second Edition by the California Department of Education is used with permission

[3] Image by *NappyStock is in the public domain*

17.4: Physical Environments Supporting Social-Emotional Development

Supporting Social-Emotional Development in Environment Design

Childcare centers must also consider how the environment can be designed to support social-emotional development. If the environment is set up to make it easy for children and caregivers to make eye contact and communicate with each other, caregivers can be emotionally and physically available to children and the children can develop a secure base for learning. Care routines are more emotionally satisfying in environments that are arranged for interaction and the children's participation. The environment influences everyone's moods—children and teachers alike—and the amount of stress experienced in the childcare setting. An environment with ample fresh air, peaceful colors, different kinds of lighting, places to move freely, and easy access to play materials promotes a sense of calm that allows children and teachers to focus on exploring and learning together.[1]

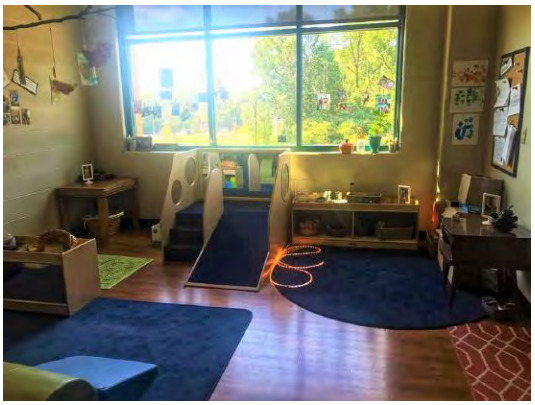


Figure 17.4.1: An environment with natural light can be a great way to support emotions. [2]

Caregivers can arrange the physical environment in many ways to scaffold and support peer interactions and relationships. Environments should provide spaces for small groups of children to explore materials and each other. Non-mobile infants who cannot physically move closer to peers or see peers should be placed on their backs, 1 to 3 feet apart at various times during the day so they can see and hear each other.[1]

Figure 17.4.1: Infant Environment

Additional Environment Suggestions to Support Social-Emotional Development:

- Provide soft, easy-to-hold toys which allow infants and toddlers to give and take toys with other children.
- Create individual, small group, and open spaces in the environment.
- Offer places where children can feel "alone" (e.g., individual cardboard boxes, carpeted riser boxes, cubby spaces).
- Provide small areas where a child can be with 1 or 2 friends and open spaces where groups of children can gather.
- Make a collection of small cards with each child's picture.
- Stock multiples of popular toys so children can engage in parallel and associative play (this also reduces peer conflict).

[1] California Department of Education, 2019 Infant/Toddler Learning and Development Program Guidelines, Second Edition by the California Department of Education is used with permission

[2] Infant Environment by Jennie Powell is used with permission

17.5: Conclusion

Conclusion to Supporting Social-Emotional Development in Group Care

Caregivers offer an incredible gift by recognizing and giving appropriate responses to an infant's early developmental achievements. This attention communicates that the infant's path is progressively moving along and is understood and supported. It lays the foundation for the young infant's emerging emotional security and attachment relationships, which are essential for learning and development throughout the early years.[1]

[1] California Department of Education, 2019 Infant/Toddler Learning and Development Program Guidelines, Second Edition by the California Department of Education is used with permission

17.6: References

References for Supporting Social-Emotional Development in Group Care

- Belsky, J. (2006). Early childcare and early child development: major findings of the NICHD study of early childcare. *Eur. J. Dev. Psychol.* 3, 95–110. doi: 10.1080/17405620600557755
- Brownell, C. A., and Drummond, J. (2018). Early childcare and family experiences predict development of prosocial behaviour in first grade. *Early Child Dev. Care* 1–26. doi: 10.1080/03004430.2018.1489382
- Chatzipanteli, A., Grammatikopoulos, V., and Gregoriadis, A. (2014). Development and evaluation of metacognition in early childhood education. *Early Child Dev. Care* 184, 1223–1232. doi: 10.1080/03004430.2013.861456
- California Department of Education, 2019 Infant/Toddler Learning and Development Program Guidelines, Second Edition by the California Department of Education is used with permission
- Gomajee, R., El-Khoury, F., van der Waerden, J., Pryor, L., and Melchior, M. (2017). Early life childcare and later behavioral difficulties: a causal relationship? data from the french EDEN study. *J. Econ. Behav. Org.* (in press).
- Gluschkoff, K., Oksman, E., Knafo-Noam, A., Dobewall, H., Hintsa, T., Keltikangas-Järvinen, L., et al. (2018). The early roots of compassion: from childcare arrangements to dispositional compassion in adulthood. *Pers. Indiv. Diff.* 129, 28–32. doi: 10.1016/j.paid.2018.03.005
- Harris, J. R. (1995). Where is the child's environment? A group socialization theory of development. *Psychol. Rev.* 102, 458–489. doi: 10.1037/0033-295X.102.3.458
- Huston, A. C., Bobbitt, K. C., and Bentley, A. (2015). Time spent in childcare: how and why does it affect social development? *Dev. Psychol.* 51, 621–634. doi: 10.1037/a0038951
- Hughes, C. (2011). *Social Understanding and Social Lives: From Toddlerhood through to the Transition to School.* Abingdon: Taylor & Francis Group.
- Maccoby, E. E., and Lewis, C. C. (2003). Less day care or different day care? *Child Dev.* 74, 1069–1075. doi: 10.1111/1467-8624.00592
- Melhuish, E. (2015). *Early childhood environments: long-term consequences of early childhood education and parenting. In s. Hay (ed.), early years education and care.* Oxford, UK: Routledge, 29–49.
- Oksman E, Rosenström T, Gluschkoff K, Saarinen A, Hintsanen M, Pulkki-Råback L, Viikari J, Raitakari OT and Keltikangas-Järvinen L (2019) Associations Between Early Childcare Environment and Different Aspects of Adulthood Sociability: The 32-Year Prospective Young Finns Study. *Front. Psychol.* 10:2060. doi: 10.3389/fpsyg.2019.02060 This is an open-access article distributed under the terms of the **Creative Commons Attribution License (CC BY)**.
- Rubin, K. H., and Pepler, D. J. (1995). "The relationship of child's play to social-cognitive growth and development," in *Friendship and Social Relations in Children*, eds H. C. Foot, A. J. Chapman, and J. R. Smith, (Piscataway, NJ: Transaction Publishers), 207–232.
- Roberts, B. W., Walton, K. E., and Viechtbauer, W. (2006). Patterns of mean-level change in personality traits across the life course: a meta-analysis of longitudinal studies. *Psychol. Bull.* 132, 1–25. doi: 10.1037/0033-2909.132.1.1
- Vandell, D. L., Belsky, J., Burchinal, M., Steinberg, L., and Vandergrift, N. (2010). Do effects of early childcare extend to age 15 years? Results from the NICHD study of early childcare and youth development. *Child Dev.* 81, 737–756. doi: 10.1111/j.1467-8624.2010.01431.x
- Waldfogel, J. (2001). international policies toward parental leave and childcare. *Future Child.* 11, 98–111. doi: 10.2307/1602812
- Wellman, H. M., Cross, D., and Watson, J. (2001). Meta-analysis of theory-of-mind development: the truth about false belief. *Child Dev.* 72, 655–684. doi: 10.1111/1467-8624.00304

CHAPTER OVERVIEW

18: Attachment and Reciprocal Relationships

18.1: Introduction

Introduction to Attachment and Reciprocal Relationships

Some of the most rewarding experiences in people's lives involve developing and maintaining close relationships. For example, some of the most significant sources of joy include falling in love, starting a family, being reunited with distant loved ones, and sharing experiences with close others. And not surprisingly, some of the most painful experiences in people's lives involve disrupting critical social bonds, such as separation from a spouse, losing a parent, or being abandoned by a loved one.

Why do close relationships play such a profound role in human experience? Attachment theory is one approach to understanding the nature of close relationships. In this section, we review the origins of the theory, the core theoretical principles, and how attachment influences human behavior, thoughts, and feelings across the life course.[1]

---

[1] Attachment Through the Life Course by R. Chris Fraley is licensed under CC: BY-NC-SA

18.2: Attachment Theory

Bowlby

Attachment theory was developed initially in the 1940s by John Bowlby, a British psychoanalyst who attempted to understand the intense distress experienced by infants who had been separated from their parents. Bowlby (1969) observed that infants would go to extraordinary lengths to prevent separation from their parents or reestablish proximity to a missing parent. For example, he noted that children who had been separated from their parents would often cry, call for their parents, refuse to eat or play, and stand at the door in desperate anticipation of their parents' return. At the time of Bowlby's initial writings, psychoanalytic writers held that these expressions were manifestations of immature defense mechanisms operating to repress emotional pain. However, Bowlby observed that such expressions are common to many mammalian species and speculated that these responses to separation might serve an evolutionary function.[1]

Phases of Attachment

According to Bowlby, there are 4 phases of attachment (table 1[2]). Infants and Toddlers go through stages or milestones similar to physical, cognitive, and language development stages.

Bowlby Phases of Attachment

Stage	Age	Characteristics
Pre-attachment Phase	Birth - 6 weeks	The innate signals attract the caregiver (grasping, gazing, crying, smiling while looking into the adult's eyes). When the baby responds positively, the caregivers remain close by. The adults encourage the infants to remain close as it comforts them. Babies recognize the mother's fragrance, voice, and face. They are not yet attached to the mother and don't mind being left with unfamiliar adults as they have no fear of strangers.
Attachment in Making	6 weeks to 6 to 8 months	Infants respond differently to familiar caregivers than to strangers. The baby would smile more to the mother, babble to her, and become quiet more quickly whenever picked by the mother. The infant learns that their actions affect the behavior of those around them. They tend to develop a "Sense of Trust" where they expect the caregiver's response when signaled. They do not protest when they get separated from their caregiver.
Clear Cut	6 to 8 months - 18 months - 2 Years	The attachment to a familiar caregiver becomes evident. Babies show "separation anxiety" and get upset when an adult they rely on leaves them. This anxiety increases between 6 -15 months, and its occurrence depends on the temperament and the context of the infant and the behavior of the adult. The child would show signs of distress if the mother leaves, but with the supportive and sensitive nature of the caretaker, this anxiety could be reduced.

Stage	Age	Characteristics
Formation of Reciprocal Relationship	18 months to 2 years	With the rapid growth in representation and language by 2 years, the toddler can understand a few factors that influence the parent's coming and going and predict their return, leading to a decline in separation protests. The child can negotiate with the caregiver to alter their goals via requests and persuasions. The child depends less on the caregiver along with age.

[1] Attachment Through the Life Course by R. Chris Fraley is licensed under CC: BY-NC-SA

[2] https://www.gracepointwellness.org/82-parenting/article/10118-infancy-emotional-and-social-development-social-connections

18.3: Attachment Behavior vs. Attachment Bond

Behaviors and Bonds

While Bowlby focused on phases of attachment, Mary Ainsworth (a student of Bowlby) believed attachment is a secure base from which to explore. She found that adult attachment representations, the construct of how adults remember their own childhood experiences, might influence the attachment categorization of their children. In attachment theory, it is important to distinguish attachment behavior and attachment bond. Attachment behavior is behavior on the part of the infant that promotes proximity to the attachment figure, such as smiling and vocalization (Carlson & Sroufe; Cassidy). Attachment bond, however, is described by Ainsworth and Bowlby not as a dyadic and reciprocal relationship existing between the infant and his caregiver but rather as the infant's interpretation of his relationship with his mother (Cassidy). Evidence supports the positive influence of secure mother-child attachment on later development (Slade & Aber, 1992). A secure attachment system serves as a foundation for the expression of emotions and communication in future relationships, provides opportunities for self-regulation of affect (the ability to consider emotional processes before responding), and creates the potential for resilience (Belsky & Cassidy; Carlson & Sroufe; Cassidy; Karen, 1990).[1]

Figure 18.3.1: The importance of secure attachments ([2])

[1] Human Development by Human Development Teaching & Learning Group is licensed under a Creative Commons CC: BY-NC-SA

[1] Image by Marie Harris is licensed CC By-NC

18.4: Ainsworth Strange Situation

The Experiment

Ainsworth continued studying the development of attachment in infants. Ainsworth and her colleagues created a laboratory test that measured an infant's attachment to their parent. The test is called The Strange Situation Technique because it is conducted in a context unfamiliar to the child and therefore likely to heighten the child's need for his or her parent (Ainsworth, 1979).[1]

During the procedure, which lasts about 20 minutes, the parent and the infant are first left alone while the infant explores the room full of toys. Then a strange adult enters the room and talks for a minute to the parent, after which the parent leaves the room. The stranger stays with the infant for a few minutes, and then the parent again enters, and the stranger leaves the room. A video camera records the child's behaviors during the session, which trained coders later code. The investigators were especially interested in how the child responded to the caregiver leaving and returning to the room, referred to as the "reunion." Based on their behaviors, the children are categorized into one of four groups. Each group reflects a different kind of attachment relationship with the caregiver. One style is secure, and the other three styles are referred to as insecure. [1]

- A child with a **secure attachment style** usually explores freely while the caregiver is present and may engage with the stranger. The child will typically play with the toys and bring one to the caregiver to show and describe from time to time. The child may be upset when the caregiver departs but is also happy to see the caregiver return.
- A child with a **resistant** (sometimes called ambivalent) **attachment style** is wary about the situation in general, particularly the stranger, and stays close or even clings to the caregiver rather than exploring the toys. When the caregiver leaves, the child is extremely distressed and is ambivalent when the caregiver returns. The child may rush to the caregiver, but then fails to be comforted when picked up. The child may still be angry and even resist attempts to be soothed.
- A child with an **avoidant attachment style** will avoid or ignore the mother, showing little emotion when the mother departs or returns. The child may run away from the mother when she approaches. The child will not explore very much, regardless of who is there, and the stranger will not be treated much differently from the mother.
- A child with a **disorganized/disoriented attachment style** seems to have an inconsistent way of coping with the stress of the strange situation. The child may cry during the separation, but avoid the mother when she returns, or the child may approach the mother but then freeze or fall to the floor. [1]

The Strange Situation Technique

Stages	Event	Secure	Insecure-Avoidant	Insecure-Resistant	Insecure-Disorganized
1	Exploration with caregiver in the room	Explores freely	High exploration, but unfocused	Stays close to caregiver	Chaotic exploration
2	Stranger enters room and talks with caregiver	May interact with stranger	Indifferent to stranger	Afraid of stranger when caregiver present	Afraid or uncertain about stranger
3	Caregiver leaves room and child is left alone with stranger	May be upset when caregiver leaves	Not upset when caregiver leaves	High distress when alone with stranger	Unpredictable (may be upset or not)
4	Reunion with caregiver	Happy to see caregiver return	Ignores or avoids caregiver	Ambivalent: wants contact with caregiver but is upset at them	Reacts to return of caregiver with distress

How common are the attachment styles among children in the United States? It is estimated that about 65 percent of children in the United States are securely attached. Twenty percent exhibit avoidant styles, and 10 to 15 percent are ambivalent. Another 5 to 10 percent may be characterized as disorganized (Ainsworth, Blehar, Waters, & Wall, 1978).[1]

[1] Human Development by Human Development Teaching & Learning Group is licensed under a Creative Commons CC: BY-NC-SA

18.5: Contact Comfort

Harlow's Research

When Bowlby was initially developing his attachment theory, there were alternative theoretical perspectives on why infants were emotionally attached to their primary caregivers (most often, their biological mothers). Bowlby and other theorists, for example, believed that there was something important about the responsiveness and contact provided by mothers. Other theorists, in contrast, argued that young infants feel emotionally connected to their mothers because mothers satisfy more basic needs, such as the need for food. The child comes to feel emotionally connected to the mother because she is associated with the reduction of primary drives, such as hunger, rather than the reduction of drives that might be relational in nature.[1]

In a classic set of studies, psychologist Harry Harlow placed young monkeys in cages that contained two artificial surrogate "mothers" (Harlow, 1958). One of those surrogates was a simple wire contraption; the other was a wire contraption covered in cloth. Both of the surrogate mothers were equipped with a feeding tube so that Harrow and his colleagues had the option to allow the surrogate to deliver or not deliver milk. Harlow found that the young macaques spent a disproportionate amount of time with the cloth surrogate as opposed to the wire surrogate. Moreover, this was true even when the infants were fed by the wire surrogate rather than the cloth surrogate. This suggests that infants' strong emotional bond with their primary caregivers is rooted in something more than whether the caregiver provides food per se. Harlow's research is now regarded as one of the first experimental demonstrations of the importance of "contact comfort" in establishing infant-caregiver bonds.[1]

[1] Attachment Through the Life Course by R. Chris Fraley is licensed under CC: BY-NC-SA

18.6: Internal Working Models of Attachment

Creating a Model of Attachment

As research accumulated showing the long-term effects of the quality of attachment between young children and their caregivers, researchers became very interested in why — as in "Why does attachment at an early age predict later aspects of social, emotional, and cognitive development?" They began exploring possible mediating mechanisms to answer this question, looking for the pathways through which attachment exerts its effects. Research has uncovered several mechanisms, including neurophysiological pathways (e.g., children in securely attached dyads have lower levels of stress reactivity), but among the most interesting are young children's (and the later older children's, adolescents', and adults') internal working models of close relationships (Crittenden, 1999; Dykas & Cassidy, 2011; Main, Kaplan, & Cassidy, 1985).[1]

As attachment develops, day-to-day interactions between infant and caregiver form the basis of the infant's internal working model – a set of beliefs and expectations they build about the availability and reliability of their attachment figures (Sherman, Rice, & Cassidy, 2015). These internal working models are constructed starting at a very young age, about the age of four months, as soon as children can mentally represent their experiences. It is as if over the first few years of life infants are "taking mental notes" about how these important relationships function, and the effects of these expectations can be seen in the ways infants wait after sending out distress signals to see if their caregiver is on the way or they need to escalate their communications. The specific, repeated experiences babies have with their caregivers become more generalized and internalized over time, indicating whether the attachment figure can be counted on for dependable comfort and protection in times of distress and serve as a secure base from which the infant can explore the world. This internal representation then informs what types of behavior can be expected from others, i.e., whether a person will pick them up when they are upset or should be turned to for comfort when sad.[1]

As children start to interact and form relationships with others, like other family members, preschool teachers, and peers, their internal working models form the basis of their expectations for how people will respond to them and therefore shape their behavior in relationships. Negative experiences with one caregiver may, for example, create the expectation that people are not to be trusted. So young children are less able to be their authentic selves or reach out to others when they are upset and need comfort. Because these internal working models influence children's behavior, they may shape the quality of their subsequent relationships, all the way up until adolescence and young adulthood (Allen & Miga, 2010). For example, adolescents with insecure-resistant internal working models may show ambivalence about close romantic relationships, both intensely wanting them and being resentful about how their needs are being met (Mikulincer, Shaver, Bar-On, & Ein-Dor, 2010).[1]

Though these internal representations tend to stay somewhat stable for children with secure attachments, they can continue to grow and change as children age and gather more social experiences. For example, consistent, warm, and caring interactions with other attachment figures, such as grandmothers or preschool teachers, have the power to change those beliefs allowing children to rework a negative internal working model into a positive one. Internal working models can be reworked at any age, as children encounter family members, neighbors, teachers, or other adults who provide high-quality care. For adolescents, close and caring friendships can provide opportunities to reconsider and expand their understanding of relationships. The good news is that, as adults, we can become aware of our internal working models of relationships and see how we may be bringing things from previous relationships into subsequent ones in ways that are causing us problems. Then we can intentionally rework our expectations about others in ways that make it easier for us to form secure relationships with our friends, romantic partners, and eventually our children.[1]

18.7: Support for Caregivers

Caregivers and Attachment

Sometimes parents need help in responding consistently to their infant's needs. A positive and strong support group can help a parent and child build a strong foundation by offering assistance and positive attitudes toward the newborn and parent. In a direct test of this idea, Dutch researcher van den Boom (1994) randomly assigned some babies' mothers to a training session in which they learned to better respond to their children's needs. The research found that these mothers' babies were more likely to show a secure attachment style than the mothers in a control group that did not receive training.[1]

18.8: Attachment and Culture

Culture

In the years that have followed Ainsworth's ground-breaking research, researchers have investigated various factors that may help determine whether children develop secure or insecure relationships with their primary attachment figures. Some cultural differences in attachment styles have been found (Rothbaum, Weisz, Pott, Miyake, & Morelli, 2000). For example, German parents value independence, and Japanese mothers are typically by their children's sides. As a result, the rate of insecure-avoidant attachments is higher in Germany, and insecure-resistant attachments are more elevated in Japan. However, these differences reflect cultural variation rather than actual insecurity (van Ijzendoorn and Sagi, 1999). [1]

Figure 18.8.1: Infant and mother in India ([3])

One of the critical determinants of attachment patterns is the history of sensitive and responsive interactions between the caregiver and the child. In short, when the child is uncertain or stressed, the ability of the caregiver to provide support to the child is critical for their psychological development. It is assumed that such supportive interactions help the child learn to regulate their emotions, give them the confidence to explore the environment and provide them with a safe haven during stressful circumstances.[2]

It is essential to note that the attachment theory work of Bowlby and Ainsworth focused on Westernized caretaking ideals in their determination of healthy, secure attachment. What is considered "ideal" in Westernized culture is not necessarily prioritized in other cultures. Sensitivity and caution are required in determining if observed attachment patterns are adaptive within the child's environment.[2] Overall, secure attachment is the most common type of attachment seen in every culture studied thus far (Thompson, 2006). [1]

---

[1] Human Development by Human Development Teaching & Learning Group is licensed under a Creative Commons CC: BY-NC-SA

[2] Culture and Psychology is licensed under a Creative Commons CC-BY-NC-SA

[3] Image by *piqsels is in the public domain*

18.9: Attachment and Separation Anxiety

Separation Anxiety

All children and teens feel some anxiety. It is a normal part of growing up. Separation anxiety is normal in very young children. Nearly all children between 18 months and 3 years old have separation anxiety and are clingy to some degree.[1]

Even securely attached toddlers find separation challenging. Separation anxiety can be seen in many forms. As caregivers or parents, we might see it in various ways. Some characteristics that infants and toddlers may experience are :

- Tears at drop off
- Asking to be held during transition times or for long periods throughout the day
- Extra clingy during transitions
- Challenges with nap, diapering, mealtime
- Night terrors during sleep at home, or calling out a parent's name during sleep
- Intense reactions and behaviors to situations that would not normally impact them.

How to support children during separation anxiety

Age	Developmental Stage	What You Can Do
Birth to 8 months	Although infants recognize a voice, face, smell, and caregiving style, as long as their needs are being met they can easily be comforted by another caregiver.	A new caregiver may not immediately be able to read a baby's unique cues for attention, diaper changes, and hunger. The caregiver can observe the baby with the parent to learn as much as possible about how they communicate needs.
8 months to 2 years	During this stage of development, it is expected that separation anxiety begins, and children may become frightened and upset when their parents leave.	Reminding children that mommy or daddy always comes back can help ease fears. Transitional objects such as a special blanket or soft, snuggly toy can also alleviate anxiety. Providing experiences that focus on sensory exploration can be calming when children are distressed.
2 to 5 years	Preschoolers usually handle separation reasonably well, but life stresses like a new sibling, problems in the family or a new caregiver can trigger separation anxiety.	Sometimes children cope by regressing to earlier behavior like tantrums, thumb sucking, or baby talk. Reading children's books with separation themes can help your children with their feelings. Providing opportunities for children to role-play using puppets can help them work through their feelings of fear or sadness.

How to support children during separation anxiety[1]

[1] https://www.cedars-sinai.org/health-...-children.html

[1] Children's Home Society of California - Family Education Program - Separation Anxiety Easing the transition from home to child care - www.chs-ca.org

18.10: Attachment Disorder

Reactive Attachment Disorder (RAD)

Another attachment pattern is reactive attachment disorder (RAD). Students with RAD typically have serious aggression problems, often hurting others and showing little empathy or remorse. Safety-seeking behaviors, anxiety, and depression are characteristic of the condition and an inability to be genuinely affectionate with others or develop strong connections. Students with RAD feel the need to be in control and may demonstrate bossy, argumentative, and defiant behaviors. Reactive attachment disorder is a mental health disorder diagnosed according to the criteria in the Diagnostic and Statistical Manual of Mental Disorders: DSM-5 (American Psychiatric Association [APA], 2013). Here it is characterized as a stress-related disorder that can only be caused by a lack of adequate care (social neglect) during childhood. Children with RAD demonstrate withdrawn, internalizing type behaviors. RAD is only diagnosed in children and must be evident within the first five years of life.

RAD is a deficit in the child's capacity to manage their feelings. If we think about RAD from the perspective of the child with it, characteristics could be described as follows:

- *I do relationships and conflict poorly because my social, emotional, and behavioral skills are ineffective in my interactions with others. My difficulties' frequency, duration, and intensity in many settings set me apart.*
- *Why am I like this? My need for comfort, nurturing, and connection as a baby/young child were not met. My world is or has been one of neglect, fear, and hurt. As a result, I cannot articulate my feelings and thoughts.*
- *I threaten, I throw tantrums; I am aggressive, I am demanding of your attention, I am manipulative, charming, and angry. Behaving like this is the only way I can control relationships. (Flaherty, 2011)*[1]

Remember that it is not our place to diagnose but to understand. Regardless of the type of attachment difficulty a child may have, they all need:

- Safety
- A caring adult who will be there
- Emotional support
- Understanding
- Behavior support
- Routines and consistency

---

[1] Human Development by Human Development Teaching & Learning Group is licensed CC BY-NC-SA

18.11: References

References for Attachment and Reciprocal Relationships

- Ainsworth, M. (1979). Infant-mother attachment. *American Psychologist, 34*(10), 932-937.
- Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment*. Hillsdale, NJ: Erlbaum.
- Ainsworth, M., Blehar, M., Waters, E., & Wall, S. (1978). *Patterns of attachment*. Hillsdale, NJ: Erlbaum.
- Akimoto, S. A., & Sanbinmatsu, D. M. (1999). Differences in self-effacing behavior between European and Japanese Americans: Effect on competence evaluations. *Journal of Cross-Cultural Psychology, 30*, 159-177.
- Allen, J. P. & Miga, E. M. (2010). Attachment in adolescence: A move to the level of emotion regulation. *Journal of Social and Personal Relationships, 27*, 181-190. doi:10.1177/0265407509360898
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders, 5th edition (DSM-5).* Washington, DC: Author.
- Berk, L. E. (2007). *Development through the life span* (4th ed.). Boston: Allyn and Bacon.
- Berne, S. A. (2006). The primitive reflexes: Considerations in the infant. *Optometry & Vision Development, 37(3)*, 139-145.
- Bowlby, J. (1969). *Attachment and loss.* London: Hogarth Press.
- Bowlby, J. (1982). *Attachment* (2nd ed.). New York: Basic Books.
- Center on the Social and Emotional Foundations for Early Learning. (n.d.). *Center on the social and emotional foundations for early learning*. CSEFEL. Retrieved February 12, 2022, from http://csefel.vanderbilt.edu/
- Cedars-Sinai. (n.d.). *Articles*. Cedars. Retrieved February 12, 2022, from https://www.cedars-sinai.org/health-...-children.html
- Chappell, K. D., & Davis, K. E. (1998). Attachment, partner choice, and perception of romantic partners: An experimental test of the attachment-security hypothesis. *Personal Relationships, 5*, 327–342.
- Children's Home Society of California. (n.d.). Retrieved February 12, 2022, from http://www.chs-ca.org/
- Crittenden, P. M. (1999). Internal representational models of attachment relationships. *Infant Mental Health Journal, 11*, 259-277. doi:10.1002/1097-0355(199023)11:3<259::AID-IMHJ2280110308>3.0.CO;2-J
- Collins, N., & Read, S. (1990). Adult attachment, working models and relationship quality in dating couples. *Journal of Personality and Social Psychology, 58*, 644-663.
- Culture and Psychology by L D Worthy; T Lavigne; and F Romero is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License, except where otherwise noted.
- Dykas, M. J., & Cassidy, J. (2011). Attachment and the processing of social information across the life span: Theory and evidence. *Psychological Bulletin*, *137*, 19-46. doi:10.1037/a0021367
- Erikson, E. (1982). *The life cycle completed*. NY: Norton & Company.
- Feeney, J. A., & Noller, P. (1992). Attachment style and romantic love: Relationship dissolution. *Australian Journal of Psychology, 44*, 69–7
- Flaherty, S. C., & Sadler, L. S. (2011). *A review of attachment theory in the context of adolescent parenting*. Journal of pediatric health care : official publication of National Association of Pediatric Nurse Associates & Practitioners. Retrieved February 12, 2022, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3051370/
- Fraley, R. C. (2022). Attachment through the life course. In R. Biswas-Diener & E. Diener (Eds), *Noba textbook series: Psychology.* Champaign, IL: DEF publishers. Retrieved from http://noba.to/s3kj9ufv
- Fraley, R. C., Roisman, G. I., Booth-LaForce, C., Owen, M. T., & Holland, A. S. (2013). Interpersonal and genetic origins of adult attachment styles: A longitudinal study from infancy to early adulthood. *Journal of Personality and Social Psychology, 104*, 8817-83
- Frazier, P. A, Byer, A. L., Fischer, A. R., Wright, D. M., & DeBord, K. A. (1996). Adult attachment style and partner choice: Correlational and experimental findings. *Personal Relationships, 3*, 117–136.
- Freud, S. (1938). *An outline of psychoanalysis.* London: Hogarth.
- Gillath, O., Shaver, P. R., Baek, J. M., & Chun, D. S. (2008). Genetic correlates of adult attachment style. *Personality & Social Psychology Bulletin*, 34, 1396–1405.
- Grossmann, K., Grossmann, K. E., Spangler, G., Suess, G., & Unzner, L. (1985). Maternal sensitivity and newborns orientation responses as related to quality of attachment in northern Germany. *Monographs of the Society for Research in Child Development, 50(1-2)*, 233–256.
- Harlow, H. F. (1958). The nature of love. *American Psychologist, 13*, 673-685.

- Hazan, C., & Shaver, P. R. (1987). Romantic love conceptualized as an attachment process. *Journal of Personality and Social Psychology, 52*, 511-524.
- Hudson, N. W., Fraley, R. C., Vicary, A. M., & Brumbaugh, C. C. (2012). *Attachment coregulation: A longitudinal investigation of the coordination in romantic partners' attachment styles*. Manuscript under review.
- Main, M., Kaplan, N., & Cassidy, J. (1985). Security in infancy, childhood, and adulthood: A move to the level of representation. In I. Bretherton & E. Waters (Eds.), *Growing points in attachment theory and research. Monographs of the Society for Research in Child Development, 50*, 66-106. doi:10.2307/3333827
- Main, M., & Solomon, J. (1990). Procedures for identifying infants as disorganized/disoriented during the Ainsworth Strange Situation. In M. T. Greenberg, D. Cicchetti, & E. M. Cummings (Eds.), *Attachment in the Preschool Years* (pp. 121–160). Chicago, IL: University of Chicago Press.
- McClure, M. J., Lydon., J. E., Baccus, J., & Baldwin, M. W. (2010). A signal detection analysis of the anxiously attached at speed-dating: Being unpopular is only the first part of the problem. *Personality and Social Psychology Bulletin, 36*, 1024–1036.
- Mikulincer, M., Shaver, P. R., Bar-On, N., & Ein-Dor, T. (2010). The pushes and pulls of close relationships: Attachment insecurities and relational ambivalence. *Journal of Personality and Social Psychology, 98*,450-468. doi:10.1037/a0017366
- O'Connor, T. G., Marvin, R. S., Rotter, M., Olrich, J. T., Britner, P. A., & The English and Romanian Adoptees Study Team. (2003). Child-parent attachment following early institutional deprivation. *Development and Psychopathology*, *15*, 19-38.
- Oldmeadow, J. A., Quinn, S., & Kowert, R. (2013). Attachment style, social skills, and Facebook use amongst adults. *Computers in Human Behavior*, 28, 1142–1149.
- Oswalt, A. (n.d.). *Infancy emotional and social development: Social Connections*. Infancy Emotional and Social Development: Social Connections - Parenting. Retrieved February 12, 2022, from https://www.gracepointwellness.org/8...al-connections
- Rothbaum, F., Weisz, J., Pott, M., Miyake, K., & Morelli, G. (2000). Attachment and culture: Security in the United States and Japan. *American Psychologist, 55*, 1093-1104.
- Seifer, R., Schiller, M., Sameroff, A., Resnick, S., & Riordan, K. (1996). Attachment, maternal sensitivity, and infant temperament during the first year of life. *Developmental Psychology, 32*, 12-25.
- Sherman, L. J., Rice, K., & Cassidy, J. (2015). Infant capacities related to building internal working models of attachment figures: A theoretical and empirical review. *Developmental Review, 37*, 109-141. doi:10.1016/j.dr.2015.06.001
- Simpson, J. A., Collins, W. A., Tran, S., & Haydon, K. C. (2007). Attachment and the experience and expression of emotions in adult romantic relationships: A developmental perspective. *Journal of Personality and Social Psychology, 92*, 355–367.
- Simpson, J. A., Rholes, W. S., & Nelligan, J. S. (1992). Support seeking and support giving within couples in an anxiety-provoking situation. *Journal of Personality and Social Psychology, 62*, 434–446.
- Trauma Informed Behaviour Support: A Practical Guide to Developing Resilient Learners by University of Southern Queensland is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License, except where otherwise noted.
- Weinfield, N. S., Sroufe, L. A., Egeland, B., Carlson, E. A. (2008). Individual differences in infant-caregiver attachment: Conceptual and empirical aspects of security. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (2nd ed., pp. 78–101). New York, NY: Guilford Press.
- van den Boom, D. C. (1994). The influence of temperament and mothering on attachment and exploration: An experimental manipulation of sensitive responsiveness among lower-class mothers with irritable infants. *Child Development, 65*, 1457–1477.
- Van Ijzendoorn, M. H., & Sagi, A. (1999). Cross-cultural patterns of attachment. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 713-734). New York: Guilford.
- "Lifespan Development: A Psychological Perspective, Second Edition" by Martha Lally and Suzanne Valentine-French is licensed under a CC-BY-NC-SA-3.0 / additional material (Internal Working Model of Attachment; Table 3.3 Strange Situation) by Ellen Skinner & Kristen Raine, Portland State University is licensed under a CC-BY-NC-SA-4.0

CHAPTER OVERVIEW

19: Temperament

19.1: Introduction

Introduction to Temperament

Perhaps you have spent time with several infants. How were they alike? How did they differ? How do you compare your siblings or other children you have known well? Have you heard stories from your parents or grandparents about what you were like as a baby? If you have any videos of yourself as a baby, what do they depict about how you thought about the world? You may have noticed that some infants seem to be more comfortable, friendly or in a better mood than others and that some are more sensitive to noise or more easily distracted. These differences may be attributed to temperament. Temperament refers to innate neurophysiologically-based characteristics of infants, including mood, activity level, and emotional reactivity, noticeable soon after birth.[1]

---

[1] Human Development by Human Development Teaching & Learning Group is licensed under a CC BY- NC-SA 4.0,

---

19.2: Overview of Temperament

Overview

It is estimated that 40–60% of the observed variability in personality is due to temperament characteristics or traits (Cloninger et al., 1993; Bouchard, 1994; Loehlin et al., 1998; Robins, 2005) (Fisher, Island, Rich, Marchalik, and Brown 2015). Temperamental traits are biologically based characteristics present early in life that contribute to individual differences in regulating and modulating emotion, attention, behavior, and motor activity (Rothbart, 1981, 2007; Gartstein and Rothbart, 2003) (Spinelli, Fasolo, Shah, Genovese and Aureli, 2018). Temperament is an inherited pattern of cognition, emotion, motivation, and behavior; it is influenced by experience (Terracciano et al., 2005; Roberts and Mroczek, 2008) but is mainly stable across the lifespan (Bouchard, 1994; McCrae et al., 2000; Roberts and DelVecchio, 2000). According to Rothbart et al. (2000), “temperament arises from our genetic endowment. It influences and is influenced by the individual's experience, one of the outcomes is the adult personality." Although some theorists argue that there is no rigid distinction between personality and temperament (McCrae et al., 2000), elements of temperament traditionally include behavioral dispositions from childhood to adulthood, observable in preverbal infants and generalizable to non-human animals (Rothbart et al., 2000; Clark, 2005)) (Fisher, Island, Rich, Marchalik, and Brown 2015). Because development emerges through bidirectional interactions between the infant and his environment (Sameroff, 1975), temperament can influence how the infant receives and responds to stimuli in his environment, impacting subsequent development. [1]

---

[1] Fisher HE, Island HD, Rich J, Marchalik D and Brown LL (2015) Four broad temperament dimensions: **doi: 10.3389/fpsyg.2015.01098** is licensed **CC BY**

19.3: Temperament Dimensions

Dimensions of Temperament

In a landmark study in 1956, Chess and Thomas (1996) evaluated 141 children's temperament based on parental interviews. Referred to as the New York Longitudinal Study, infants were assessed on 9 dimensions of temperament.[1] Behaviors for each one of these traits are on a continuum. These traits include:

- Activity level
- Rhythmicity (regularity of biological functions)
- Approach/withdrawal (how children deal with new things)
- Adaptability to situations
- Intensity of reactions
- ·Threshold of responsiveness (how intense a stimulus must be for the child to react)
- Quality of mood
- Distractibility
- Attention span
- Persistence

The Temperament Chart explains these traits in more detail.[2]

Temperament Traits Chart

Dimensions	Typical Behavioral Indicator	The Child...
Activity Level refers to the general level of motor activity when one is awake or asleep. Motor activity involves large and small muscle movements like running, jumping, rolling over, holding a crayon, picking up toys, etc.	High Activity	is squirmy and active.
	Low Activity	prefers less noise and movement.
Distractibility is the ease with which one can be distracted; or conversely, his level of concentration or focus.	High Distractibility	is very distracted by discomfort, noticing even small signals such as hunger, being sleepy, etc.
	Low Distractibility	can handle discomfort, does not seem very bothered at all.
Intensity refers to the energy level of one's emotional response, both positive and negative.	High Intensity	has strong or intense positive and negative reactions.
	Low Intensity	has muted emotional reactions.
Regularity relates to the predictability of biological functions such as eating, sleeping, etc.	Highly Regular	has predictable appetite, sleep, and elimination patterns.
	Irregular	has unpredictable appetite, sleep, and elimination patterns.
Sensitivity describes how responsive one is to physical stimuli such as light, sound, and textures.	High Sensitivity	is sensitive to physical stimuli, including sounds, tastes, touch, and temperature changes; is a picky eater; and has difficulty sleeping in a strange bed.
	Low Sensitivity	is not sensitive to physical stimuli, including sounds, tastes, touch, and temperature changes; can fall asleep anywhere; and tries new foods easily.
Approachability is one's initial response to new places, situations, or things.	High Approaching	eagerly approaches new situations or people.
	Low Approaching	is hesitant and resistant when faced with new situations, people, or things.
Adaptability describes how easily one adjusts to changes and transitions.	High Adaptability	requires very small amount of time to feel ok in new situations.

Dimensions	Typical Behavioral Indicator	The Child...
	Low Adaptability	may cry or stay close to a caregiver before approaching a new situation.
Persistence relates to the length of time one continues in activities in the face of obstacles.	High Persistence	continues with a task or activity in the face of obstacles and does not get easily frustrated.
	Low Persistence	moves on to a new task or activity when faced with obstacles and gets frustrated easily.
Mood is one's tendency to react to the world primarily in a positive or negative way.	Positive mood	reacts to the world in a positive way and is generally cheerful.
	Serious Mood	reacts in an observant, sometimes more serious way and tends to be thoughtful about new situations.

[1] Human Development by Human Development Teaching & Learning Group is licensed under a CC BY- NC-SA 4.0,

[2] U.S Department of Health and Human Services. (2018, May 30). *Introduction to Temperament*. ECLKC. is in the public domain

19.4: Temperament Styles

Types of Temperament

Thomas, Chess, Birch, Hertzig, and Korn found that these broad patterns of temperamental qualities are remarkably stable through childhood.[1] Based on the infants' behavioral profiles, most infants can be categorized into 3 general types of temperament.:[2]

Table Types of Temperament

Types of Temperament

Type	Percentage	Description
Easy	40%	- Able to quickly adapt to the routine and new situations - Remains calm - Easy to soothe - Usually in a positive mood
Difficult	10%	- Reacts negatively to new situations - Has trouble adapting to routine - Usually negative in mood - Cries frequently
Slow-to-warm	15%	- Low activity level - Adjusts slowly to new situations - Often negative in mood

The percentages do not equal 100% as some children could not be placed neatly into one of the categories.[3] Approximately 65% of children fit one of the patterns. Of the 65%, 40% fit the easy pattern, 10% fell into the difficult pattern, and 15% were slow to warm up. Each category has its strength and weakness, and one is not superior to another.[4] Children's long-term adjustment depends on the fit of their temperament with the nature and demands of the environment in which they find themselves. Caregivers' responses appear to be more important than child temperament.[5]

---

[1] Culture and Psychology by L D Worthy; T Lavigne; and F Romero is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License

[2] Human Development by Human Development Teaching & Learning Group is licensed under a CC BY- NC-SA 4.0,

[3] Human Development by Human Development Teaching & Learning Group is licensed under a CC BY- NC-SA 4.0,

[4] Culture and Psychology by L D Worthy; T Lavigne; and F Romero is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License

[5] Human Development by Human Development Teaching & Learning Group is licensed under a CC BY- NC-SA 4.0,

19.5: Goodness of Fit

The Importance of Fit

An important aspect of Thomas & Chess's (1977) research considers the interaction of child temperament with caretaker personality and parenting style. They proposed that a match between the needs of a child's temperament with parental care would enhance the healthy development of self-regulation and the child's sense of self. This critical balance is known as goodness of fit. [1] A caregiver's ability to accurately read and work well with a child determines the goodness of fit between the child's temperament, parenting and caregiving. The goal for parents and caregivers in an infant or toddler center is to provide a good fit or match, meaning their styles align well and communication and interaction can flow. Temperamentally active children can do well with parents who support their curiosity but could have problems in a more rigid family.[2]

This goodness of fit between child temperament and parental demands and expectations can cause struggles. Rather than assuming discipline alone will improve children's behavior, temperament knowledge may help a parent, teacher, or other caregiver gain insight to work more effectively with a child. It is helpful to view temperamental differences as varying styles rather than 'good' or 'bad' behavior. For example, a persistent child may be difficult to distract from forbidden things such as electrical cords, but this persistence may serve her well in other areas such as problem-solving.[3]

What is most beneficial about the goodness of fit concept is that it does not require adults and children to have matching temperaments. The parent or caregiver does not have to change who they are; they can alter or adjust their caregiving methods to positively support their child's natural way of responding to the world. For example, if a child is highly active, a caregiver may pack extra activities in the diaper bag for waiting times at visits to the doctor, grocery store, etc. For a child who needs some extra time in approaching new activities, giving the child time to adjust and feel safe sets them up for more success. [4]

---

[1] Culture and Psychology by L D Worthy; T Lavigne; and F Romero is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License

[2] Human Development by Human Development Teaching & Learning Group is licensed under a CC BY- NC-SA 4.0,

[3] Human Development by Human Development Teaching & Learning Group is licensed under a CC BY- NC-SA 4.0,

[4] U.S Department of Health and Human Services. (2018, May 30). *Introduction to Temperament*. ECLKC. is in the public domain

---

19.6: Temperament, Culture, and Environment

Factors Effecting Temperament

Thomas and Chess also studied temperament and environment. One sample consisted of white middle-class families with high educational status; Puerto Rican working-class families made up the other sample. They found several differences. Parents of middle-class children were more likely to report behavior problems before the age of 9, and the children had sleep problems. This report may be because children start preschool between the ages of 3 and 4. De Vries (1974) followed Masai (tribe in East Africa) infants and mothers for several years during a period of famine. The researcher found that Masai infants who were more demanding were more likely to survive during periods of environmental stress than infants who were more docile. The researcher suggested that infants who were more aggressive and demanding – or in temperament terms, more difficult – were more likely to be fed and have their needs met than docile infants who might have been easier to ignore. The findings from these cross-cultural studies of temperament demonstrate how interaction between ecology, temperament, and culture impact an individual.[2]

---

[1] Human Development by Human Development Teaching & Learning Group is licensed under a CC BY- NC-SA 4.0,

[2] Culture and Psychology by L D Worthy; T Lavigne; and F Romero is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International Licens

---

19.7: Temperament and Language Development

The Influence of Language on Temperament

The developmental role of temperament has been primarily studied in the social-emotional domain, where it is usually associated with external and internal problems, challenging behaviors (i.e., Ullsperger et al., 2016; Rubin et al., 2017), and social competence (i.e., Baer et al., 2015; Penela et al., 2015). However, temperament also plays a role in language acquisition and partially accounts for the variability in how much language a child has and how language is acquired (e.g., the age of the first word and rate of vocabulary development and syntactic emergence) during the first 2 years of life (Bates et al., 1991; Lieven, 1997). Research in the language domain focused on caregiver (typically parents) contributions, with a large portion looking into the mother's quality and input of language. These studies find consistent results on the impact of those factors on infant language outcomes (see Soderstrom, 2007 for a review). Fewer studies exist on how a child contributes to language development, such as the influence of temperamental traits on language acquisition. One potential explanation for the differences in available research studies is the failure to consider an approach (Sameroff, 1975) which includes both the child's contributions to language development (i.e., temperament) and the caregiver's role (e.g., quality of the maternal input).[1]

The first year of life is characterized by the rapid emergence of the infant's ability to decode the streams of speech directed to them and begin to associate sounds with symbolic meaning. Two characteristics based on temperament, attentional control and the capacity for self-regulation, are thought to support or inhibit language development (Canfield and Saudino, 2016). However, research has not universally agreed on this point. Infants who demonstrated better attentional abilities also demonstrated higher language comprehension at the end of the first year (Dixon and Smith, 2000; Morales et al., 2000) and greater language vocabulary at 21 months (Dixon and Shore, 1997; Dixon and Smith, 2000; Salley et al., 2013). These findings suggest that greater sustained attention to the environment might facilitate a child's abilities to focus on events rich in language, contributing to vocabulary development. However, other research yielded contradictory findings (Kubicek and Emde, 2012; Pérez-Pereira et al., 2016). These disparities indicate a need for additional research. Overall, the literature suggests that greater expressions of positive affect may foster more significant social exchanges in infancy (a critical period of language development), helping facilitate language development in the infant and toddler period (See Pérez-Pereira et al., 2016, Morales et al., 2000, Laake and Bridgett, 2014, Slomkowski et al., 1992 and Kubicek and Emde, 2012). Another body of literature suggests that a difficult temperament is adversely associated with language development. McNally and Quigley (2014) found that infants rated as having a more difficult temperament at 9 months had lower global language scores at 3 years of age, with similar associations demonstrated for infants at 21 months of age (Dixon and Smith, 2000; Salley and Dixon, 2007). One potential explanation contends that an infant's difficult temperament may interfere with his ability to control the attention needed to process language-relevant information, affecting his development during a critical period of language acquisition. [1]

Despite research suggesting an association between emotion regulation and language development, additional literature has demonstrated contradictory findings. Some studies have failed to find an association between the negative affect in infancy (e.g., distress to limitations scale and difficult temperament) and language competencies in the toddler years (Dixon and Smith, 2000; Morales et al., 2000; Westerlund and Lagerberg, 2008; Canfield and Saudino, 2016). Adding to the complexity of the association between emotion regulation and language, Moreno and Robinson (2005) found that greater expressions of joy and greater expressions of anger at 8 months were associated with better expressive language at 30 months. This study indicates that emotional expression (both positive and negative) may facilitate language development by providing opportunities for the infant to develop language through exchanges with her caregiver (Molfese et al., 2010).[1]

These contradictory findings suggest that while attentional and emotional temperamental aspects may play a role in fostering interactions that enhance language development, further research is needed to clarify the association between attention, emotion regulation, and development of language competencies.[1]

---

[1] Spinelli M, Fasolo M, Shah PE, Genovese G and Aureli T (2018) The Influence of Early Temperament on Language Development: The Moderating Role of Maternal Input. CC BY.

19.8: Temperament and Later Personality

Continuing Influences

Parents gaze into the faces of their newborn infants and wonder "What kind of person will this child become?" They scrutinize their baby's preferences, characteristics, and responses for clues of a developing personality. Temperament is a foundation for personality growth, but it is not the whole story. Although temperament is biologically based, it interacts with the influence of experiences from the moment of birth (if not before) to shape personality (Rothbart, 2011). Temperamental dispositions are affected by the support level of parental care, and personality is shaped by the goodness of fit between the child's temperamental qualities and the characteristics of the environment (Chess & Thomas, 1999). For example, an adventurous child would find goodness of fit and supported personality growth with parents who regularly take her on weekend hiking and fishing trips. Much like the other facets of social development, personality results from the continuous interplay between biological disposition and experience.

Personality develops from temperament in other ways (Thompson, Winer, & Goodvin, 2010). As children mature biologically, temperamental characteristics emerge and change over time. A newborn is not capable of much self-control, but temperamental self-regulation changes become more apparent as brain-based self-control capacities advance. For example, a newborn who cries frequently doesn't necessarily have a grumpy personality; over time, with sufficient parental support and an increased sense of security, the child might be less likely to cry.

Personality is made up of many other features besides temperament. Children's developing self-concept, motivations to achieve or socialize, values and goals, coping styles, sense of responsibility and conscientiousness, and many other qualities are encompassed in personality. Biological dispositions and the child's experiences with others (particularly in close relationships) both guide the growth of individual characteristics.

Personality development begins with the biological foundations of temperament but becomes elaborated, extended, and refined over time. The newborn whose parents first gazed upon him becomes an adult with depth and nuanced personality.[1]

---

[1] Thompson, R. (2022). Social and personality development in childhood CC BY-NC-SA. Permissions beyond the scope of this license may be available in our Licensing Agreement.

19.9: Conclusion

Conclusion to Temperament

In psychology, temperament broadly refers to consistent individual differences in biologically based behavior and is relatively independent of learning, a system of values, and attitudes.[1] Temperament doesn't change dramatically as we grow up. Positive traits can be enhanced, and negative traits can be channeled; however, the child's underlying reaction style is unlikely to change. If we are lucky, we learn how to work with and manage our temperamental qualities.[2]

---

[1] Culture and Psychology by L D Worthy; T Lavigne; and F Romero is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License

[2] Human Development by Human Development Teaching & Learning Group is licensed under a CC BY- NC-SA 4.0,

---

19.10: References

References for Temperament

- Baer, J., Schreck, M., Althoff, R. R., Rettew, D., Harder, V., Ayer, L., et al. (2015). Child temperament, maternal parenting behavior, and child social functioning. *J. Child Fam. Stud.* 24, 1152–1162. doi: 10.1007/s10826-014-9924-5
- Bates, E., Bretherton, I., and Snyder, L. S. (1991). *From First Words to Grammar: Individual Differences and Dissociable Mechanisms*, Vol. 20. Cambridge: Cambridge University Press.
- Bouchard, T. (1994). Genes, environment, and personality. *Science* 264, 1700–1701. doi: 10.1126/science.8209250
- Canfield, C. F., and Saudino, K. J. (2016). The influence of infant characteristics and attention to social cues on early vocabulary. *J. Exp. Child Psychol.* 150, 112–129. doi: 10.1016/j.jecp.2016.05.005
- Chess, S., & Thomas, A. (1999). *Goodness of fit: Clinical applications from infancy through adult life*. New York, NY: Brunner-Mazel/Taylor & Francis.
- Cloninger, R. C., Svrakic, D. M., and Przybeck, T. R. (1993). A psychobiological model of temperament and character. *Arch. Gen. Psychiatry* 50, 975–990. doi: 10.1001/archpsyc.1993.01820240059008
- Culture and Psychology by L D Worthy; T Lavigne; and F Romero is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License, except where otherwise noted.
- Dixon, W. E., and Smith, P. H. (2000). Links between early temperament and language acquisition. *Merrill Palmer Q.* 46, 417–440.
- Dixon, W. E., and Shore, C. (1997). Temperamental predictors of linguistic style during multiword acquisition. *Infant Behav. Dev.* 20, 99–103. doi: 10.1016/S0163-6383(97)90065-5
- Fisher HE, Island HD, Rich J, Marchalik D and Brown LL (2015) Four broad temperament dimensions: description, convergent validation correlations, and comparison with the Big Five. *Front. Psychol.* 6:1098. **doi: 10.3389/fpsyg.2015.01098** his is an open-access article distributed under the terms of the **Creative Commons Attribution License (CC BY)**
- Gartstein, M. A., and Rothbart, M. K. (2003). Studying infant temperament via the revised infant behavior questionnaire. *Infant Behav. Dev.* 26, 64–86. doi: 10.1016/S0163-6383(02)00169-8
- Human Development by Human Development Teaching & Learning Group is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License, except where otherwise noted.
- Kubicek, L. F., and Emde, R. N. (2012). Emotional expression and language: a longitudinal study of typically developing earlier and later talkers from 15 to 30 months. *Infant Ment. Health J.* 33, 553–584. doi: 10.1002/imhj.21364
- Laake, L. M., and Bridgett, D. J. (2014). Happy babies, chatty toddlers: infant positive affect facilitates early expressive, but not receptive language. *Infant Behav. Dev.* 37, 29–32. doi: 10.1016/j.infbeh.2013.12.006
- Lieven, E. V. (1997). "Variation in a crosslinguistic context," in *The Cross-Linguistic Study of Language Acquisition: Expanding the Contexts*, Vol. 5, ed. D. I. Slobin (Hillsdale, NJ: Lawrence Erlbaum), 199–263.
- Loehlin, J. C., McCrae, R. R., Costa, P. T., and John, O. P. (1998). Heritabilities of common and measure-specific components of the big five personality factors. *J. Res. Pers.* 32, 431–453. doi: 10.1006/jrpe.1998.2225
- McNally, S., and Quigley, J. (2014). An Irish cohort study of risk and protective factors for infant language development at 9 months. *Infant Child Dev.* 23, 634–649. doi: 10.1002/icd.1861
- Molfese, V. J., Rudasill, K. M., Beswick, J. L., Jacobi-Vessels, J. L., Ferguson, M. C., and White, J. M. (2010). Infant temperament, maternal personality, and parenting stress as contributors to infant developmental outcomes. *Merrill Palmer Q.* 56, 49–79. doi: 10.1353/mpq.0.0039
- Morales, M., Mundy, P., Delgado, C. E., Yale, M., Neal, R., and Schwartz, H. K. (2000). Gaze following, Temperament, and language development in 6-month-olds: a replication and extension. *Infant Behav. Dev.* 23, 231–236. doi: 10.1016/S0163-6383(01)00038-8
- Moreno, A. J., and Robinson, J. L. (2005). Emotional vitality in infancy as a predictor of cognitive and language abilities in toddlerhood. Infant Child Dev. 14, 383–402. doi: 10.1002/icd.406
- Penela, E. C., Walker, O. L., Degnan, K. A., Fox, N. A., and Henderson, H. A. (2015). Early behavioral inhibition and emotion regulation: pathways toward social competence in middle childhood. *Child Dev.* 86, 1227–1240. doi: 10.1111/cdev.12384
- Pérez-Pereira, M., Fernández, P., Resches, M., and Gómez-Taibo, M. L. (2016). Does temperament influence language development? Evidence from preterm and full-term children. *Infant Behav. Dev.* 42, 11–21
- Roberts, B. W., and DelVecchio, W. F. (2000). The rank-order consistency of personality from childhood to old age: a quantitative review of longitudinal studies. Psychol. Bull. 126, 3–25. doi: 10.1037/0033-2909.126.1.3

- Robins, R. W. (2005). The nature of personality: Genes, culture, and national character. *Science* 310, 62–63. doi: 10.1126/science.1119736
- Rothbart, M. K. (2007). Temperament, development, and personality. *Curr. Dir. Psychol. Sci.* 16, 207–212. doi: 10.1111/j.1467-8721.2007.00505.x
- Rothbart, M. K., Ahadi, S. A., and Evans, D. E. (2000). Temperament and personality: Origins and Outcomes. *J. Pers. Soc. Psychol.* 78, 122–135. doi: 10.1037/0022-3514.78.1.122
- Rubin, D. H., Crehan, E. T., Althoff, R. R., Rettew, D. C., Krist, E., Harder, V., et al. (2017). Temperamental characteristics of withdrawn behavior problems in children. *Child Psychiatry Hum. Dev.* 48, 478–484. doi: 10.1007/s10578-016-0674-z
- Salley, B., Panneton, R. K., and Colombo, J. (2013). Separable attentional predictors of language outcome. *Infancy* 18, 462–489. doi: 10.1111/j.1532-7078.2012.00138.x
- Sameroff, A. (1975). Transactional models in early social relations. *Hum. Dev.* 18, 65–79. doi: 10.1159/000271476
- Slomkowski, C. L., Nelson, K., Dunn, J., and Plomin, R. (1992). Temperament and language: relations from toddlerhood to middle childhood. Dev. Psychol. 28, 1090–1095. doi: 10.1037/0012-1649.28.6.1090
- Soderstrom, M. (2007). Beyond babytalk: re-evaluating the nature and content of speech input to preverbal infants. *Dev. Rev.* 27, 501–532. doi: 10.1016/j.dr.2007.06.002
- Spinelli M, Fasolo M, Shah PE, Genovese G and Aureli T (2018) The Influence of Early Temperament on Language Development: The Moderating Role of Maternal Input. Front. Psychol. 9:1527. doi: 10.3389/fpsyg.2018.01527 This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY).
- Terracciano, A., Abdel-Khalek, A. M., Ádám, N., Adamovová, L., Ahn, C. K., Ahn, H. N., et al. (2005). National character does not reflect mean personality trait levels in 49 cultures. *Science* 310, 96–100. doi: 10.1126/science.1117199
- Thompson, R. (2022). Social and personality development in childhood. In R. Biswas-Diener & E. Diener (Eds), *Noba textbook series: Psychology.* Champaign, IL: DEF publishers. Retrieved from http://noba.to/gdqm6zvc Social and Personality Development in Childhood by Ross Thompson is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License. Permissions beyond the scope of this license may be available in our Licensing Agreement.
- Thompson, R. A. (2012). Whither the preconventional child? Toward a life-span moral development theory. *Child Development Perspectives*, 6, 423–429.
- U.S Department of Health and Human Services. (2018, May 30). *Introduction to Temperament*. ECLKC. Retrieved April 18, 2022, from https://eclkc.ohs.acf.hhs.gov/mental...on-temperament is in the public domain
- Ullsperger, J. M., Nigg, J. T., and Nikolas, M. A. (2016). Does child temperament play a role in the association between parenting practices and child attention deficit/hyperactivity disorder? *J. Abnorm. Child Psychol.* 44, 167–178. doi: 10.1007/s10802-015-9982-1
- Westerlund, M., and Lagerberg, D. (2008). Expressive vocabulary in 18-month-old children in relation to demographic factors, mother and child characteristics, communication style and shared reading. Child Care Health Dev. 34, 257–266. doi: 10.1111/j.1365-2214.2007.00801.x
- Wolfe, C. D., and Bell, M. A. (2007). The integration of cognition and emotion during infancy and early childhood: regulatory processes associated with the development of working memory. *Brain Cogn.* 65, 3–13. doi: 10.1016/j.bandc.2006.01.009

CHAPTER OVERVIEW

20: Influences on Development

20.1: Introduction

Introduction to Influences on Development

A child's relationships with family members shape how he experiences relationships outside the home. "What young children learn, how they react to events and people around them, and what they expect from themselves, and others are deeply affected by their relationships with parents, the behavior of parents, and the environment of the homes in which they live" (Shonkoff and Phillips 2000).[2]

---

[1] California Department of Education, Infant/Toddler Learning and Development Program Guidelines, Second Edition by the California Department of Education is used with permission

[2] California Department of Education, Infant/Toddler Learning and Development Program Guidelines, Second Edition by the California Department of Education is used with permission

---

20.2: Socialization and Enculturation Agents

The Girl in the Window

In the summer of 2005, police detective Mark Holste followed an investigator from the Department of Children and Families to a home in Plant City, Florida to investigate a neighbor's statement concerning a shabby house on Old Sydney Road. A small girl was observed peering from one of its broken windows. The report seemed odd because no one in the neighborhood had seen a young child in or around the home, which had been inhabited by a woman, her boyfriend, and two adult sons for the past three years.

Who was the mystery girl in the window?

Upon entering the house, Detective Holste and his team were shocked. It was the worst mess they'd ever seen, infested with cockroaches, smeared with feces and urine from both people and pets, and filled with dilapidated furniture and ragged window coverings.

Detective Holste headed down a hallway and entered a small room. He found a little girl staring into the darkness with big, vacant eyes. A newspaper report later described the detective's first encounter with the child: "She lay on a torn, moldy mattress on the floor. She was curled on her side . . . her ribs and collarbone jutted out . . . her black hair was matted, crawling with lice. Insect bites, rashes, and sores pocked her skin . . . She was naked—except for a swollen diaper. … Her name, her mother said, was Danielle. She was almost seven years old" (DeGregory 2008).

Detective Holste immediately carried Danielle out of the home, and she was taken to a hospital for medical treatment and evaluation. Through extensive testing, doctors determined that, although she was severely malnourished, Danielle could see, hear, and vocalize normally. Yet she wouldn't look anyone in the eyes, didn't know how to chew or swallow solid food, didn't cry, didn't respond to stimuli that would typically cause pain, and didn't know how to communicate either with words or simple gestures such as nodding "yes" or "no." Likewise, although tests showed she had no chronic diseases or genetic abnormalities, the only way she could stand was with someone holding onto her hands, and she "walked sideways on her toes, like a crab" (DeGregory 2008).

What had happened to Danielle? Simply put, neglect. Only the basic requirements for survival were fulfilled in Danielle's care. Based on their investigation, social workers concluded that she had been left almost entirely alone in rooms like the one in which she was found. Without regular interaction—the holding, hugging, talking, explanations, and demonstrations given to most young children—she had not learned to walk or speak, eat or interact, play, or even understand the world around her. From a sociological point of view, Danielle had not been socialized.

Socialization is the process through which people are taught to be proficient members of society. It describes how people come to understand societal norms and expectations, accept society's beliefs, and be aware of societal values. Socialization is not the same as socializing (interacting with others, like family, friends, and coworkers); it is a sociological process that occurs through socializing. As Danielle's story illustrates, even the most basic human activities are learned. Physical tasks like sitting, standing, and walking had not automatically developed for Danielle, and without socialization, Danielle hadn't learned about some material cultural norms of her society: for example, she couldn't hold a spoon, bounce a ball, or use a chair for sitting. She also hadn't learned about her nonmaterial culture, such as its beliefs, values, and norms. Danielle didn't understand the concept of family and didn't know cultural expectations for using a bathroom for elimination. Most importantly, she hadn't learned to use the symbols that make up language, through which we learn about who we are, how we fit with other people, and the natural and social worlds in which we live.

Sociologists have long been fascinated by circumstances like Danielle's—in which a child receives sufficient human support to survive but virtually no social interaction—because they highlight how much we depend on social interaction to provide the information and skills needed to be part of society or develop a "self."[1]

Socialization occurs in societies big and small, complex and straightforward, preindustrial and industrial. It happens in the United States, Brazil, Saudi Arabia, and Indonesia.[2] Families teach children, both directly and by example, how to behave and how the world works. Eurocentric cultures encourage children to use socially expected norms such as "thank you." They teach kids how to dress appropriately for the culture in which their family is living. They introduce children to religious beliefs and the rituals that go with them. They even teach children how to think and feel. This uniquely human form of learning, where the cultural tools for success are passed from one generation to another, is called enculturation. Enculturation agents are individuals and institutions that shape individual adaptions to a specific culture to ensure growth and effectiveness.[3]

20.2.1: Agents of Socialization and Enculturation

Institutional sources of socialization and enculturation are called agents of socialization. The first of these, the family, is undoubtedly the most important agent of socialization for infants and young children.[1]

The Role of Culture

Families and their children are interconnected with cultural communities. Each family has beliefs, values, and expectations rooted in cultural traditions that also reflect unique perspectives of the family. No two families follow cultural rules precisely the same way, and most families are connected to and influenced by multiple cultures. Williams and De Gaetano (1985) describe culture as a way of life of a group of people, including shared views of the world and social realities, values and beliefs, roles and relationships, and patterns or standards of behavior. Through culture, children gain a sense of identity, belonging, and beliefs about what is important in life.[2]

Much cultural knowledge is transmitted implicitly. "Before the start of formal education, children begin to acquire competencies and skills that the cultural group considers important for maturation and independence as an adult. Sometimes this is conveyed directly through intentional teaching by the family. These skills are often absorbed indirectly through select experiences provided in family life. For example, an older child may learn to take care of a younger one just by watching her mother or an older sibling".[2]

---

[1] Introduction to Diversity Studies by Northeast Wisconsin Technical College is licensed under a CC BY-NC-CA

[2] California Department of Education, Infant/Toddler Learning and Development Program Guidelines, Second Edition by the California Department of Education is used with permission

---

20.2.1.1: Parents and Families

Those Closest to Us

Families bring unique traits and qualities to the parenting relationship, including a parent's age, gender identity, personality, developmental history, beliefs, knowledge about parenting and child development, and mental and physical health. Personalities also affect parenting behaviors.[1] Differences in caretaking reflect differences in parenting goals, values, resources, and experiences.[2] Parents who are more agreeable, conscientious, and outgoing are warmer and provide more structure to their children. Parents who are more agreeable, less anxious, and less negative support their children's autonomy more than anxious and less agreeable parents.[3]

Parents' developmental histories (their experiences as children) also affect parenting strategies. Parents may learn parenting practices from their parents; for example, fathers whose own parents provided monitoring, consistent and age-appropriate discipline, and warmth are more likely to provide this constructive parenting to their children (Kerr, Capaldi, Pears, & Owen, 2009). Patterns of negative parenting and ineffective discipline also appear from one generation to the next.[1] Regardless of parents' specific choices, families play a pivotal role in exposing a child to early cultural learning. Many researchers believe that parents/families serve as the single, most crucial enculturation agent in any child's life.[2]

Family Functions

Many family functions mirror parenting tasks, goals, and responsibilities. It is important to understand how family functions and parenting tasks impact each other. The following is a list of somewhat universal family functions (almost all families worldwide have some of these in common).[1] :

- Economic support: providing basic needs, such as food, shelter, clothing, etc.
- Emotional support: providing love, comfort, intimacy, companionship, nurturing, belongingness, etc.
- Socialization of children: rearing children, parenting, helping children function to the best of their abilities within their society
- Control of sexuality: defining and managing when and with whom (e.g., marriage) sexuality occurs
- Procreation: contributing to the continuation of society and offspring
- Ascribed status: providing a social identity (e.g., social class, race, ethnicity, kinship, religion, etc.) (Hammond, Cheney, Pearsey, 2015)

While some parenting priorities are culturally universal, many childrearing values and habits are culture-specific. Culture-specific influences on caretaking choices can be subtle or overt and promote a narrative of what parents "ought" to do to successfully raise their children. For example, American parents are encouraged to enculturate a sense of independence and assertiveness in children, while Japanese parents prioritize self-control, emotional maturity, and interdependence (Bornstein, 2012). Every society places expectation on caretakers as enculturation agents to raise their young in ways that promote culture-specific goals and expectations. [2]

---

[1] Parenting and Family Diversity Issues by Diana Lang and Marissa L. Diener is licensed under a CC BY-NC-SA

[2] Culture and Psychology by L D Worthy; T Lavigne; and F Romero is licensed CC BY-NC-SA

[3] Parenting and Family Diversity Issues by Diana Lang and Marissa L. Diener is licensed under a CC BY-NC-SA

[4] Kuppens, S and Ceulemans, E. Parenting Styles: A Closer Look at a Well-Known Concept. Is licensed CC: BY

[5] Child Characteristics is adapted from "The Developing Parent" by Marisa Diener, licensed CC BY NC SA

[6] California Department of Education, Infant/Toddler Learning and Development Program Guidelines, Second Edition by the California Department of Education is used with permission

---

20.2.1.1.1: Parenting Theories

Parenting Theories

Parenting has gained ample research attention from various scientific areas. Many theories emphasize the vital role of parenting in child development. When studying parenting, researchers use different strategies considering parenting practices, parenting dimensions, or parenting styles. Parenting practices can be defined as directly observable, specific behaviors parents use to socialize with their children (Darling and Steinberg 1993). For example, parenting practices intended to promote academic achievement show involvement by attending parent-teacher meetings or regular supervision of children's homework. Other parenting practices include positive reinforcement, discipline, or problem-solving.

Definition: Parenting Practices

directly observable, specific behaviors parents use to socialize with their children

Rather than focusing on specific parenting practices, other researchers identified overarching parenting dimensions seen in relationship modeling. Most scientists agree on at least two broad dimensions of parenting, labeled parental support and parental control. Parental support is the affective nature of the parent-child relationship, indicated by showing involvement, acceptance, emotional availability, warmth, and responsivity (Cummings et al. 2000). The parental support dimension has been related to positive development outcomes in children, such as the prevention of alcohol abuse and deviance (Barnes and Farrell 1992), depression and delinquency (Bean et al. 2006), and externalizing problem behavior (Shaw et al. 1994).[1]

The parental control behavioral dimension consists of parenting behavior that attempts to control, manage or regulate child behavior, either through enforcing demands and rules, disciplinary strategies, control of rewards and punishment, or through supervisory functions (Barber 2002; Maccoby 1990; Steinberg 1990). Appropriate behavioral control has been considered to affect child development positively. In contrast, insufficient (e.g., poor parental monitoring) or excessive behavioral control (e.g., parental physical punishment) has been commonly associated with negative child developmental outcomes, such as deviant behavior, misconduct, depression, and anxiousness (e.g., Barnes and Farrell 1992; Coie and Dodge 1998; Galambos et al. 2003; Patterson et al. 1984). This parental behavioral control refers to control over the child's behavior; parental psychological control pertains to the parent's attempt to manipulate children's thoughts, emotions, and feelings (Barber 1996; Barber et al. 2005). Due to the manipulative and intrusive nature of psychological control, this type of control has almost exclusively been associated with negative developmental outcomes in children and adolescents, such as depression, antisocial behavior, and relational regression (e.g., Barber and Harmon 2002; Barber et al. 2005). The three parenting dimensions (support, psychological control, and behavioral control) have been labeled as distinct concepts that are interrelated. (Barber et al. 2005; Soenens et al. 2012).[1]

Other researchers have taken a different approach in studying parenting by emphasizing that specific combinations of parenting practices impact child development rather than separate parenting practices or dimensions (e.g., Baumrind 1991; Maccoby and Martin 1983). This approach examines which patterns of parenting practices occur within the same parent and how these patterns—commonly labeled as parenting styles—relate to children's development. It focuses on configurations within individuals rather than a variable–centered approach that focuses on relationships among individuals (Magnusson 1998).[1]

Baumrind's Parenting Styles

Baumrind (1966, 1967, 1971) is a pioneer of research in parenting styles. She introduced three parenting styles to describe differences in typical (she used the term normal) parenting behaviors: the authoritarian, authoritative, and permissive parenting styles. Baumrind (1971) suggested that authoritarian parents try to shape, control, and evaluate their children's behavior based on an absolute set of standards. In contrast, permissive parents are warmer, less controlling and grant more autonomy. Baumrind considered an authoritative parenting style to fall between those two extremes.

Maccoby and Martin: Demandingness and Responsiveness

In the 1980s, Maccoby and Martin (1983) attempted to bridge Baumrind's styles and parenting dimensions, focusing their research efforts primarily on the configuration of parenting styles. Based on the combination of two dimensions – demandingness and responsiveness – they defined four parenting styles: authoritative (i.e., high demandingness and high responsiveness); authoritarian (i.e., high demandingness and low responsiveness); indulgent (i.e., low demandingness and high responsiveness); and neglectful (i.e., low demandingness and low responsiveness). These parenting dimensions are similar to parental support and parental behavioral control. Based on Maccoby and Martin's work, Baumrind (1989, 1991) expanded her classification with a fourth parenting style: the neglectful parenting style.[1]

This work consistently demonstrated that children of authoritative parents had the most favorable development outcomes; authoritarian and permissive parenting was associated with negative developmental effects, while results for children of neglectful parents were the poorest. Other researchers have also replicated these associations.

- authoritative parenting style is associated with positive developmental outcomes in youth, such as psychosocial competence (e.g., maturation, resilience, optimism, self-reliance, social competence, self-esteem) and academic achievement (e.g., Baumrind 1991; Lamborn et al. 1991; Steinberg et al. 1994).
- Findings regarding permissive/indulgent parenting have inconsistently yielded associations with internalizing (i.e., anxiety, depression, withdrawn behavior, somatic complaints) and externalizing problem behavior (i.e., school misconduct, delinquency), and also with social skills, self–confidence, self–understanding and active problem coping (e.g., Lamborn et al. 1991; Steinberg et al. 1994; Williams et al. 2009; Wolfradt et al. 2003).
- An authoritarian parenting style has consistently been associated with adverse developmental outcomes, such as aggression, delinquent behaviors, somatic complaints, depersonalization, and anxiety (e.g., Hoeve et al. 2008; Steinberg et al. 1994; Williams et al. 2009; Wolfradt et al. 2003).
- Children of neglectful parents have shown the least favorable outcomes in multiple domains, such as lacking self-regulation and social responsibility, poor self-reliance and social competence, poor school competence, antisocial behavior and delinquency, anxiety, depression, and somatic complaints (e.g., Baumrind 1991; Hoeve et al. 2008; Lamborn et al. 1991; Steinberg et al. 1994).[1]

Criticism of Baumrind

Although Baumrind's classifications have greatly influenced parenting research, three issues have been overlooked. We'll look at the first two now and explore the influence of culture later. The first issue relates to the psychological control dimension, which is currently considered the third parenting dimension. Initially, Baumrind paid little attention to the role of psychological control because her control dimension solely referred to parental socializing practices aimed at integrating the child into the family and society (Darling and Steinberg 1993). In her later work (1971, 1989, 1991), Baumrind incorporated aspects of psychological control. Limited research (e.g., Pereira et al. 2008; Wolfradt et al. 2003) has identified four parenting styles that match the theoretically distinct styles. Within these parenting styles, psychological control coincided with behavioral control levels in the authoritarian parenting style.

When Parenting Styles Don't Align in a Family

Existing research provides little insight into the coexistence of different parenting styles and their collective impact on child development. Although Baumrind included both parents in her studies, she assigned a pre-defined parenting style to each one separately. In some studies (1991), data was limited to mothers when both parents were assigned a different parenting style; in others (1971), families were entirely excluded. Baumrind, along with general research on parenting styles, paid less attention to the impact of joint parenting styles on child development (Martin et al. 2007; McKinney and Renk 2008; Simons and Conger 2007). Children in two-parent/two-unit households are influenced by the combined practices of multiple people (Martin et al. 2007), and some studies have shown that family members can differ in their parenting styles (Conrade and Ho 2001; McKinney and Renk 2008; Russell et al. 1998). When research considers how families' parenting styles combine, it aligns more closely with the real experiences of children growing up in two-parent households. Only this kind of approach can shed light on possible developmental effects (Martin et al. 2007). For example, Simons and Conger (2007) found that having two authoritative parents was associated with the most favorable outcomes in adolescents; additionally, one parent's authoritative parenting style generally buffered the less effective parenting style of the other parent. Similarly, McKinney and Renk (2008) suggested that in late adolescence, perceiving one parent as authoritative while the other parent offered a different parenting style partly buffered emotional adjustment problems. [1]

Culture and Parenting Styles: What Baumrind Missed

Several studies demonstrate the influence of culture on parenting practices (Nair and Murray 2005) and parental authority and family relationships following cultural or gender differences [Zhang 2006)] Some research suggests the influence of parenting styles differs across ethnic groups [Dwairy M 2004a,b]. Parental authority depends on various factors, including social context, social classes, and cultures. Culture may affect the maternal and paternal roles and control [Albert, Trommsdorff and Mishra, 2004]. Some research has found that maternal control gives the feeling of security and acceptance to Indian adolescents but not German adolescents (Eman and Abdel,2017) . While many children reared in European-American cultures fare poorly with too much strictness (authoritarian parenting), children raised in Chinese cultures often perform well, especially academically Chao, R. K. (1994). Rozumah (2009) argues that parenting styles depend on the cultural context of the society, claiming Asian cultures are more collectivist than Western societies: the parenting outcomes valued in collectivist groups may form the basis for authoritarian parenting and be deemed more appropriate when compared with other parenting styles. These results are consistent with former results reported among the Palestinians in Israel [Dwairy M 2004a,b], but seem to contradict other findings concerning more strictness and oppression toward females than males in Arab societies (The Arab Woman Developmental Report, 2003). In a study of parenting styles of Egyptian adolescents [Dwairy and Menshar, 2006)], researchers found that parenting styles among Arabs are not as distinct as in the West. The three original parenting styles are not on a linear continuum where authoritarian and permissive styles exist at points on either side. Many studies using Baumrind's parenting prototypes found that most of their samples do not fit into any of the four styles [Marcus (1990 , Kim and Rohner, (2002)] (Eman and Abdel,2017).

Influences of Child Characteristics

Parenting is bidirectional. Not only do parents and caregivers affect their children, but children influence their parents or guardians. [2] A child’s characteristics, such as gender identity, birth order, temperament, and health status, can affect child-rearing behaviors and roles. For example, an infant with an easy temperament may enable families to feel more effective, as they can easily soothe the child and elicit smiling and cooing. On the other hand, a cranky or fussy infant can elicit fewer positive reactions from family and may result in parents feeling less effective.[Eisenberg et. al., 2008] Over time, parents and families of more difficult children may become more punitive and less patient with their children [Clark, Kochanska,, & Ready,2000) Kiff, Lengua, & Zalewski, 2011]. Many parents who have a fussy, difficult child are less satisfied with their relationships and have more significant challenges in balancing work and family roles.[Hyde, Else-Quest, & Goldsmith 2004).] Thus, child temperament is one of the characteristics that influences how parents and families behave with their children. Research also demonstrates that some parents talk differently with their children based on their child's gender identity, such as providing more scientific explanations to their sons and using more emotion words with their daughters [Crowley, Callanan, Tenenbaum, & Allen, 2001].[3]

Influences of Family Structures

The family is central in children's lives because children learn about themselves and the world around them through experiences with their families. "Family member" is used here to define the people primarily responsible for a child, including parents, extended family members, guardians, and foster families. Family structures, processes, and functions must be assessed to understand family members' roles in child outcomes.[Hammond, Cheney and Pearson, 2015].[3]

"Family structures" delineate household members related by blood or legal ties; this concept typically assumes there is at least one child younger than 18 residing in the household. Specific structures include two-parent, one-parent, and living with neither parent (e.g., grandparents or other relatives rearing a child, families providing foster care, or children living in institutionalized settings), blended families, single-parent plus partner families (cohabiting couples, for example), multigenerational families, binuclear families, and adoptive families.

The U.S. Census Bureau utilizes these definitions of family structures:

Nuclear family: a child lives with two married, biologically related parents and only full siblings if siblings are present.

Cohabiting families: a child's parent lives with at least one opposite-sex, non-related adult. This additional adult may or may not be the child's biological parent.

Same-sex cohabiting/married families: a child's parent lives with at least one same-sex, non-related adult. The additional adult may or may not be the child's biological parent.

Stepfamilies and blended families (terms used interchangeably): children who live in a household formed through remarriage resulting in children living with one or no biologically related parents. The presence of a stepparent, stepsibling, or half-sibling designates a family as blended [United States Census Bureau, 2019].[1]

Caregivers of infants and toddlers need to learn the diversity of the child's family structure and roles when welcoming children and their families into the program. Henderson and Mapp (2002, 10) highlight the importance of family by recognizing that "all family members, siblings, grandparents, aunts, uncles, and fictive kin who may be friends or neighbors, often contribute in significant ways to children's education and development." It is essential for families to give information about important people and their relationships with each other and the child. Questions like, "Tell me about your family?" and "Who are the important people in your child's life?" will be more valuable than "What is the mother's name?" and "What is the father's name?" Family-centered care also recognizes the teacher's and program's roles in helping build networks and sustainable communities of support for families. These communities can support families years after leaving the infant and toddler program.[5]

[1] Kuppens, S and Ceulemans, E. Parenting Styles: A Closer Look at a Well-Known Concept. Is licensed CC: BY

[2] Child Characteristics is adapted from "The Developing Parent" by Marisa Diener, licensed CC BY NC SA

[3] Parenting and Family Diversity Issues by Diana Lang and Marissa L. Diener is licensed under a CC BY-NC-SA

[4] Culture and Psychology by L D Worthy; T Lavigne; and F Romero is licensed CC BY-NC-SA

[5] California Department of Education, Infant/Toddler Learning and Development Program Guidelines, Second Edition by the California Department of Education is used with permission

---

20.2.1.2: Families with Less Economic Support or Resources

Poverty

Poverty is a multidimensional, relational, and dynamic phenomenon, clearly illustrated through many definitions and indicators generated during the last 200 years by disciplines such as economy, sociology, political science, and anthropology (Spicker et al., 2006). In general, there are three main approaches to considering poverty: (a) as a material condition in which needs, a pattern of deprivations, and limited access to resources are the main components; (b) as an economic circumstance, in which standards of living, inequality, and the economic position are the main components; and (c) as a social circumstance, in which lack of basic security, exclusion, dependency, and social class are the most referred components.[1]

Contemporary literature surrounding poverty suggests the following as the most critical protective/risk factors:

- prenatal maternal health (i.e., nutrition, exposure to environmental toxic agents and drugs, stressors)
- perinatal health (e.g., prematurity, birth weight)
- quality of early attachment
- environmental stressors at home and schools
- parenting and care styles
- early cognitive and learning stimulation at home, care centers, and schools
- parental and teachers' mental health
- developmental disorders
- family financial stress
- access to social security and health systems; community resources
- lack of social mobility
- the social, political, and economic crisis
- family, social, and cultural expectations about child development (e.g., discrimination, stigmatization, exclusion)
- natural disasters (Bradley and Corwyn, 2002; Yoshikawa et al., 2012; Lipina, 2015; Ursache and Noble, 2016).

In addition, evidence suggests that the influences of poverty on cognitive development are due to the compilation of risk factors, the accompaniment of adversities, the individual's susceptibility to family and social environments, and the duration of the exposure (NICHD Early Child Care Research Network, 2005; McLaughlin et al., 2014; Wagmiller, 2015).[1]

Since the mid-20th century, several researchers designed and implemented different intervention programs to reduce the negative impacts of poverty on cognitive and emotional regulation. These efforts have emerged simultaneously within the humanities, social, and health sciences. This type of intervention program demonstrates that, given the multidimensional nature of childhood poverty and development, any intervention aimed at optimizing the conditions and opportunities for the development of children who live in poverty requires the same type of complexity. This involves designing multiple intervention modules that incorporate actions for children, families, teachers, civil organizations, and governments and developing the genuine integration of different conceptual and methodological perspectives.[1]

The rights to adequate nourishment, housing, education, and health care are listed in the UN General Assembly (1948, §§25–26). These rights are contested in different political systems and cultural contexts where there is a tendency to deny these rights as a social responsibility and, instead, explain poverty as a personal failure of the person afflicted (e.g., Feagin, 1972, 1975, and the review by Hunt and Bullock, 2016). Poverty is not regarded universally as unequal access to social benefits. These individualistic views are common in North America and South America, where the problem of poverty is immense, compared to western and northern Europe, where social views on poverty are more dominant. Countries and political systems accepting these rights as a shared social responsibility are among the countries most successful in combatting poverty, social violence, and insecurity [e.g., the Scandinavian countries (cf. Eurostat, or the World Bank Global Poverty Overview)].[1]

Evidence from neuroscience renders the individualistic way of explaining poverty as a personal failure absurd. For example, an infant does not choose which social context to be born. When the infant's brain is prevented from healthily developing due to poverty and its surrounding social conditions (lack of adequate nourishment, housing, childcare, schooling, health care, etc.), it is not a question of personal failure. Parents cannot be held entirely responsible for an environment that does not provide each child with the means of healthy development. Neuroscientific evidence reveals how poverty may breach human rights and how it may prevent a child's possibility of ever enjoying them. It is a crucial discovery of how poverty may cause problems in the very prerequisites for attaining development.[1]

[1] Lipina SJ and Evers K (2017) Neuroscience of Childhood Poverty: Evidence of Impacts and Mechanisms as Vehicles of Dialog With Ethics is licesed CC BY

20.2.1.3: Infants in Kinship or Foster Care

Other Types of Care

Foster care is a system in which a minor is placed into a group home (residential childcare community, treatment center, etc.), or private home of a state-certified caregiver (referred to as a foster parent), or with a state-approved family member. The child's placement is usually arranged through the government or a social service agency. The institution, group home, or foster parent is typically compensated for expenses unless the child is placed with a family member.(Wikipedia,202)].[1]

The foster care system has been around for years. According to The National Foster Parent Association, the United States foster care system developed from the English Poor Law of 1562. This law stated that children from poor homes would enter indentured services until they reached an age they could care for themselves. Children in foster care are often abused or neglected somehow, and the risk of repeated abuse is very high. Foster care is considered a short-term intervention and usually the last resort: immediately after removal, reunification is attempted to bring the child back to their family.[2]

Disruptions in family and school change are factors that affect children in foster care more than their peers (Tordön, et al. 2020). Findings indicate that children exposed to early adverse childhood experiences in general [Minnis , Rabe-Hesketh , and Wolkind, n.d) and, more specifically, children placed in foster care have a heightened risk of attachment difficulties [Minnis , Everett , Pelosi , Dunn, and Knapp, 2006; Boris, Hinshaw-Fuselier, Smyke, Scheeringa, Heller, and Zeanah,2004]. Attachment difficulties have been related to other mental health problems among foster and adopted children [Millward, Kennedy, Towlson, and Minnis, 2006; Kočovská et al., 2012] (Lehmann, Havik, and, Havik, 2013). In one study by Lewis et al. (2007) on adopted children with and without the experience of placement instability, the authors found associations between instability in early placements and adverse effects on social-emotional development (Tordön, et al. 2020)

Children placed in foster care are also exposed to a range of other risk factors [Rutter, 1998]. Adverse childhood experiences, such as psychological and physical abuse and neglect, parental substance abuse, and mental illness, all increase the risk of physical and mental health problems and health risk behaviors [Repetti, Taylor, and Seeman, 2002; Essex, Klein, Miech, and Smider, 2001; Felitti et al., 1998; Gilbert, Widom, Browne, Fergusson, Webb, and Janson,2009; Turner, Finkelhor, and Ormrod, 2006; Flaherty and Sege, 2005]. Older age at placement, frequent placement changes, number of placements, and persistent adverse events after placement pose additional risks for these children [Tarren-Sweeney,2008; Jones et al.,n.d]. However, few studies have examined whether such risk factors show specific associations with certain types of mental disorders [McMahon, Grant, Compas, Thurm, Ey,2003] (Lehmann,Havik, and Havik et al.,2013).

---

[1] Parenting and Family Diversity Issues by Diana Lang and Marissa L. Diener is licensed under a CC BY-NC-SA

[2] Gladden, J. (2021). Child Welfare and Foster Care. In *Introduction to Social Work*. essay, Ferris State University is licensed CC BY

20.3: Providing and Supporting Culturally Sensitive Care

Culturally Sensitive Care

A person's approach to nurturing infants and toddlers reflects one's values. "Every aspect of how parents and teachers care for, educate, and think about young children is embedded in cultural perspectives and beliefs. How you respond when children cry, how you decide it is time for them to eat, what you define as healthy and as sick, what you believe are appropriate clothes to wear, how you express love, what you expect to do for children, and what you expect them to do on their own are examples of the millions of ways that culture affects who we are as people, parents, and teachers" (Keyser 2017). Familiar values may be considered natural, whereas unfamiliar values may feel different or wrong. Interactions involving differing cultural norms can create feelings of confusion, discomfort, curiosity, and judgment, as each person often feels their norms are "right". When children enter care, children and families may be navigating an unfamiliar cultural context. During this process, caregivers need to maintain an open, interested demeanor with each individual and family to learn about their unique culture.

Suppose an infant or toddler caregiver begins to feel uncomfortable with a family's practice with their child or the family's request for a certain type of care. This presents an opportunity for the infant or toddler caregiver to think about their values, cultural influences, and how the family's values might be equally important and relevant in their cultural context. When learning about other cultures, it is important to suspend judgment: to separate understanding of cultures from judgments of their values. "If judgments of values are necessary, as they often are, they will thereby be much better informed if they are suspended long enough to gain some understanding of the patterns involved in one's familiar ways as well as in the sometimes-surprising ways of other communities" (Rogoff 2003). If teachers use these situations to grow in understanding and appreciation of multiple perspectives, they will more deeply understand their own and others' cultural influences.[1]

Learning about others' cultures takes time, interest, respect, communication, and observation. Since many cultural beliefs are learned implicitly, infant and toddler caregivers may not be experienced in articulating them. When a parent picks up her child from the blanket and hands him to you to say goodbye, she may not be able to verbalize "I feel more comfortable knowing that I am physically giving you my baby to care for when I leave. I can't just leave when he is alone on the floor." This creates an opportunity for an infant and toddler caregiver to pick up on the parent's cue and hold the baby for goodbye or ask the parent next time "Would you like me to hold Leo so he can say goodbye to you?" When childcare centers ask parents to write down their cultural practices on intake forms, parents often do not know what to write or what this means. One effective way to learn about and uncover cultural practices is to ask parents about familiar routines and respectfully probe more deeply if the routines are different from the early learning and care culture (Tonyan 2015).[1]

The early childhood profession in the United States has historically emphasized that young children be set on a path toward independence and encouraged to care for themselves as early as possible. Encouraging older babies to feed themselves reflects the profession's emphasis on independence, while many families value interdependence more than independence. This value can be observed in the ways children are taught to help one another and to respect the needs of others (such as staying at the table until everyone is finished). Early learning and care programs have begun to modify program practices and policies to weave the concepts of both interdependence and independence into the fabric of care.[1]

In circumstances when an infant or toddler caregiver cannot incorporate a family's request or preference for care into the center's practices, it is still possible to demonstrate respect for the family's culture. For example, a caregiver might say to the child: "I know you love to sleep in your swing at home. Your papa tells me how contented you are sleeping there. At school, I will help you nap, too. We can rock a little, and then I'll put you in your comfy bed and pat your back." The caregiver may tell the parent "Thanks Tomas for letting me know how you help Benji sleep at home. It may take him a few days to learn a new way to go to sleep here, but I'll be sure to help him with a little extra rocking so it won't feel so different, and we can check in every day to see how it is going."[1]

---

[1] California Department of Education, Infant/Toddler Learning and Development Program Guidelines, Second Edition by the California Department of Education is used with permission

---

20.4: Influences of Language, Culture and Caregiving

Language

Language is an important transmitter of culture and an essential component of a child's identity (California Department of Education 2016, I/T Guidelines).. From the beginning of life, children learn the sounds of their family's language or languages and engage in interactions rooted in their family's culture. Supporting language development is critical because a child's home language develops hand in hand with all other domains. Responsive infant and toddler programs create a climate of respect for each child's culture and language. An essential part of being culturally and linguistically responsive is valuing and supporting each child's use of home language as they acquire English. Inviting parents to use their home language in the care setting, read to children, or do activities in their home language conveys to families that their culture and language are a vital part of the curriculum.[1]

[1] California Department of Education, Infant/Toddler Learning and Development Program Guidelines, Second Edition by the California Department of Education is used with permission

20.5: Creating Positive Caregiver Parenting Relationships

Connection Between Caregivers and Parents

The relationship between the family and the caregiver is critical. For a family, the experience of entering an infant or toddler setting may be highly emotional. Family members often experience anxiety separating from their child and may feel conflicted about leaving their child.

Caregivers actively promote attachment between a child and her family. Learning about each child's unique family, particularly the family members and others who care for the child, supports the child's significant relationships. When a child has a disability or other delay, early interventionists may also have a role in the care process. The teacher is the bridge connecting the child and family during the day: the more the teacher partners with the family in supporting attachment with their child, the more successful the child will be in the program. This collaborative relationship between families and caregivers benefits children in many ways. The quality of the relationship, the ease of two-way communication, and the mutual respect of expertise give both families and caregivers the information necessary to provide the best care and education for the child. It communicates to the child that their world is working in synchrony. The more respect and comfort shared between families and teachers, the more comfortable and secure the child is.

The nature of relationships between programs and families has changed significantly. Historically, teachers and caregivers saw their role with parents as providing parent education and parent involvement opportunities, both more deficit-driven than strengths-based. Currently, there are more strengths-based and collaborative approaches to the program–family relationship. These approaches include family-centered care, transformative family engagement, and a pedagogical approach from educators in Reggio Emilia, Italy. They believe that "the participation of the families is just as essential as is the participation of children and educators" (Edwards, Gandini, and Forman 1998, 21).[1]

The concept of family engagement (versus parent involvement) recognizes all members of a child's family (not just parents) and emphasizes the importance of the reciprocal relationship between families and schools. Program staff must be aware that family participation in both the program and the home can take on many forms and depend on each family's unique characteristics (Halgunseth et al. 2009). Family engagement occurs when there is an ongoing, reciprocal, and strengths-based partnership between families and early care programs (Halgunseth et al. 2009).[1]

Principles of family engagement include:

- encouraging and validating family participation in decision-making related to their children's education;
- consistent, two-way communication through multiple forms that are responsive to a family's linguistic preference;
- collaboration and exchange of knowledge;
- collaboration between families and programs in creating learning activities in the home and community;
- creation of a home environment that values learning;
- collaboration between families and teachers in establishing home and school goals for children;
- support and training for education professionals in creating a comprehensive system for promoting family engagement (Halgunseth et al. 2009).[1]

The teachers in Reggio Emilia, Italy, also support the idea that family engagement, collaboration, and the sharing of mutual expertise strengthen the program for children, families, and teachers. "The ideas and skills that the families bring to the school and, even more importantly, the exchange of ideas between parents and teachers favors the development of a new way of educating and helps teachers to view the participation of families not as a threat but as an intrinsic element of collegiality and as the integration of different wisdoms" (Edwards, Gandini, and Forman 1998).[1]

Families know the child's and family's history and significant events; the child's personality, routines and schedules; important relationships; style of exploring and learning; ways of communicating; disabilities; and health history. Taking time to understand important family knowledge is key to supporting infants’ and toddlers' healthy psychological and physical growth. Equally important is the communication to the family letting them know about their child's day, sharing updates and information about the day, communicating moments when their child is thinking about them, and recognizing the loving interactions you see between the child and parent.[1]

Struggles and Challenges in Building Partnerships

There are times when caregivers struggle to find a way to respect and build trust with a family. The teacher may feel like family members are not trying, do not understand their child, are not responsive to their child's cues, or care for their child in inappropriate ways. An infant or toddler caregiver needs to determine if the child is safe, but it is also important to understand the family along a developmental and cultural continuum. When we think about child development, we expect an infant to go through specific steps in learning. We do not expect him to walk before he can turn over. If we think about families along a similar developmental continuum, we may be better able to partner with them from a strengths-based perspective. For example, suppose a family is not reading their child's cues but is clearly excited to have a baby. In that case, you could acknowledge the love: "It is so clear how much you love your baby. I can see it in your eyes" and you could make a small observation: "I notice when you move from one side of the stroller to the other that Sammy is watching you. He is so observant." In this way, you are using a strengths-based approach to leverage a new perspective for the parent. Sometimes differences of opinion arise between the program and a family about how to care for children. Addressing these differences often provides opportunities for teachers to learn and grow together with families. Teachers must initiate conversations with family members to learn their thoughts about caring for their child. Even when a family belongs to the same cultural community as the teacher, the teacher's perspective may differ from the family, as each person interprets cultural rules and expectations differently.[1]

When issues arise involving cultural differences, educators can use the three-step procedure of Acknowledge, Ask, and Adapt. To acknowledge is to communicate awareness of the issue, convey sincere interest and responsiveness, and involve the family in seeking a joint solution. To ask is to learn about the parent's precise point of view by restating what the parent is saying and paying attention to verbal and nonverbal responses. To adapt is to work with family members toward a solution by searching for areas of joint agreement and negotiating on the crucial issues (adapted from Virmani and Mangione 2013, 72–5).[1]

[1] California Department of Education, Infant/Toddler Learning and Development Program Guidelines, Second Edition by the California Department of Education is used with permission

20.6: Conclusion

Conclusion to Influences on Development

The quality of interactions between parents and children, teachers and children, and parents and teachers matter to infants and toddlers (Virmani and Mangione 2013). Learning and development happen within the context of children's relationships with their families and teachers and the relationships between their families and teachers. Parents and teachers both play a central role in children's learning. The relationships children form in their early years are critical to successful learning and development throughout their lives. Educators of young children can engage with the family, culture, language, and community when building programs and developing relationships. Learning how to build authentic collaboration, two-way communication, reflective practice, and strong communities of support with families enables teachers to honor and leverage the resources and multiple perspectives of the parent community.[1]

Through a welcoming relationship, the child's teachers begin to understand the family's perspectives, strengths, needs, routines, hopes, and expectations. As educators, when we understand there are many successful ways to care for and educate children, we can collaborate with parents to better understand the diversity of cultural perspectives through dialogue, listening, collaboration, and sensitive observation.[1]

---

[1] California Department of Education, Infant/Toddler Learning and Development Program Guidelines, Second Edition by the California Department of Education is used with permission

---

20.7: References

References for Influences on Development

- Albert I, Trommsdorff G, Mishra R (2004) Parenting and adolescent attachment in India and Germany. Paper presented at the 17 Congress of the International Association for Cross Cultural Psychology, Xian, China.
- Barber, B. K. (2002). Reintroducing parental psychological control. In B. K. Barber (Ed.), Intrusive parenting: How psychological control affects children and adolescents (pp. 3–11). Washington, DC: American Psychological Association.
- Barnes, G. M., & Farrell, M. P. (1992). Parental support and control as predictors of adolescent drinking, delinquency, and related problem behaviors. Journal of Marriage and the Family, 54, 763–776.
- Bean, R. A., Barber, B. K., & Crane, D. R. (2006). Parental support, behavioral control, and psychological control among African American youth: The relationships to academic grades, delinquency, and depression. Journal of Family Issues, 27, 1335–1355.
- Barber, B. K. (1996). Parental psychological control: revisiting a neglected construct. Child Development, 67, 3296–3319.
- Barber, B. K., Stolz, H. E., Olsen, J. A., Collins, W. A., & Burchinal, M. (2005). Parental support, psychological control, and behavioral control: Assessing relevance across time, Culture, and method. Monographs of the society for research in child development, 70, i-147.
- Barber, B. K., & Harmon, E. L. (2002). Violating the self: Parental psychological control of children and adolescents. In B. K. Barber (Ed.), Intrusive parenting: How psychological control affects children and adolescents (pp. 15–52). Washington, DC: American Psychological Association.
- Barber, B. K., Stolz, H. E., Olsen, J. A., Collins, W. A., & Burchinal, M. (2005). Parental support, psychological control, and behavioral control: Assessing relevance across time, Culture, and method. Monographs of the society for research in child development, 70, i-147.
- Baumrind, D. (1966). Effects of authoritative parental control on child behavior. Child Development, 37, 887–907.
- Baumrind, D. (1967). Child care practices anteceding three patterns of preschool behaviour. Genetic Psychology Monographs, 75, 43–88.
- Baumrind, D. (1991). The influence of parenting style on adolescent competence and substance abuse. Journal of Early Adolescence, 11, 56–95.
- Baumrind, D. (1971). Current patterns of parental authority. Developmental Psychology, 4, 1–103.
- Baumrind, D. (1989). Rearing competent children. In W. Damon (Ed.), Child Development Today and Tomorrow (pp. 349–378). San Francisco: Jossey-Bass.
- Baumrind, D. (1991). The influence of parenting style on adolescent competence and substance abuse. Journal of Early Adolescence, 11, 56–95.
- Boris NW, Hinshaw-Fuselier SS, Smyke AT, Scheeringa MS, Heller SS, Zeanah CH: Comparing criteria for attachment disorders: Establishing reliability and validity in high-risk samples. J Am Acad Child Adolesc Psychiatry. 2004, 43: 568-577. 10.1097/00004583-200405000-00010.
- Bradley, R. H., and Corwyn, R. F. (2002). Socioeconomic status and child development. *Annu. Rev. Psychol.* 53, 371–399. doi: 10.1146/annurev.psych.53.100901.135233
- California Department of Education, Infant/Toddler Learning and Development Program Guidelines, Second Edition by the California Department of Education is used with permission
- Chao, R. K. (1994). Beyond parental control and authoritarian parenting style: Understanding Chinese parenting through the cultural notion of training. *Child Development, 65*, 1111-1119. ↵
- Clark, L. A., Kochanska, G., & Ready, R. (2000). Mothers' personality and its interaction with child temperament as predictors of parenting behavior. *Journal of Personality and Social Psychology, 79*, 274-285. ↵
- Coie, J. D., & Dodge, K. A. (1998). Aggression and antisocial behavior. In W. Damon & N. Eisenberg (Eds.), Handbook of Child Psychology. 3: Social, Emotional and Personality Development (pp. 779–862). New York, NY: Wiley & Sons.
- Conrade, G., & Ho, R. (2001). Differential parenting styles for fathers and mothers. *Australian Journal of Psychology*, *53*, 29–35.
- Cummings, E. M., Davies, P. T., & Campbell, S. B. (2000). Developmental Psychopathology and Family Process. New York, NY: The Guilford Press.
- Crowley, K., Callanan, M. A., Tenenbaum, H. R., & Allen, E. (2001). Parents explain more often to boys than to girls during shared scientific thinking. *Psychological Science, 12*(3), 258-261. https://doi.org/10.1111/1467-9280.00347 ↵

- Darling, N., & Steinberg, L. (1993). Parenting style as context: an integrative model. Psychological Bulletin, 113, 487–496.
- DeGregory, Lane. 2008. "The Girl in the Window." *St. Petersburg Times*, July 31. Retrieved January 31, 2012
- Dwairy M (2004a) Parenting styles and psychological adjustment of Arab adolescents. Transcult Psychiatry 41(2): 233-252.
- Dwairy M (2004b) Parenting styles and psychological adjustment of Arab gifted children. Gifted Child Quarterly 48(4): 275-286.
- Dwairy M, Menshar KE (2006) Parenting style, individuation, and mental health of Egyptian adolescents. J Adolesc 29(1): 103-117.
- Child Characteristics is adapted from "The Developing Parent" by Marisa Diener, licensed CC BY NC SA. ↵
- Edwards, C., L. Gandini, and G. Forman. 1998. The Hundred Languages of Children: The Reggio Emilia Approach Advanced Reflections. 2nd Ed. Westport, CT: Ablex Publishing. Kindle Edition.
- Eman M, Fadel A, Abdel A M. The Relation between Parenting Styles and Attachment among Preschool Children in the Gaza strip. Glob J Intellect Dev Disabil. 2017: 555619 DOI: 10.19080/GJIDD.2017.03.555619
- Eisenberg, N., Hofer, C., Spinrad, T., Gershoff, E., Valiente, C., Losoya, S. L., Zhou, Q., Cumberland, A., Liew, J., Reiser, M., & Maxon, E. (2008). Understanding parent-adolescent conflict discussions: Concurrent and across-time prediction from youths' dispositions and parenting. *Monographs of the Society for Research in Child Development, 73*(2), 1-160. ↵
- Essex MJ, Klein MH, Miech R, Smider NA: Timing of initial exposure to maternal major depression and children's mental health symptoms in kindergarten. Br J Psychiatry. 2001, 179: 151-156. 10.1192/bjp.179.2.151
- Feagin, J. (1975). *Subordinating the Poor.* Englewood Cliffs, NJ: Prentice Hall.
- Felitti Md FVJ, Anda Md MSRF, Nordenberg Md D, Williamson Ms PDF, Spitz Ms MPHAM, Edwards Ba V, Koss PhD MP, Marks Md MPHJS: Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: the adverse childhood experiences (ace) study. Am J Prev Med. 1998, 14: 245-258. 10.1016/S0749-3797(98)00017-8.
- Flaherty EG, Sege R: Barriers to physician identification and reporting of child abuse. Pediatr Ann. 2005, 34 (5): 349-356.
- Galambos, N. L., Barker, E. T., & Almeida, D. M. (2003). Parents do matter: trajectories of change in externalizing and internalizing problems in early adolescence. Child Development, 74, 578–594.
- Gilbert R, Widom CS, Browne K, Fergusson D, Webb E, Janson S: Burden and consequences of child maltreatment in high-income countries. The lancet. 2009, 373: 68-81. 10.1016/S0140-6736(08)61706-7.
- Gladden, J. (2021). Child Welfare and Foster Care. In *Introduction to Social Work*. essay, Ferris State University. This page is licensed under a CC BY license and was authored, remixed, and/or curated by Jessica Gladden et al.. A detailed versioning history of the edits to source content is available upon request.
- Hammond, R., Cheney, P., & Pearsey, R.(2015). S*ociology of the Family in Introduction to Sociology Textbook*. Rocky Ridge Press. Retrieved from http://freesociologybooks.com/Sociology_Of_The_Family/01_Changes_and_Definitions.php ↵
- Halgunseth, L., S. Moodie, A. Peterson, D. Stark. 2009. "Family Engagement, Diverse Families, and Early Childhood Education Programs: An Integrated Review of the Literature." Young Children 64 (5): 56–8.
- Henderson, A. T., and K. L. Mapp. 2002. A New Wave of Evidence: The Impact of School, Family, and Community Connections on Student Achievement. Austin, TX: National Center for Family & Community Connections with Schools. Southwest Educational Development Laboratory
- Hoeve, M., Blokland, A., Dubas, J. S., Loeber, R., Gerris, J. R. M., & van der Laan, P. H. (2008). Trajectories of delinquency and parenting styles. Journal of Abnormal Child Psychology, 36, 223–235
- Hunt, M., and Bullock, H. (2016). "Ideologies and beliefs about poverty," in *The Oxford Handbook of the Social Science of Poverty*, eds D. Brady and L. Burton (Oxford: Oxford University Press), 93–116.
- Hyde, J. S., Else-Quest, N. M., & Goldsmith, H. H. (2004). Children's temperament and behavior problems predict their employed mothers' work functioning. *Child Development, 75*, 580–594. ↵
- Jones R, Everson-Hock ES, Papaioannou D, Guillaume L, Goyder E, Chilcott J, Cooke J, Payne N, Duenas A, Sheppard LM, Swann C: Factors associated with outcomes for looked-after children and young people: a correlates review of the literature. Child Care Health Dev. 2011, 37: 613-622. 10.1111/j.1365-2214.2011.01226.x.
- Keyser, J. 2017. From Parents to Partners: Building a Family-Centered Early Childhood Program. St. Paul, MN: Redleaf Press.
- Kiff, C. J., Lengua, L. J., & Zalewski, M. (2011). Nature and nurturing: Parenting in the context of child temperament. *Clinical Child and Family Psychology Review, 14*(1), 251–301. https://doi.org/10.1007/s10567011-0093-4 ↵
- Kočovská E, Puckering C, Follan M, Smillie M, Gorski C, Barnes J, Wilson P, Young D, Lidstone E, Pritchett R: Neurodevelopmental problems in maltreated children referred with indiscriminate friendliness. Res Dev Disabil. 2012, 33: 1560-1565. 10.1016/j.ridd.2012.02.016.

- Kuppens, S., Ceulemans, E. Parenting Styles: A Closer Look at a Well-Known Concept. J Child Fam Stud 28, 168–181 (2019). https://doi.org/10.1007/s10826-018-1242-x This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (http://creativecommons.org/licenses/by/4.0/), which permits use, duplication, adaptation, distribution, and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made.
- Kerr, D. C. R., Capaldi, D. M., Pears, K. C., & Owen, L. D. (2009). A prospective three generational study of fathers' constructive parenting: Influences from family of origin, adolescent adjustment, and offspring temperament. Developmental Psychology, 45(1), 1257-1275. ↵
- Kim K, Rohner RP (2002) Parental warmth, control, and involvement in schooling: Predicting academic achievement among Korean American adolescents. Journal of Cross-Cultural Psychology 33(2): 127-140.
- Lamborn, S. D., Mounts, N. S., Steinberg, L., & Dornbusch, S. M. (1991). Patterns of competence and adjustment among adolescents from authoritative, authoritarian, indulgent, and neglectful families. Child Development, 62, 1049–1065.
- Little and McGivern (nd) Introduction to Sociology - 1st Canadian Edition by William Little and Ron McGivern is licensed under a Creative Commons Attribution 4.0 International License, except where otherwise noted.
- Parenting and Family Diversity Issues by Diana Lang and Marissa L. Diener is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License, except where otherwise noted.
- Lehmann, S., Havik, O.E., Havik, T. *et al.* Mental disorders in foster children: a study of prevalence, comorbidity and risk factors. *Child Adolesc Psychiatry Ment Health* **7,** 39 (2013). https://doi.org/10.1186/1753-2000-7-39
- · Lewis, E. E., Dozier, M., Ackerman, J., and Sepulveda-Kozakowski, S. (2007). The effect of placement instability on adopted children's inhibitory control abilities and oppositional behavior. *Dev. Psychol.* 43, 1415–1427. doi: 10.1037/0012-1649.43.6.1415
- · Lipina SJ and Evers K (2017) Neuroscience of Childhood Poverty: Evidence of Impacts and Mechanisms as Vehicles of Dialog With Ethics. *Front. Psychol.* 8:61. doi: 10.3389/fpsyg.2017.00061 **Creative Commons Attribution License (CC BY)**. *glossary.* London: Zed Books.
- Lipina, S. J. (2015). "Biological and sociocultural determinants of neurocognitive development: central aspects of the current scientific agenda," in *Proceedings of the Working Group Bread and Brain, Education and Poverty*, eds I. Portykus and A. Battro (Vatican: Pontifical Academy of Sciences).
- Maccoby, E. E., & Martin, J. A. (1983). Socialization in the context of the family: Parent-child interaction. In P. H. Mussen (Series Ed.) & E. M. Hetheringtono(Vol. Ed.), Handbook of Child Psychology: Vol. IV. Socialization, Personality and Social Development (4th Ed., pp. 1-101). New York: Wilepy.
- Magnusson, D. (1998). The logic and implications of a person-oriented approach. In R. B. Cairns, L. R. Bergman & J. Kagan (Eds.), Methods and Models for Studying the Individual (pp. 33–63). Thousand Oaks, CA: Sage.
- Marcus RF (1990) The Parent/Child Reunion Inventory: A Measure of Attachment for Children beyond the Infancy Years. Psychol Rep 67(2- 3): 1329-1330.
- Martin, A., Ryan, R. M., & Brooks-Gunn, J. (2007). The joint influence of mother and father parenting on child cognitive outcomes at age 5. *Early Childhood Research Quarterly*, *22*, 423–439.
- McKinney, C., & Renk, K. (2008). Differential parenting between mothers and fathers. implications for late adolescents. *Journal of Family Issues*, *29*(6), 806–827.
- McLaughlin, K. A., Sheridan, M. A., and Lambert, H. K. (2014). Childhood adversity and neural development: deprivation and threat as distinct dimensions of early experience. *Neurosci. Biobehav. Rev.* 47, 578–591. doi: 10.1016/j.neubiorev.2014.10.012
- McMahon SD, Grant KE, Compas BE, Thurm AE, Ey S: Stress and psychopathology in children and adolescents: is there evidence of specificity?. J Child Psychol Psychiatry. 2003, 44: 107-133. 10.1111/1469-7610.00105.
- Millward R, Kennedy E, Towlson K, Minnis H: Reactive attachment disorder in looked-after children. Emot Behav Difficulties. 2006, 11: 273-279. 10.1080/13632750601022212.
- Minnis H, Rabe-Hesketh S, Wolkind S: Development of a brief, clinically relevant, scale for measuring attachment disorders. Int J Meth Psychiatr Res. 2002, 11: 90-98. 10.1002/mpr.127.
- Minnis H, Everett K, Pelosi AJ, Dunn J, Knapp M: Children in foster care: Mental health, service use and costs. Eur Child Adolesc Psychiatry. 2006, 15: 63-70. 10.1007/s00787-006-0452-8.
- Baumrind's Parenting Styles by Joel A Muraco; Wendy Ruiz; Rebecca Laff; Ross Thompson; and Diana Lang is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License, except where otherwise noted.

- Introduction to Diversity Studies by Northeast Wisconsin Technical College is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License, except where otherwise noted.
- Nair H, Murray A (2005) Predictors of attachment security in preschool children from intact and divorced families. J Genet Psychol 166(33): 245-263.
- NICHD Early Child Care Research Network (2005). Predicting individual differences in attention, memory, and planning in first graders from experiences at home childcare and school. *Dev. Psychol.* 41, 99–114. doi: 10.1037/0012-1649.41.1.99
- Patterson, G. R., Dishion, T. J., & Bank, L. (1984). Family interaction: a process model of deviancy training. Aggressive Behavior, 10, 253–267.
- Pereira, A. I., Canavarro, C., Cardoso, M. F., & Mendonça, D. (2008). Patterns of parental rearing styles and child behaviour problems among Portuguese school-aged children. *Journal of Child and Family Studies*, *18*, 454–464.
- Prinzie, P., Stams, G. J., Dekovic, M., Reijntjes, A. H., & Belsky, J. (2009). The relations between parents' Big Five personality factors and parenting: A meta-review. *Journal of Personality and Social Psychology, 97*(1), 351–362. ↵
- Repetti RL, Taylor SE, Seeman TE: Risky families: Family social environments and the mental and physical health of offspring. Psychol Bull. 2002, 128: 330-366.
- Rinaldi, C. 2003. "The Image of the Child." Lecture given to Reggio Emilia Study Group Tour, Reggio Emilia, Italy, April 8, 2003.
- Rogoff, B. 2003. The Cultural Nature of Human Development. New York, NY: Oxford University Press.
- Russell, A., Aloa, V., Feder, T., Glover, A., Miller, H., & Palmer, G. (1998). Sex-based differences in parenting styles in a sample with preschool children. *Australian Journal of Psychology*, *50*, 89–99.
- Rutter M: Children in substitute care: Some conceptual considerations and research implications. Child Youth Serv Rev. 2000, 22: 685-703. 10.1016/S0190-7409(00)00116-X.
- Shaw, D. S., Keenan, K., & Vondra, J. I. (1994). Developmental precursors of externalizing behavior: ages 1 to 3. Developmental Psychology, 30, 355–364.
- Shonkoff, J. P., and D. A. Phillips. 2000. From Neurons to Neighborhoods: The Science of Early Childhood Development. Washington, DC: National Academy Press.
- Simons, L. G., & Conger, R. D. (2007). Linking mother-father differences in parenting to a typology of family parenting styles and adolescent outcomes. *Journal of Family Issues*, *28*, 212–241.
- Somayeh K, Rozumah B (2009) Parenting style in a collectivist culture of Malaysia. European Journal of Social Sciences 10(1): 66-73.
- Spicker, P., Álvarez Leguizamón, S., and Gordon, D. (2006). *Poverty. An international glossary.* London: Zed Books.
- Steinberg, L. (1990). Autonomy, conflict, and harmony in the family relationship. In S. S. Feldman & G. R. Elliot (Eds.), At the Threshold: The developing Adolescent (pp. 255–276). Cambridge, MA: Harvard University Press.
- Steinberg, L., Lamborn, S. D., Darling, N., Mounts, N. S., & Dornbusch, S. M. (1994). Over-time changes in adjustment and competence among adolescents from authoritative, authoritarian, indulgent, and neglectful families. *Child Development*, *65*, 754–770.
- Soenens, B., Park, S. Y., Vansteenkiste, M., & Mouratidis, A. (2012). Perceived parental psychological control and adolescent depressive experiences: A cross-cultural study with Belgian and South-Korean adolescents. Journal of Adolescence, 35, 261–272.
- Tarren-Sweeney M: Retrospective and concurrent predictors of the mental health of children in care. Child Youth Serv Rev. 2008, 30: 1-25.
- Thompson, R. A., Winer, A. C., & Goodvin, R. (2010). The individual child: Temperament, emotion, self, and personality. In M. Bornstein & M. E. Lamb (Eds.), *Developmental science: An advanced textbook* (6th ed., pp. 423–464). New York, NY: Psychology Press/Taylor & Francis. ↵
- Tonyan, H. A. 2015. "Everyday Routines: A Window into the Cultural Organization of Family Child Care." Journal of Early Childhood Research 13: 311–327.
- Turner HA, Finkelhor D, Ormrod R: The effect of lifetime victimization on the mental health of children and adolescents. Soc Sci Med. 2006, 62: 13-27. 10.1016/j.socscimed.2005.05.030.
- United States Census Bureau. (2019). *Historical living arrangements of children*. Retrieved from https://www.census.gov/data/tables/time-series/demo/families/children.html ↵
- Ursache, A., and Noble, K. G. (2016). Neurocognitive development in socioeconomic context: multiple mechanisms and implications for measuring socioeconomic status. *Psychophysiology* 53, 71–82. doi: 10.1111/psyp.12547
- UN General Assembly (1948). Universal Declaration of Human Rights (217 [III] A). Paris: United Nations.

- Virmani, E. A., and P. L. Mangione, eds. 2013. Infant/Toddler Caregiving: A Guide to Culturally Sensitive Care. 2nd ed. Sacramento: California Department of Education.
- Wagmiller, R. L. (2015). The temporal dynamics of childhood economic deprivation and children ì s achievement. *Child Dev. Perspect.* 9, 158–163. doi: 10.1111/cdep.12125
- Culture and Psychology by L D Worthy; T Lavigne; and F Romero is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License, except where otherwise noted.
- Williams, L. R., and Y. De Gaetano. 1985. Alerta: A Multicultural, Bilingual Approach to Teaching Young Children. Boston, MA: Addison-Wesley Publishing Co.
- Williams, L. R., Degnan, K. A., Perez-Edgar, K. E., Henderson, H. A., Rubin, K. H., Pine, D. S., & Fox, N. A. (2009). Impact of behavioral inhibition and parenting style on internalizing and externalizing problems from early childhood through adolescence. Journal of Abnormal Child Psychology, 37, 1063–1075.
- Wikipedia. (2020). *Foster care.* Retrieved from https://en.Wikipedia.org/wiki/Foster_care#cite_note-1 ↵
- Wolfradt, U., Hempel, S., & Miles, J. N. (2003). Perceived parenting styles, depersonalisation, anxiety and coping behaviour in adolescents. Personality and Individual differences, 34(3), 521–532.
- Yoshikawa, H., Aber, J. L., and Beardslee, W. R. (2012). The effects of poverty on the mental, emotional, and behavioral health of children and youth. *Am. Psychol.* 67, 272–284. doi: 10.1037/a0028015
- Zhang W, Fuligni A (2006). Authority, autonomy and family relationships among adolescents in urban and rural China. Journal of Research on Adolescents 16(4): 527-537.

CHAPTER OVERVIEW

21: Licensing and Regulations

21.1: Introduction

Introduction to Licensing and Regulations

Child care quality is a concept with no easy answer and many different variables. The safety and health conditions of child care facilities, availability of learning materials, teaching qualifications, and caregiver and child interactions can determine the quality of care (Slot, 2018). High-quality child care programs provide long-lasting positive outcomes. (see, e.g., Abner et al., 2013; Almond & Currie, 2011; Barnett, 2008; Burchinal et al., 2010; NICHD and Duncan 2003; Nores & Barnett, 2010). (Karoly, 2009). [1]

Since it can be difficult for parents to easily tell just by observing a child center if the care is quality care, judgments about quality may not reflect the actual quality observed by experts in the field (Barraclough & Smith, 1996; Cryer & Burchinal, 1997; Cryer et al., 2002). Alternative approaches such as regulations, accreditation, licensing, and quality reporting systems are used to remedy this disconnect and improve quality in child care settings. Licensing and regulations are more accessible and less costly than other alternative routes to improve quality. These standards generally concentrate on a narrow set of readily observable quality aspects, such as group size, child–staff ratio, and cleanliness of the childcare setting, providing minimum quality standards (Karoly, 2009). The government has a role in setting and implementing the standards for child care quality through these approaches (Pekkurnaz, Aran, & Aktakke, 2021).[1]

Child care quality generally aggregates into two broad categories: structural quality and process quality. The structural components of quality are generally more easily observed and evaluated and include infrastructure, staff-child ratio, education level and staff experience, and the child care facility (Burchinal, 2010; Helburn & Howes, 1996; Slot, 2018). Process quality refers mainly to the presence of developmentally appropriate equipment, materials, and learning activities, characteristics of the child–staff interactions, and the teaching style of educators when performing those activities in childcare settings (Burchinal, 2010; Helburn & Howes, 1996; Slot, 2018). [1]

---

[1] Pekkurnaz, D., Aran, M.A. & Aktakke, N. Does quality matter in determining child care prices? (2021). is licensed CC-BY

21.2: Understanding Licensed Care and License Exempt Care

Defining Types of Care

In California, licensed providers undergo an application and review process with Community Care Licensing (CCL) and are required to comply with specific health and safety regulations. License-exempt care is not regulated by Community Care Licensing, although there may be other government agencies that monitor their activities.

Four main groups of childcare providers are exempt by California from obtaining a childcare license.

- The first group includes individuals who care for a relative's children or who care for the children of one other family and their children. Certain parent cooperatives, in which families rotate care unpaid, are also exempt.
- The second group includes public and private non-profit programs that offer recreational services. These programs include some community centers and most parks and recreation programs.
- The third group includes businesses that offer limited childcare to their clients and customers. These programs usually require that the parent or guardian remain on the premises and that they remove their children within a specified amount of time.
- A fourth group includes programs overseen by state agencies other than Community Care Licensing. For example, organized camps managed by the Department of Public Health and heritage schools that the Department of Education oversees.

[1]

Additional Resources:

Licensed Child Care Reporting Requirements

Licensed child care providers submit reports to Community Care Licensing to ensure current records. Most reports are the same between a center and home-based providers, although some differences might exist between the two types of programs.

Most reports fall into two major categories:

Reporting of unusual incidents

- outbreaks of communicable diseases, such as mumps or measles
- suspected child abuse
- also, incidents that put children in danger, such as their wandering away from the facility unattended
- and injuries to children that require medical intervention

Reporting related to the overall operation of a facility

- personnel changes
- address changes

- and modifications to your facility

Reporting specific to the type of program include:

- Family childcare providers must report information about any adult moving into or out of the home where the facility operates.

Childcare centers must report the appointment of a new facility director and changes in board membership.[1]

Additional Resources:

[1] California Department of Social Services . Care Center General Licensing Requirements

21.3: Requirements And Qualifications Of Staff Section 101152

Section 101152

A criminal background check is required for people who work or regularly spend time in a licensed childcare center or for anyone who resides in a private home where a family childcare facility operates.

There are different background check requirements for family childcare homes and childcare centers.

Every adult who works or lives in the household must undergo a background check for family childcare homes. Including residents who:

- are not providing care directly to children,
- are not on the premises during caregiving hours,
- children 18 years of age or older, or who turn 18 while still living in the home,
- and any adult living in a different part of the home, such as an in-law unit, a rented room, or a rented guesthouse on the same property as the family childcare home.

Everyone who works or volunteers at a center must undergo a background check, with a few exceptions for center-based facilities.

These exceptions include:

- Specific volunteers who provide time-limited services do not need to obtain a criminal record clearance.
- For example, medical professionals who have already been cleared as a condition of licensure
- college students who volunteer less than 16 hours per week, are not left alone with children and are directly supervised at all times by an employee with a criminal record clearance.
- Legal guardians or relatives of the children in care also don't need a criminal record clearance.

Adults must obtain a criminal record clearance to work in a licensed childcare facility. Beyond minor traffic violations, adults with a prior criminal history can request a criminal record exemption if they have not been convicted of a felony or any crime perpetrated against children. Relatives of the children in care and specific volunteers are not required to obtain a clearance. Also, in both family childcare homes and childcare centers, if you cannot provide documentation that everyone who has access to your facility has undergone a required background check, you will be subject to a type A citation and a civil penalty. [1]

Additional Resources:

Background Check Requirements for Caregivers

What is a Civil Penalty?

Infant Care Center Director Qualifications And Duties Summary Section 101415

An infant center director must meet the requirements of Section 101215.1, and the following:

- Experience requirements shall be completed in an Infant Care Center or a comparable group child care program with children less than five years of age.
- At least three semester units completed must be related to infant care.
- The director shall appoint a substitute director when the infant director is temporarily away from the Center.
- In centers where an assistant director is required, the assistant director shall act as a substitute.
- A fully qualified infant care teacher can act as a substitute for the director or the assistant director.
- If the director's absence is more than 30 consecutive days, a substitute director shall meet the qualifications of a director.[2]

Assistant Infant Care Center Director Qualifications And Duties Summary Section 101415.1

- An assistant director shall be present if the Center has 25 or more infants in attendance. The assistant director has to be a fully qualified infant teacher and has completed, with passing grades, at least three-semester units in administration at an approved college. This course work may be completed within one year of employment of the assistant director.
- The assistant director shall work under the direction of the center director.

Infant Care Teacher Qualifications Duties Summary Section 101416.2

- In addition to Section 101216.1, infant care teachers need to have taken and passed at least 3 semesters units in early childhood education or child development and 3-semester units in the care of infants from an approved college.
- After employment, a teacher who has not completed the 12 required semester units shall complete with passing grades, at least 2 units each semester until the 12-semester units are completed.
- To be a fully qualified infant care teacher, they shall:
- Complete 12-semester units, with passing grades, in early childhood education or child development. At least 3 units shall be related to the care of infants.
- Have a least six months of experience in a licensed infant care program or comparable program for children under five years old. [1] [2]

Infant Care Aide Qualification And Duties Summary Section 101416.3

- An aide must work under the supervision of the director or a fully qualified teacher, except when observing sleeping infants.
- Aides shall participate in an on-the-job training program.
- An aide shall provide direct care and supervision to infants.[2]

---

[1] California Department of Social Services . Care Center General Licensing Requirements

21.4: Teacher to Child Ratios in Child Care Centers Section 101216.3

Section 101216.3

Minimum teacher-to-child ratios are necessary to protect the health and safety of children in child care centers. These teacher-to-child ratios provide developmentally appropriate support to children of different ages, from infancy to school age. The ratios outlined by Community Care Licensing are minimal. Programs should always look to increase staffing beyond the minimum requirements to promote positive adult/child relationships and high-quality learning experiences. Although many programs desire to increase rations, many factors make it difficult for programs to maintain even these minimal ratios. [1]

Teacher-to-child ratios are based on several variables, including the number and ages of children in the facility and the nature of the care provided, such as naptime or outdoor play.

- Infant centers serving children from birth to age 2 need to have a minimum ratio of 1 fully-qualified infant teacher for 4 infants.
- In a room with more than 4 infants, up to a maximum of 12 infants, there must be 1 fully-qualified teacher responsible for the direct care and supervision of a maximum of 4 infants. In addition, if that fully-qualified teacher supervises aides with each aide accountable for the direct care and supervision of a maximum of 4 infants.
- If Community Care Licensing has approved the Center to offer a toddler component, a minimum ratio of 1 fully-qualified teacher for 6 children and a maximum group size of 12 children with 2 teachers or 1 teacher and 1 aide must be maintained.[1]

Figure 21.4.1: Six Toddlers and caregiver making playdough in large bin ([2])

These ratios are the minimum required standards for health and safety. Especially when working with infants and toddlers, it is always recommended to increase the teacher-to-child ratio to better provide both small and large group activities for the children. Increasing these ratios also allows for more one-on-one time with individual children.

As described previously, teacher aides may be included in the ratio when certain conditions are met, including direct supervision by a teacher. The center director can be included in the ratio if actively engaged in teaching children. However, adults who provide clerical or custodial services do not qualify to be in the teacher-to-child ratio.[1]

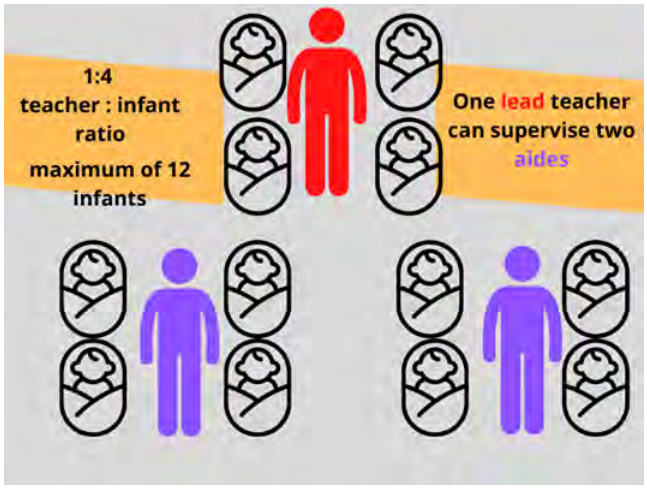


Figure 21.4.1: 1 teacher for every four infants. Maximum of 12 infants. One lead teacher can supervise two aides each with 4 infants. ([2])

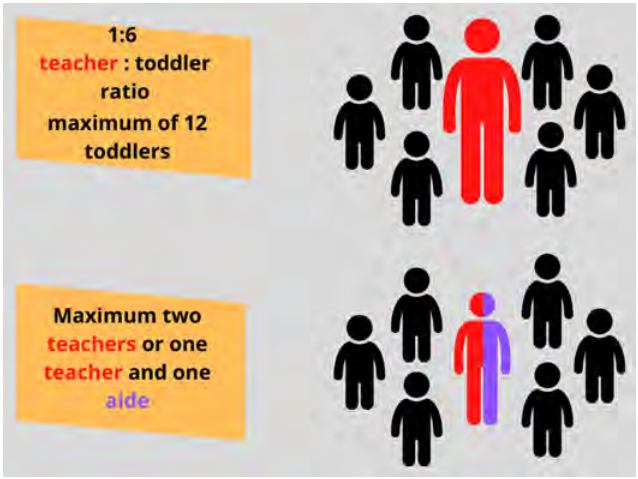


Figure 21.4.1: One teacher for every 6 toddlers. Maximum of 12 toddlers. Maximum two teachers or one teacher and one aide. ([2])

Ensuring that qualified adults are present is critical to the safety of the children and it's important to develop a backup plan for teacher absences so that the minimum teacher-to-child ratios are always maintained.

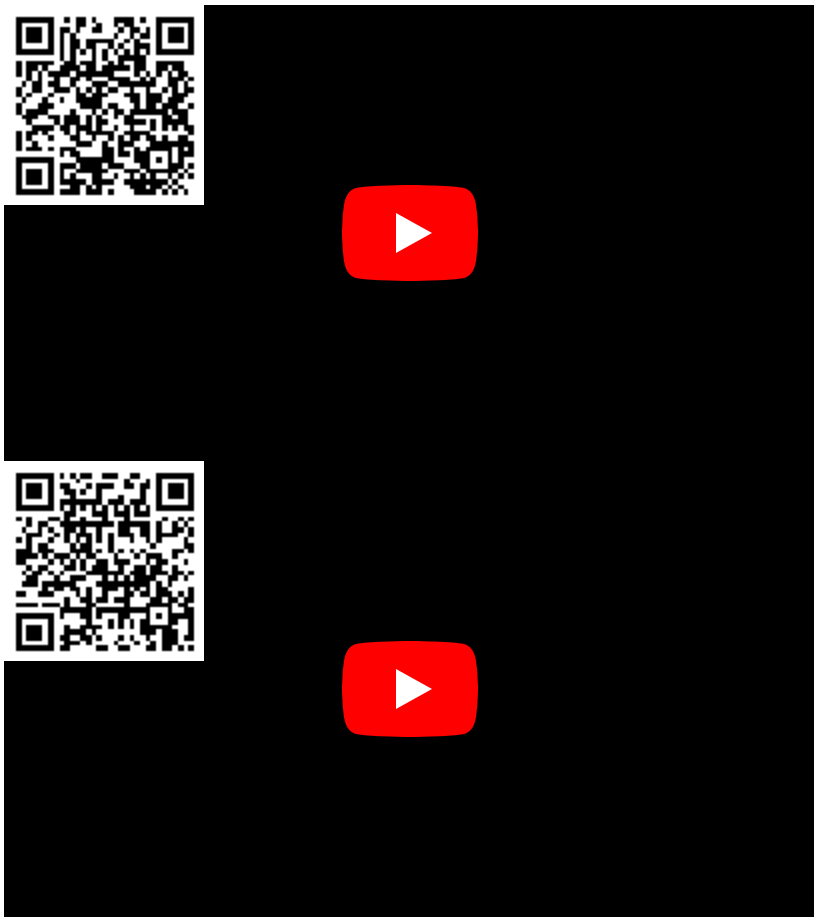
Staff-Infant Ratio Summary Section 101416.5

- There shall be a ratio of one teacher to every four infants.
- An aide may be substituted for a teacher if a fully qualified teacher directly supervises no more than 12 infants.
- When in activities away from the Center there shall be a minimum of one adult to every two infants.
- The director may be counted in the staff-infant ratio when actually working with infants.
- There shall be one staff visually observing no more than 12 sleeping infants, as long as additional staff are available at the Center to meet the above ratios when necessary. [4]

Toddler Component In An Infant Care Center Summary Section 101417

- Licensees serving infants may create a special program component for children between 18 and 30 months.
- A ratio of one teacher for every 6 toddlers is required.
- An aide participating in on-the-job training can substitute for a teacher when directly supervised by a fully qualified teacher.
- The maximum group size is two teachers to 12 toddlers.
- The toddler program shall be conducted in areas physically separate from those used by older or younger children. [1] [4]

Additional Resources:



[1] California Department of Social Services . Care Center General Licensing Requirements

[2] Image by Amanda Taintor is licensed under CC BY

[3] Appendix B- Title 22 Licensing Regulation Highlights is shared under a CC BY license and was authored, remixed, and/or curated by Jennifer Paris

21.5: Supervising Children in Child Care Centers Section 101216.3

Section 101216.3

Licensing regulations concerning the supervision of children in childcare centers focus on; children in care are always in view of a teacher or an aide to ensure their safety, an adult can be by a child's side at a moment's notice, and each child receives the attention they need while in care

In the context of licensing laws and regulations, supervision in child care centers refers to the visual supervision of children by teachers and aides at all times. Supervision helps prevent and minimize accidents and injuries in the child care setting and increases the quality of care. Supervision of children by caregivers must be 100% visual at all times, whether they are in the classroom, outdoors, or in any area of the child care center. Including being escorted by a teacher or aide to the restroom, whether individually or in groups. If one child needs to use the bathroom while the others are playing outdoors or are involved in indoor activities, supervision of the individual child and the larger group must always be maintained. Adequate supervision also needs to be maintained when children transition from one activity to another, such as from indoor to outdoor play. For example, as the children finish outdoor play and get ready to go indoors, a teacher many not allow some children inside while others are still outside unless sufficient supervision is available in each location.[1]

Additional Resources:

Infant Care Activities Section 101430

- The Center shall implement a written plan to ensure the provision of indoor and outdoor activities designed to meet the needs of the infants, including but not limited to quiet and active play; rest and relaxation; eating; toileting; individual attention; being held by a caregiver.
- All infants shall be allowed to nap/sleep without distraction or disturbances.
- No infant shall be forced to sleep, stay awake, or stay in the napping area.[2]

Staffing For Infant Water Activities Section 101416.8

- A ratio of one adult to two infants shall be required during activities near a swimming pool or any body of water. [2][1]

---

[1] California Department of Social Services . Care Center General Licensing Requirements

[2] Appendix B- Title 22 Licensing Regulation Highlights is shared under a CC BY license and was authored, remixed, and/or curated by Jennifer Paris

21.6: Children's Personal Rights Section 101223

Section 101223

What are children's rights in childcare?

They include:

- Children have the right not to be spanked, slapped, or physically hurt for any reason whatsoever.
- Children's sleep should not be interrupted, and they should not be kept from the use of the bathroom.
- Food cannot be withheld from children in order to discipline them.
- Children have the right to be free of mental abuse, such as coercion, intimidation, humiliation, ridicule, or threats. These are not allowed.
- Children can't be locked in a room or building. However, facilities may keep exterior doors and windows locked if they remain in compliance with local fire codes for a large family home or Center.
- Children cannot be placed or restrained in any device if it's not being used for its original purpose. For example, highchairs are for use only during meal time. Car seats are used only for transportation.
- Children can never be left alone in a car, including when they've fallen asleep in the vehicle.
- And you can never deny children prescribed medication or, if the situation arises, first aid or medical care.

21.7: Health And Safety Regulations Section 1596.866

Section 1596.866

Childcare centers are required to have at least one person on-site at all times with documented proof of approved health and safety training.

Recommended training resources include:

- the American Red Cross,
- the American Heart Association,
- accredited colleges or universities,
- and any training facility or course certified by the Emergency Medical Service Authority (EMSA).

For both family child care and center-based licensees, the following courses are required:

- pediatric CPR,
- pediatric first aid,
- and preventive health practices training.

Suppose the person who obtained the license is absent from the facility during daily operations. In that case, there must be one person on site who has completed pediatric CPR and pediatric first aid. Licensees for family childcare homes must make sure that at least one staff member with a current, approved course completion card in pediatric first aid and pediatric CPR is on site at all times when children are present, and with the children when they are off site for facility activities.[1]

Additional Resources:

Infant Care General Sanitation Summary section 101438.1

- ll items used by pets and animals shall be kept out of the reach of infants.
- Each caregiver shall wash their hands with soap and water before feeding and after each diaper change.
- Areas that infants have access to shall be washed, cleared, and sanitized as follows: floors shall be vacuumed or swept and mopped daily and as often as necessary.
- Carpeted floors shall be vacuumed daily and cleaned at least every 6 months.
- Walls shall be washed with a disinfecting solution at least weekly.
- After each diaper change, diaper changing area shall be disinfected, including walls and floors and counter tops, sinks, drawers, and cabinets near the diaper changing area shall be washed.
- Objects mouthed by infants shall be washed and disinfected.
- All disinfectants and other hazardous materials shall be stored inaccessible to infants.

- Only dispenser soap in an appropriate dispenser shall be used.
- Only disposable paper towels in an appropriate holder or dispenser shall be used for hand drying.[2]

---

[1] California Department of Social Services . Care Center General Licensing Requirements

---

21.8: Locks and Inaccessibility Requirements in Child Care Section 101238

Section 101238

Within licensing regulations, different requirements exist for inaccessible items to children and what's required to be locked up. Things that need to be made inaccessible include anything that could cause harm to a child, such as cleaning products or places like stairwells when children under the age of 5 are present. Items that need to be kept locked up include guns, ammunition, and poisons. Organizing a childcare facility to keep harmful things that need to be accessible to providers but inaccessible to children, such as cleaning supplies, requires environmental planning. The use of locks on dangerous items is a great way to keep children safe from harmful things. In addition to locks, there are other ways to make items and areas inaccessible to children. If you place items in out-of-reach cabinets, shelves, or drawers, they can be considered inaccessible. Using products labeled as childproofing devices and safety latches can make items inaccessible. Failure to keep items and areas inaccessible as regulations require is a health and safety violation. Any item or space that could cause harm to a child must be made inaccessible.[1]

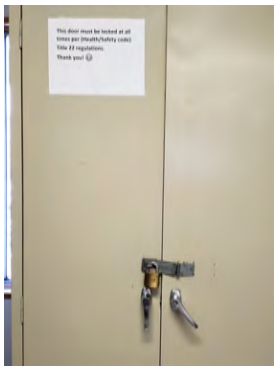


Figure 21.8.1: Cabinet with locked door and sign. ([2])

If children under 5 are present, gates must be in place to ensure the following areas are inaccessible.

- Off-limits areas of your home or Center
- Areas used to store hazardous and dangerous materials
- Stairwells
- Fireplaces and open-faced heaters.
- Swimming or wading pools when not being used for adult-supervised water play
- hot tubs, ponds, and any other bodies of water.

Any sturdy lock that can't be tampered with is acceptable. A lock is a key or combination-operated mechanism used to fasten shut a door, lid, or the like. Products labeled as childproof devices and safety latches are not considered locks unless a key or combination operates them. Firearms and other weapons are not allowed on the premises of a child care center. In family child care homes, guns and ammunition must be locked in a gun safe or other storage units, guns must have a trigger lock on, or the firing pin may be removed from the firearm and stored separately. Weapons and ammunition must be stored apart from one another. There is zero tolerance for failing to keep guns stored and locked as required. Gun and ammunition violations result in citations and civil penalties.[1]

Additional Resources:

[1] California Department of Social Services . Care Center General Licensing Requirements

[2] Image by Amanda Taintor is licensed CC BY-NC

21.9: Bodies of Water Requirements in Child Care Section 101238

Section 101238

In the United States, drowning is the leading cause of unintentional death among children 1 to 4 years of age and is the second leading cause of death for children 5 to 14 years old (Center for Disease Control, *Drowning facts* 2022). Licensing regulations that address bodies of water help prevent these kinds of tragic accidents. Following these regulations minimizes the risk of water-related accidents in child care.

Research has shown that an infant face down can drown in just 1 inch of water. So almost all bodies of water are considered a potential hazard and must be treated with caution.

Examples include, but aren't limited to:

- swimming pools
- wading pools
- hot tubs
- creeks, streams, and ponds

If using a body of water such as a swimming pool or wading pool for organized play, supervise children closely. When the play session has ended, the equipment must be made inaccessible. Empty wading pools when not in use.

Often, water tables are used in child care centers and family child care homes for children's play. An adult must closely supervise when water tables are in use. When not in use, the container must be emptied, and children must not have access to water to fill the container independently.

Figure 21.9.1: When not in use all bodies of water must be emptied. . ([1])

There are additional regulations about water safety, specifically for child care centers.

- At least one supervising adult must have current water safety training, and stricter adult-child ratios are required for water activities.
- For infants from birth to 24 months, you will need 1 staff member for every 2 infants…
- …or 1 staff member for every 4 infants if there's an accessible body of water that children are less likely to drown in.
- For toddlers and older, one staff member for every six children is required no matter what type of body of water is present. Lifeguards are not counted as supervising adults.[1]

Specific regulations for pools

No pools at a facility can be accessible directly from a door or window, there must be additional fencing between the door or window and the pool. Pool fencing must be at least 5 feet high, have no openings wider than an inch and a half, and in no way obstruct a complete and clear view of the pool from the outside. In addition, the fence must have a gate that is self-closing and self-latching. When released, it must swing shut and latch on its own. It must also swing away from the water when opened, be kept closed when the pool is not in use and is not locked since it may be necessary for an adult to enter the pool area without having to find a key or remember a combination.[2]

Wading pools

- can only be used by children with direct adult supervision
- can only be filled immediately prior to use
- must be emptied immediately after every use.

[1] Image by Amanda Taintor is licensed CC BY-NC

[2] California Department of Social Services. Care Center General Licensing Requirements

---

21.10: Infant Care Transportation Summary Section 101425

Section 101425

- The driver has to be 18 years old or older to transport infants.
- The vehicle must contain a first-aid kit.
- Children must be secured in a child passenger restraint system, i.e., a car seat.
- Staff/infant ratios must be maintained whether the vehicle is moving or parked.
- Infants in vehicles shall have constant adult supervision and shall not be left unattended.[1]

[1] California Department of Social Services . Care Center General Licensing Requirements

Additional Resources:

21.11: Disaster Planning and Fire Safety Section 101174

Section 101174

Licensing regulations require child care centers to submit a written disaster plan identifying a plan to keep children safe during an emergency. The Community Care Licensing website offers emergency disaster planning forms that must be completed as part of a license application.

These plans require the following.

- How will you evacuate the children in case of an emergency?
- Where will you take the children if you cannot return to your facility immediately?

Centers must conduct a disaster drill at least every 6 months. Adults and children who are old enough should know their duties during drills and emergencies. Documentation of drill completion, including the date, must be kept. [1]

Additional Resources:

[1] California Department of Social Services. Care Center General Licensing Requirements

21.12: Food Service Requirements for Child Care Centers Section 101227

Section 101227

How foods are stored and served is crucially essential to the health and safety of all children in childcare. Knowing Community Care Licensing's food-related requirements and remaining compliant with them are among the most critical responsibilities of a child care provider.

Licensing requirements regarding food service fall into two types. The first type covers food safety, emphasizing how and how long foods may be stored in child care centers. The second type covers the kinds of foods that may or may not be provided to children in care and the amount of allowed foods that centers need to have on hand. [1]

Food Safety Section

- Foodservice areas must have a sink, refrigeration, storage space for food, and hot and cold running water.
- Hot water must be hot enough to clean all dishes and utensils after use thoroughly.
- Food storage and preparation areas must be kept clean of dirt and debris and be free of pest contamination, mold, and other health hazards.
- All edible items must be stored separately from potentially hazardous items, such as cleaning materials and poisons, which means they cannot be stored on the same shelf or in the same cabinet, closet, or pantry.
- Refrigerators used to store food for children must be kept clean and in good working order.
- Food items must not be served to children if they show any signs of spoilage or contamination.
- In infant childcare centers, all food items provided by families, such as milk or formula, must be labeled with the child's name for whom they're intended, the contents of the container, and the date provided to the caregiver.

Figure 21.12.1: Foodservice areas must have a sink, refrigeration, storage space for food, and hot and cold running water. ([1])

Although not required by regulations, it is a best practice not to allow the sharing of food brought from home by any children. This practice can help prevent allergic reactions and the spread of infectious diseases.

Infant Care Food Service Section 101427

- Each infant shall have an individual feeding plan completed before the infant's first day at the Center. This plan must be developed by the director, the infant's representative and/or physician.
- The plan shall include instructions for the infant's special diet, feeding schedule, breast milk or formula, schedule for introduction to solid/new foods, food consistency, likes and dislikes, allergies, and plan for introducing cups and utensils.
- This plan shall be updated as often as necessary.
- Bottle-fed infants shall be fed at least every four hours.
- Infant care centers shall have appropriate food available for the infants.
- The Center shall provide only commercially prepared formulas that are stored and prepared following the label.
- The infant's representative may provide formula or breast/mother's milk. Such formula or milk shall be bottled before being accepted by the Center.
- Bottles shall be labeled.[1]
- Center may heat formula or breast/mother's milk.
- The Center must keep a supply of nipples. Bottles/nipples can not be shared between infants unless sterilized.

- Infants unable to hold a bottle shall be held by staff for bottle feeding.
- Bottles cannot be propped; infants shall not carry a bottle while ambulatory; a bottle given to an infant able to hold his/her own shall be unbreakable.
- High chairs or appropriate seating equipment shall be used for infants during feeding. Infants unable to sit unassisted shall be held by staff for feeding.
- Bottles, dishes, and food containers brought from infant's home shall be labeled with infant's name and current date.
- Formula partially consumed in a bottle shall be discarded at end of each day.
- Food shall be discarded if not consumed within 72 hours of date on the container label.
- The infant care center shall not serve honey.
- Commercially prepared baby food in jars shall be transferred to a dish before being fed to the infant. Any food leftover in the dish at the end of a meal shall be discarded.
- The mother may make arrangements with the Center for privacy to nurse the infant.
- Bottles and nipples in Center shall be sterilized.
- Infants shall not be bathed in, and diapers or clothing shall not be rinsed in, the food preparation area.[2]

Figure 21.12.1: Food labeled with name and date. ([2])

Infant Care Personal Services Section 101428

- There shall be a written toilet-training plan for each infant being toilet trained.
- Whenever a potty chair is used, it shall be placed on the floor and promptly emptied, cleaned, and disinfected after each use.
- No child shall be left unattended while on a potty chair or seat.
- Each child shall receive instruction and assistance in handwashing after use of the toilet. The infant shall be kept clean and dry at all times.
- Soiled or wet clothing provided by the infant's representative shall be placed in an airtight container and given to the representative at the end of the day.
- When changing an infant's diaper, each infant shall be on a changing table and no infant shall be left unattended while on the changing table.
- Towels and washcloths used for cleaning infants shall not be shared and shall be washed after each us.
- The changing table shall be disinfected after each use.[3]

Kinds of food allowed (and not allowed) Section 101227

All meal and snack items must meet guidelines maintained by Community Care Licensing and other governing agencies covering nutrition. These include the types and amounts of the four food groups included in meals and snacks, and the need to serve only healthy beverages to children, which are limited to:

- clean and safe drinking water,
- 1% or nonfat milk,
- and no more than 1 serving of 100% fruit juice with no added sweetener.

Childcare providers must post a complete menu of all meals and snacks to be served at least 1 week in advance and make updates when changes occur. Providers might substitute a menu item not listed on the menu if an adequate supply of the original item wasn't delivered or available. The substitute meets the stated nutritional standards.[1]

Additional Resources:

[1] California Department of Social Services. Care Center General Licensing Requirements

[2] Image by Amanda Taintor is licensed CC BY-NC

[3] Appendix B- Title 22 Licensing Regulation Highlights is shared under a CC BY license and was authored, remixed, and/or curated by Jennifer Paris

21.13: Additional Infant Specific Regulations

Infant Needs And Services Plan Section 101419.2

- A plan must be completed and on file for every infant before attending the Center
- The plan shall include: an individual feeding plan, an individual toilet training plan, and any services needed different from those provided by the program. [1]

Modifications To Infant Needs And Services Plan Section 101419.3

- The plan shall be updated quarterly or as often as necessary.[1]

Infant Care Discipline Section 101423.1

- In addition to 101223.3, no infant shall be confined to a crib, high chair, playpen, or any other furniture or equipment as a form of discipline. [1]

Infant Care Isolation For Illness Section 101426.2

- In addition to 101226.2, the isolation area must have a crib, cot, mat or playpen for each ill infant. This isolation area must be under constant visual supervision by staff.[1]

Infant Care Isolation For Illness Section 101426.2

- In addition to 101226.2, the isolation area must have a crib, cot, mat or playpen for each ill infant. This isolation area must be under constant visual supervision by staff. [1]

Outdoor Activity Space For Infants Section 101438.2

- In addition to Section 101238.2, the following shall apply:
- Outdoor space shall be physically separated from space used by children not in the infant center.
- Outdoor space shall be equipped with age-appropriate toys and equipment.[1]

Indoor Activity Space For Infants Section 101438.3

- The sleeping area for infants shall be physically separated from the indoor activity space.
- The indoor activity space shall be equipped with age- appropriate washable toys and equipment.[1]

Infant Care Center Fixtures, Equipment, And Supplies Section 101439

- In addition to Section 101239, the following shall apply:
- There shall be appropriate furniture and equipment such as cribs, cots or mats, changing tables and feeding chairs.
- High chairs, low-wheeled feeding tables, or any equipment used to seat an infant shall have broad-base legs.
- No infant shall be permitted to stand up in a high chair.
- All equipment shall be washed and disinfected after each use.
- Infant changing tables shall have a padded surface no less than 1 inch thick; raised sides at least 3 inches high; kept in good repair, within an arm's reach of a sink, and not located in the kitchen or food preparation area.
- There shall be one handwashing sink for every 15 infants and one potty chair for every 5 infants being toilet trained.
- Infants shall not be permitted to play with the potty chair.
- Toy storage containers shall be safe and maintained in good condition.
- Containers shall not be lockable.
- Toys shall be safe and not have sharp edges or small parts.
- Fixtures, furniture, equipment, or supplies shall not be made of or contain toxic substances.

Infant Care Center Napping Equipment Section 101439.1

- In addition to Section 101239.1, the following shall apply:
- A standard size six-year crib or porta-crib shall be provided for each infant who is unable to climb out of a crib.
- Cribs shall not limit the ability of staff to see the infant.
- Cribs shall not limit the infant's ability to stand upright.

- Crib mattresses shall be covered with vinyl or similar moisture-resistant material; shall be wiped and disinfected daily and when wet or soiled.
- Cribs shall be maintained in a safe condition.
- Only one infant shall occupy each crib at a time.
- Each infant's bedding shall be used by him/her only, and replaced when wet or soiled.
- Bedding shall be changed daily or more often if required.
- Cribs, mats or cots shall be arranged so as to provide a walkway and work space between the cribs, mats or cots sufficient to permit staff to reach each infant without stepping over any other infant.[1]

---

[1] Appendix B- Title 22 Licensing Regulation Highlights is shared under a CC BY license and was authored, remixed, and/or curated by Jennifer Paris

---

21.14: References

References for Licensing and Regulations

- Abner, K. S., Gordon, R. A., Kaestner, R., & Korenman, S. (2013). Does child care quality mediate associations between type of care and development? *Journal of Marriage and Family, 75*, 1203–1217. https://doi.org/10.1111/jomf.12055.
- Almond, D., & Currie, J. (2011). Human capital development before age five. In D. Card & O. Ashenfelter (Eds.), *Handbook of Labor Economics* (Vol. 4B, pp. 1315–1486). Elsevier.
- Barnett, W. S. (2008). Preschool education and its lasting effects: Research and policy implications. Boulder and Tempe: Education and the Public Interest Center & Education Policy Research Unit. Retrieved from https://nepc.colorado.edu/sites/default/files/PB-Barnett-EARLY-ED_FINAL.pdf. Accessed 27 Aug 2021.
- Barraclough, S. J., & Smith, A. B. (1996). Do parents choose and value quality child care in New Zealand? *International Journal of Early Years Education*, *4*(1), 5–26. https://doi.org/10.1080/0966976960040101.
- Burchinal, M., Vandergrift, N., Pianta, R., & Mashburn, A. (2010). Threshold analysis of association between child care quality and child outcomes for low-income children in pre-kindergarten programs. *Early Childhood Research Quarterly, 25*, 166–176. https://doi.org/10.1016/j.ecresq.2009.10.004.
- California Department of Social Services . (1998, November 1). *CHILD CARE CENTER GENERAL LICENSING REQUIREMENTS* . Child Care Center General Licensing Requirements . Retrieved May 4, 2022, from https://cdss.ca.gov/ord/entres/getinfo/pdf/ccc.pdf
- Centers for Disease Control and Prevention. (2022, March 10). *Drowning facts*. Centers for Disease Control and Prevention. Retrieved April 13, 2022, from https://www.cdc.gov/drowning/facts/i...gs%20per%20day.
- Cryer, D., & Burchinal, M. (1997). Parents as child care consumers. *Early Childhood Research Quarterly, 12*(1), 35–58. https://doi.org/10.1016/S0885-2006(97)90042-9.
- Cryer, D., Tietze, W., & Wessels, H. (2002). Parents' perceptions of their children's child care: A cross-national comparison. *Early Childhood Research Quarterly, 17*(2), 259–277. https://doi.org/10.1016/S0885-2006(02)00148-5.
- Helburn, S., & Howes, C. (1996). Child care cost and quality. *The Future of Children*, *6*(2), 62–82. https://doi.org/10.2307/1602419.
- Herbst, C. M. (2018). The Impact of quality rating and improvement systems on families' child care choices and the supply of child care labor. *Labour Economics*, *54*, 172–190. https://doi.org/10.1016/j.labeco.2018.08.007.
- Karoly, L. (2009). Design options for state preschool systems. In *Preschool adequacy and efficiency in California: Issues, policy options, and recommendations* (pp. 67–92). Santa Monica, CA; Arlington, VA; Pittsburgh, PA: RAND Corporation. Retrieved from https://www.jstor.org/stable/10.7249/mg889pf-wkkf-pew-nieer-wcjvsf-laup.11. Accessed 27 Aug 2021.
- National Institute of Child Health and Human Development (NICHD) Early Child Care Research Network, & Duncan, G. (2003). Modeling the impacts of child care quality on children's preschool cognitive development. *Child Development, 74*(5), 1454–1475. https://doi.org/10.1111/1467-8624.00617
- Nores, M., & Barnett, W. S. (2010). Benefits of early childhood interventions across the World: (Under) Investing in the very young. *Economics of Education Review, 29*, 271–282. https://doi.org/10.1016/j.econedurev.2009.09.001
- Appendix B- Title 22 Licensing Regulation Highlights is shared under a CC BY license and was authored, remixed, and/or curated by Jennifer Paris
- Pekkurnaz, D., Aran, M.A. & Aktakke, N. Does quality matter in determining child care prices? Evidence from private child care provision in Turkey. *ICEP* **15,** 11 (2021). https://doi.org/10.1186/s40723-021-00088-4 This article is licensed under a Creative Commons Attribution 4.0 International License
- Slot, P. (2018). Structural characteristics and process quality in early childhood education and care: A literature review. OECD Education Working Papers No. 176. OECD Publishing, Paris. https://doi.org/10.1787/edaf3793-en. Accessed 27 Aug 2021.

CHAPTER OVERVIEW

22: Caregiving Practices- Primary Care

22.1: Introduction

Introduction to Primary Care

High quality care and education for infants and toddlers begins with relationship-based care (Mangione, 2006). Primary caregiving is a relationship-based practice and is the practice of assigning each child (and family) to a caregiver who will serve as the primary source of information and care for the child. Primary caregiving enables caregivers to develop deep relationships with children and their families and offers opportunities to provide individualized care and interactions during daily routines and experiences. This focused care by a familiar adult can provide infants and toddlers with a sense of predictability and security that comes with knowing each child's unique needs and preferences.[1]

Figure 22.1.1: Focused care is a benefit of a primary care system. ([2])

Primary caregiving does not mean that caregivers care only for their small group of children to the exclusion of the other children in the group. Rather, it means that each caregiver, to the extent possible and practical in a group care situation, cares for and responds to children's routine care needs (e.g., eating, toileting, diapering, sleeping) who are assigned to them. However, caregivers also work as a team and rely on each other as backup when they are not able to work directly with their particular children. For example, if a caregiver is busy changing one child's diaper, the other caregivers in the room still continue to provide care for the other children until their primary caregiver returns. Another reason why primary caregiving should be conceptualized as a team effort rather than exclusive care, is when a primary caregiver is not able to work (e.g., sickness, vacation, etc.,). It is imperative for all the caregivers to have respectful relationships and establish trust with all of the children, even those children outside of their primary care assignment. Of equal importance, parents and other family members know who has primary responsibility for their child; this can strengthen the parent-caregiver relationship and communication between home and the childcare program.[3]

While primary caregiving is a common practice in the U.S., it is not a commonly implemented practice worldwide, even in highly-developed countries. In Singapore, for example, primary caregiving is not frequently practiced with infants and toddlers (Ebbeck et al., 2015). However, in a different study with parents of children under three years of age in Singapore, most parents expressed wanting to have their child cared for by the same caregiver and parents in programs that did implement primary caregiving reported high levels of satisfaction with the practice (Ebbeck, Yim, Ho & Sharma, 2022).

Despite the strong recognition of the importance of primary caregiving from organizations such as Zero to Three, the Program for Infant and Toddler Care (PITC) and the National Association for the Education of Young Children (NAEYC), there is very little empirical evidence directly investigating primary caregiving as a practice (Lee, Shin & Recchia, 2016). The research that is used to justify the importance of primary caregiving comes mainly from empirical explorations into the development of attachment. Since primary caregiving is a practice that encourages the development of a secure attachment between caregivers and children, it is often assumed that primary caregiving would also support the positive developmental outcomes associated with secure attachment (Bernhardt, 2000; Lally & Mangione, 2017).

Figure 22.1.1: Primary Care allows for focused care. ([2])

[1] "Individualizing care for infants and toddlers - part 1" from Head Start ECLKC is in the public domain.

[2] Image from "Individualizing care for infants and toddlers - part 1" from Head Start ECLKC is in the public domain.

[3] "Individualizing care for infants and toddlers - part 1" from Head Start ECLKC is in the public domain.

22.2: Attachment and Primary Caregiving

Attachment

Attachment theory was developed by John Bowlby in the 20th century to understand an infant's reaction to the short-term loss of their caregiver (Bowlby, 1969). Bowlby proposed that children are pre-programmed from birth to develop attachments and maintain proximity to their primary attachment figure(s), who was typically their mother but could be any person assuming the role of caregiver for that child. He used the term 'attachment' in a conscious effort to move away from deficit terms such as 'dependency' and 'over dependency', which were historically used to explain what Bowlby coined as 'attachment behaviors' (Bowlby, 1969). Defined as 'seeking and maintaining proximity to another individual' (Bowlby, 1969), attachment behaviors allow infants and toddlers to stay close to their attachment figure by either demonstrating signaling behaviors such as crying and smiling, or approach behaviors such as following and clinging (Ainsworth & Bell, 1970). [1]

The research on attachment relationships has important implications for supporting the implementation of primary caregiving. The first year of life is considered a critical period for attachment development and infants and toddlers require a secure base in childcare settings, in addition to the home setting, to develop secure attachments (Lee, 2016). It is critical that caregivers understand the importance of secure relationships and their impact on children's future wellbeing. Instead of a single primary attachment figure, children need access to consistently available attachment figures who can include a combination of their mother, father or paid caregiver(s) (Brown et al., 2022; van IJzendoorn et al., 1992). As a result of a network of attachment figures, children's secure base is maintained when separating from a specific attachment figure. [1]

Decades of longitudinal research have supported the notion that individual differences in children's attachment security to primary caregivers are of critical importance for children's social, emotional, and cognitive development. Several meta-analyses suggest that variations in attachment security are associated with individual differences in a range of child outcomes: higher attachment security (as compared to insecurity) is associated with better social competence (Groh et al., 2014, 2017), emotion understanding (Cooke et al., 2016), quality of peer relationships (Pallini et al., 2014), language competence (Van IJzendoorn, Dijkstra & Bus, 1995), as well as fewer internalizing (Groh et al., 2012, 2017; Madigan, Atkinson, Laurin & Benoit, 2013) and externalizing behavior problems (Fearon et al., 2010; Groh et al., 2017). Furthermore, attachment security during the first three years of life is related to later brain development (Hidalgo et al., 2019; Leblanc et al., 2017; Leblanc, Dégeilh, Beauchamp & Bernier, 2022; Moutsiana et al., 2015).

[1] Wilson-Ali et al., (2019). Multiple perspectives on attachment theory: Investigating educators' knowledge and understanding. *Australasian Journal of Early Childhood*, *44*(3), 215-229. CC by NC 4.0

22.3: Conclusion

Conclusion to Primary Caregiving

If high quality care and education for infants and toddlers begins with relationship-based care (Mangione, 2006), then primary caregiving is a critical practice for all childcare programs to adopt and support. Primary caregiving encourages the development of a secure attachment, which is related to various positive developmental outcomes. Furthermore, primary caregiving can strengthen the relationship between caregivers and parents.

22.4: References

References for Primary Caregiving

- Ainsworth, M. D., Bell, S. (1970). Attachment, exploration and separation: Illustrated by the behaviour of one-year-olds in a strange situation. *Child Development, 41*(1), 49–67.
- Bernhardt, J. L. (2000). A primary caregiving system for infants and toddlers: Best for everyone involved. *Young Children, 55(*2), 74-80.
- Bowlby, J. (1969). *Attachment and loss: Volume 1*. Attachment. New York: Basic Books.
- Brown, G. L., Mangelsdorf, S. C., Neff, C., Shigeto, A., Aytuglu, A., & Thomas, C. R. (2022). Infant attachment configurations with mothers and fathers: Implications for triadic interaction quality and children's parental preferences. *Early Childhood Research Quarterly, 58*, 155-164.
- Cooke, J. E., Stuart-Parrigon, K. L., Movahed-Abtahi, M., Koehn, A. J., & Kerns, K. A. (2016). Children's emotion understanding and mother–child attachment: A meta-analysis. *Emotion, 16*(8), 1102.
- Ebbeck, M., Phoon, D. M. Y., Tan-Chong, E. C. K., Tan, M. A. B., & Goh, M. L. M. (2015). A research study on secure attachment using the primary caregiving approach. *Early Childhood Education Journal, 43*(3), 233-240.
- Ebbeck, M., Yim, H. Y. B., Ho, S. Y., & Sharma, M. (2022). Continuity of care: Primary caregiving in Singapore. *Early Childhood Education Journal, 50*(2), 291-300.
- Fearon, R. P., Bakermans-Kranenburg, M. J., Van IJzendoorn, M. H., Lapsley, A. M., & Roisman, G. I. (2010). The significance of insecure attachment and disorganization in the development of children's externalizing behavior: A meta-analytic study. *Child Development, 81*(2), 435-456.
- Groh, A. M., Fearon, R. P., Bakermans-Kranenburg, M. J., Van IJzendoorn, M. H., Steele, R. D., & Roisman, G. I. (2014). The significance of attachment security for children's social competence with peers: A meta-analytic study. *Attachment & Human Development, 16*(2), 103-136.
- Groh, A. M., Fearon, R. P., van IJzendoorn, M. H., Bakermans-Kranenburg, M. J., & Roisman, G. I. (2017). Attachment in the early life course: Meta-analytic evidence for its role in socioemotional development. *Child Development Perspectives, 11*(1), 70-76.
- Groh, A. M., Roisman, G. I., van IJzendoorn, M. H., Bakermans-Kranenburg, M. J., & Fearon, R. P. (2012). The significance of insecure and disorganized attachment for children's internalizing symptoms: A meta-analytic study. *Child Development, 83*(2), 591-610.
- Hidalgo, A. P. C., Muetzel, R., Luijk, M. P., Bakermans-Kranenburg, M. J., El Marroun, H., Vernooij, M. W., IJzendoorn, M. H., White, T. & Tiemeier, H. (2019). Observed infant-parent attachment and brain morphology in middle childhood–A population-based study. *Developmental Cognitive Neuroscience, 40*, 100724.
- Lally, J. R., & Mangione, P. (2017). Caring relationships: The heart of early brain development. *Young Children, 72*(2), 17-24.
- Leblanc, É., Dégeilh, F., Beauchamp, M. H., & Bernier, A. (2022). Disorganized attachment behaviors in infancy as predictors of brain morphology and peer rejection in late childhood. *Cognitive, Affective, & Behavioral Neuroscience*, 1-16.
- Leblanc, É., Dégeilh, F., Daneault, V., Beauchamp, M. H., & Bernier, A. (2017). Attachment security in infancy: A preliminary study of prospective links to brain morphometry in late childhood. *Frontiers in Psychology, 8*, 2141.
- Lee, Y. (2016). Relationship-based developmentally supportive approach to infant childcare practice. *Early Childhood Development and Care, 186*(5), 734–749.
- Lee, S. Y., Shin, M., & Recchia, S. L. (2016). Primary caregiving as a framework for preparing early childhood preservice students to understand and work with infants. *Early Education and Development, 27*(3), 336-351.
- Madigan, S., Atkinson, L., Laurin, K., & Benoit, D. (2013). Attachment and internalizing behavior in early childhood: A meta-analysis. *Developmental Psychology, 49*(4), 672.
- Mangione, P. (2006). Creating responsive, reciprocal relationships with infants and toddlers. In Lally, J. R. , Mangione, P. L. & Greenwald, D. (Eds), *Concepts for care* (pp. 25–30). California: WestEd.
- Moutsiana, C., Johnstone, T., Murray, L., Fearon, P., Cooper, P. J., Pliatsikas, C., Goodyear, I. & Halligan, S. L. (2015). Insecure attachment during infancy predicts greater amygdala volumes in early adulthood. *Journal of Child Psychology and Psychiatry, 56*(5), 540-548.
- Pallini, S., Baiocco, R., Schneider, B. H., Madigan, S., & Atkinson, L. (2014). Early child–parent attachment and peer relations: A meta-analysis of recent research. *Journal of Family Psychology, 28*(1), 118.

- Regalado, M., & Halfon, N. (2001). Primary care services promoting optimal child development from birth to age 3 years: review of the literature. *Archives of pediatrics & adolescent medicine*, *155*(12), 1311-1322.
- van IJzendoorn, M. H., Dijkstra, J., & Bus, A. G. (1995). Attachment, intelligence, and language: A meta-analysis. *Social Development*, *4*(2), 115-128.
- van IJzendoorn, M. H., Sagi, A., Lambermon, M. W. (1992). The multiple caregiver paradox: Data from Holland and Israel. *New Directions for Child Development*, *57*, 5–24.

CHAPTER OVERVIEW

23: Caregiving Practices- Small Group Size and Low Ratios

23.1: Introduction

Introduction to Small Group Size and Low Ratios

Infancy and toddlerhood are critical years in shaping children's developmental trajectories (Gilkerson et al., 2018). Research has shown that high quality early childhood programs can enhance child development (Davies et al., 2021; Narea, Arriagada & Allel, 2020; Orri et al., 2019); therefore, it is important to identify aspects of programs that are key factors in supporting children's development. Group size and the ratio of caregivers to children are two aspects of structural quality identified as key quality indicators by various organizations such as the American Academy of Pediatrics (AAP), National Association for the Education of Young Children (NAEYC) and the Program for Infant and Toddler Care (PITC) (Donoghue et al., 2017; Lally, 2009; National Association for the Education of Young Children, 2005). [1]

Figure 23.1.1: Small groups allow for more focused care. ([2])

[1] Perlmanet al., (2017). Child-staff ratios in early childhood education and care settings and child outcomes: A systematic review and meta-analysis. *PloS One*, *12*(1), e0170256. CC by 4.0

[2] Image from Head Start ECLKC is in the public domain.

23.2: Small Groups

Defining Small Groups

Small groups means not exceeding the recommended number of infants and toddlers per room. PITC recommends between 6 to 12 infants and toddlers in one room, depending on the age of the children (Weinstock et al., 2012). In general, the younger the children, the lower the total number of children per room. For same-aged groups of infants under eight months of age, PITC recommends a maximum of six infants. For same-aged groups of children between 8 to 18 months of age, PITC recommends a maximum of nine children. For same-aged groups of toddlers between 18 to 36 months of age, PITC recommends a maximum of twelve children. For mixed-aged groups with children between birth to thirty-six months, when at least one child is 24 months, PITC recommends a maximum of eight children. The maximum group size recommendations from AAP are slightly different from PITC and they distinguish between family child care programs and center-based programs with group size recommendations (American Academy of Pediatrics, 2019).[1]

Recommendations for group size and ratio for same-aged groups

Age	Group Size	Adult:child ratio
Birth to 8 months	6	1:3
8 to 18 months	9	1:3
18 to 36 months	12	1:4

[2]

Recommendations for group size and ratio for mixed-aged groups.

Age	Group Size	Adult:child ratio
Birth to 36 months	8	1:4

[3]

Many infant and toddler programs do not meet the recommendations for small groups. Figure# shows the percentage of infant and toddler programs that met group size guidelines (National Institute of Child Health and Human Development, 2006). Programs were most likely to meet group size recommendations with three year old children (63%) and least likely to meet recommendations with children ages 1½ through 2 years of age at 25% and 28% respectively. When children were six months of age, 35% of programs met the guidelines.

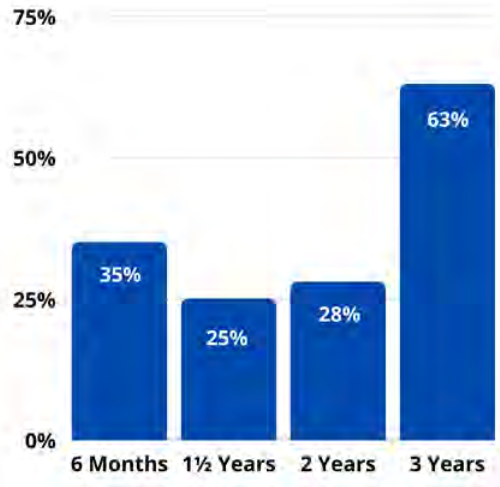


Figure 23.2.1: Percentage of programs meeting recommended guidelines for group size. 6 months = 35%, 1.5 years=25%, 2 years= 28%, 3 years = 63% ([4])

[1] Weinstock et al., (2012). Evaluation of the Program for Infant/Toddler Care (PITC): An on-site training of caregivers. Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S.

Department of Education is in the public domain.

[2] Image by Todd LaMarr is licensed under CC by 4.0

[3] Image by Todd LaMarr is licensed under CC by 4.0

[4] Image by Todd LaMarr is licensed under CC by 4.0

23.3: Low Ratios

Ratios

The number of caregivers assigned to a group of children refers to the adult-to-child ratio. A low ratio means not exceeding the recommended number of adults assigned to a group of infants and toddlers. For infants from birth through twelve months of age, AAP recommends a ratio of 1:3 one caregiver assigned to every three infants in a class (American Academy of Pediatrics, 2019). The AAP recommends a ratio of 1:4 for toddlers between the ages of 13 to 35 months one caregiver assigned to every four toddlers in a class. These ratio guidelines from the AAP are supported by PITC's recommendations which suggests either a 1:3 or a 1:4 ratio, depending on the age of the children with a lower ratio for younger children (Program for Infant and Toddler Care, 2022).

Many infant and toddler programs do not meet the recommendations for adult-to-child ratios. Figure# shows the percentage of infant and toddler programs that met ratio guidelines (National Institute of Child Health and Human Development, 2006). Programs were most likely to meet ratio recommendations with three year old children (56%) and least likely to meet recommendations with children ages 1½ through 2 years of age at 20% and 26% respectively. When children were six months of age, 36% of programs met the guidelines.

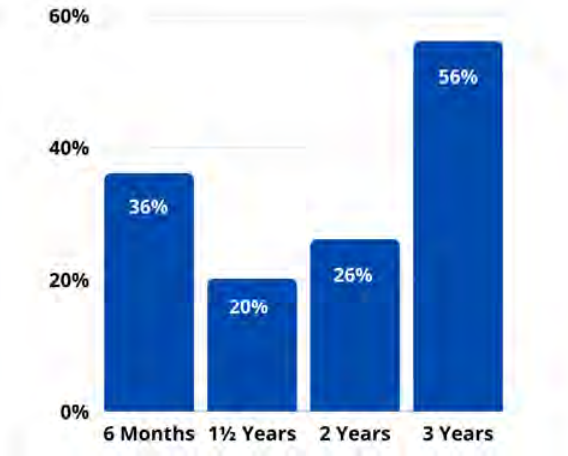


Figure 23.3.1: Percentage of programs meeting recommended guidelines for adult-to-child ratio. ([1])

[1] Image by Todd LaMarr is licensed under CC by 4.0

23.4: Benefits of Small Groups and Low Ratios

Why Small Groups and Low Ratios?

It is important to distinguish between research studies that focus on infants and toddlers (birth to 36 months) and studies that focus on children older than three years of age. Research findings on the associations between adult-to-child ratios and developmental outcomes have been contradictory with older children. In the preschool years, some studies show that better ratios are associated with improved child outcomes while other studies have found weak or no benefits (Francis & Barnett, 2019; Perlman et al., 2017; Pianta et al. 2005). In contrast, most studies with infants and toddlers find beneficial outcomes for small groups and low ratios (for exceptions see Blau, 2000 and Slot, Leseman, Verhagen & Mulder, 2015). Thus, this body of research emphasizes that the care and education of infants and toddlers should be considered distinct from the preschool years and that small groups and low ratios may be more important during the first three years, especially for infants (American Academy of Pediatrics, 2019; De Schipper, Riksen-Walraven & Geurts, 2006). [1]

Overall, small groups and low ratios are linked with better outcomes for infants and toddlers (Howes, Phillips & Whitebook, 1992). Small groups and lower ratios are associated with warmer and more responsive interactions (Burchinal, Cryer, Clifford & Howes, 2002; Early Child Care Research Network, 2006; Phillipsen, Burchinal, Howes & Cryer, 1997; Vandell, 1996). Sensitive relationships between caregivers and infants is more common in classes with smaller groups (Barros et al., 2016). Research has found that as the ratio of infants to caregivers increases, the quality of care between caregivers and children decreases (Leach et al., 2008; Rentzou & Sakellariou, 2011). For example, with higher ratios of infants, caregivers are less able to provide quality interactions that are sensitive and responsive (Pessanha et al., 2017; Thomason & La Paro, 2009). Caregivers show more positive affect and are less restrictive of toddlers' actions when ratios are low (Howes, 1983; Thomason & La Paro, 2009). In programs with a high ratio, toddlers are more likely to show behavior challenges (Kohl et al., 2020). Lastly, low ratios are related to greater infant language abilities. Specifically, small groups with a ratio of one caregiver to three infants had greater language abilities than groups with more than three infants per one caregiver (Burchinal, Roberts, Nabors & Bryant, 1996; Burchinal et al., 2000). When ratios are low, caregivers engage in more conversations and complex play with toddlers (Howes & Rubenstein, 1985). [2]

[1] Perlmanet al., (2017). Child-staff ratios in early childhood education and care settings and child outcomes: A systematic review and meta-analysis. *PloS One*, *12*(1), e0170256. CC by 4.0

[2] Løkken et al., (2018). The relationship between structural factors and interaction quality in Norwegian ECEC for toddlers. *International Journal of Child Care and Education Policy*, *12*(1), 1-15. CC by 4.0

23.5: Conclusion

Conclusion to Small Groups and Low Ratios

As we strive to provide the highest quality care and education for infants and toddlers, it is imperative that we implement practices that promote optimal quality. Small group size and low ratios are two practices that child care programs can implement to improve quality as most research has found both practices to be related to positive developmental outcomes.

23.6: References

References for Small Groups and Low Ratios

- American Academy of Pediatrics. (2019). *Caring for our children, national health and safety performance standards*. American Academy of Pediatrics.
- Barros, S., Cadima, J., Bryant, D. M., Coelho, V., Pinto, A. I., Pessanha, M., & Peixoto, C. (2016). Infant child care quality in Portugal: Associations with structural characteristics. *Early Childhood Research Quarterly, 37*, 118-130.
- Blau, D. M. (2000). The production of quality in child-care centers: Another look. *Applied Developmental Science, 4*(3), 136-148.
- Burchinal, M. R., Cryer, D., Clifford, R. M., & Howes, C. (2002). Caregiver training and classroom quality in child care centers. *Applied Developmental Science, 6*(1), 2-11.
- Burchinal, M. R., Roberts, J. E., Nabors, L. A., & Bryant, D. M. (1996). Quality of center child care and infant cognitive and language development. *Child Development, 67*(2), 606-620.
- Burchinal, M. R., Roberts, J. E., Riggins, Jr, R., Zeisel, S. A., Neebe, E., & Bryant, D. (2000). Relating quality of center-based child care to early cognitive and language development longitudinally. *Child Development, 71*(2), 339-357.
- Davies, C., Hendry, A., Gibson, S. P., Gliga, T., McGillion, M., & Gonzalez-Gomez, N. (2021). Early childhood education and care (ECEC) during COVID-19 boosts growth in language and executive function. *Infant and Child Development*, e2241.
- De Schipper, E. J., Riksen-Walraven, J. M. & Geurts, S. A. (2006). Effects of child–caregiver ratio on the interactions between caregivers and children in child-care centers: An experimental study. *Child Development, 77*(4), 861-874.
- Donoghue, E. A., Lieser, D., DelConte, B., Donoghue, E., Earls, M., Glassy, D., Mendelsohn, A., McFadden, T., Scholer, S., Takagishi, J., Vanderbilt, D. & Williams, P. G. (2017). Quality early education and child care from birth to kindergarten. *Pediatrics, 140*(2).
- Early Child Care Research Network (ECCRN). (2006). Child-care effect sizes for the NICHD study of early child care and youth development. *American Psychologist, 61*(2), 99–116.
- Francis, J., & Barnett, W. S. (2019). Relating preschool class size to classroom quality and student achievement. *Early Childhood Research Quarterly, 49*, 49-58.
- Gilkerson, J., Richards, J. A., Warren, S. F., Oller, D. K., Russo, R., & Vohr, B. (2018). Language experience in the second year of life and language outcomes in late childhood. *Pediatrics, 142*(4).
- Howes, C. (1983). Caregiver behavior in center and family day care. *Journal of Applied Developmental Psychology, 4*(1), 99-107.
- Howes, C., Phillips, D. A., & Whitebook, M. (1992). Thresholds of quality: Implications for the social development of children in center-based child care. *Child Development, 63*(2), 449-460.
- Howes, C., & Rubenstein, J. L. (1985). Determinants of toddlers' experience in day care: Age of entry and quality of setting. *Child Care Quarterly, 14*(2), 140-151.
- Hubel, G. S., Davies, F., Goodrum, N. M., Schmarder, K. M., Schnake, K., & Moreland, A. D. (2020). Adverse childhood experiences among early care and education teachers: Prevalence and associations with observed quality of classroom social and emotional climate. *Children and Youth Services Review, 111*, 104877.
- Kohl, K., Bihler, L. M., Willard, J. A., Agache, A., & Leyendecker, B. (2020). Linking quantity and quality of early childhood education and care to children's socio-emotional adjustment: A German cross-sectional study. *Early Education and Development, 31*(2), 177-199.
- Lally, J. R. (2009). The science and psychology of infant-toddler care: How an understanding of early learning has transformed child care. *Zero to Three, 30*(2), 47-53.
- Leach, P., Barnes, J., Malmberg, L. E., Sylva, K., Stein, A., & the FCCC team 1. (2008). The quality of different types of child care at 10 and 18 months: A comparison between types and factors related to quality. *Early Child Development and Care, 178*(2), 177-209.
- Narea, M., Arriagada, V., & Allel, K. (2020). Center-based care in toddlerhood and child cognitive outcomes in Chile: The moderating role of family socio-economic status. *Early Education and Development, 31*(2), 218-233.
- National Association for the Education of Young Children. (2005). *NAEYC early childhood program standards and accreditation criteria: The mark of quality in early childhood education*. National Association for the Education of Young Children.

- National Institute of Child Health and Human Development (2006). *The NICHD study of early child care and youth development: Findings for children up to age 4½ years*. Available online at: https://www.nichd.nih.gov/sites/default/files/publications/pubs/documents/seccyd_06.pdf
- Orri, M., Tremblay, R. E., Japel, C., Boivin, M., Vitaro, F., Losier, T., Brendgen, M. R., Falissard, B., Melchior, M., & Côté, S. M. (2019). Early childhood child care and disruptive behavior problems during adolescence: A 17-year population-based propensity score study. *Journal of Child Psychology and Psychiatry, 60*(11), 1174-1182.
- Perlman, M., Fletcher, B., Falenchuk, O., Brunsek, A., McMullen, E., & Shah, P. S. (2017). Child-staff ratios in early childhood education and care settings and child outcomes: A systematic review and meta-analysis. *PloS One, 12*(1), e0170256.
- Pessanha, M., Peixoto, C., Barros, S., Cadima, J., Pinto, A. I., Coelho, V., & Bryant, D. M. (2017). Stability and change in teacher-infant interaction quality over time. *Early Childhood Research Quarterly, 40*, 87-97.
-
- Phillipsen, L. C., Burchinal, M. R., Howes, C., & Cryer, D. (1997). The prediction of process quality from structural features of child care. *Early Childhood Research Quarterly, 12*(3), 281-303.
- Pianta, R., Howes, C., Burchinal, M., Bryant, D., Clifford, R., Early, D., & Barbarin, O. (2005). Features of pre-kindergarten programs, classrooms, and teachers: Do they predict observed classroom quality and child-teacher interactions? *Applied Developmental Science*, *9*(3), 144-159.
- Program for Infant and Toddler Care (2022, January 18). *About*. Program for Infant and Toddler Care. Available online at: https://www.pitc.org/about
- Rentzou, K., & Sakellariou, M. (2011). The quality of early childhood educators: Children's interaction in Greek child care centers. *Early Childhood Education Journal*, *38*(5), 367-376.
- Slot, P. L., Leseman, P. P., Verhagen, J., & Mulder, H. (2015). Associations between structural quality aspects and process quality in Dutch early childhood education and care settings. *Early Childhood Research Quarterly, 33*, 64-76.
- Thomason, A. C., & La Paro, K. M. (2009). Measuring the quality of teacher–child interactions in toddler child care. *Early Education and Development, 20*(2), 285-304.
- Vandell, D. L. (1996). Characteristics of infant child care: Factors contributing to positive caregiving: NICHD early child care research network. *Early Childhood Research Quarterly, 11*(3), 269-306.
- Weinstock, P., Bos, J., Tseng, F., Rosenthal, E., Ortiz, L., Dowsett, C., Huston, A. & Bentley, A. (2012). *Evaluation of the Program for Infant/Toddler Care (PITC): An on-site training of caregivers*. Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education.

CHAPTER OVERVIEW

24: Caregiving Practices- Continuity of Care

24.1: Introduction

Introduction to Continuity of Care

Children develop more rapidly during the first three years than any other time during development. To support this rapid development, infants and toddlers deserve respectful and nurturing relationships with their caregivers because optimal learning happens within positive relationships. This section will introduce the practice of continuity of care, describe how it is implemented into group care programs and summarize its benefits.

24.2: Continuity of Care as a Caregiving Practice

Implementing Continuity of Care

Continuity of care refers to the practice of primary caregivers and children staying together for as long as possible, preferably for the children's first three years (McMullen, 2018). Classrooms, materials and supplies may all change as the children become older, but the one constant is the relationships. Thus, continuity of care is a caregiving practice with relationships at the center, with the goal of creating and deepening relationships between caregivers and children and caregivers and families. Continuity of care contrasts the common practice of moving infants and toddlers to new classrooms based on their age and/or attainment of skills (Cryer, Hurwitz & Wolery, 2000).

Figure 24.2.1: Continuity of Care allows deeper relationships to form. ([1])

There are three ways that programs can create continuity of care systems. Programs may choose a system based on space, materials and resources, staff expertise, and parent and community needs: [2]

1. Group mixed-age infants and toddlers together by having the same primary caregivers work with classes of mixed-age infants and toddlers. The environment should include equipment and materials based on children's ages (the age range depends on the current children), interests, needs, and skills. As children move up into preschool, newly enrolled infants or toddlers are added. The same teachers remain in the classroom. Figure 24.2.1 shows an illustration depicting this continuity of care system. In classroom 'A' a primary caregiver has a mixed-age group of both infants and toddlers. When the children are old enough to attend preschool, they then move to a new preschool class, classroom 'B', and new infants and toddlers are enrolled into classroom 'A'. [2]

Figure 24.2.1: Continuity of care system #1. ([1])

2. Keep children of similar age together with the same teacher. As children grow older, the children and caregivers all move to a more age-appropriate space. In this arrangement, teachers work with different age groups over several years. Figure 24.2.1shows an illustration of this continuity of care system. In classroom 'A' the teacher is with a group of infants. As the infants grow, the teacher and children move to a new more age-appropriate room. Classroom 'B' shows the same teacher and children as in classroom 'A', but now the children are older and they are all in a new classroom together. [2]

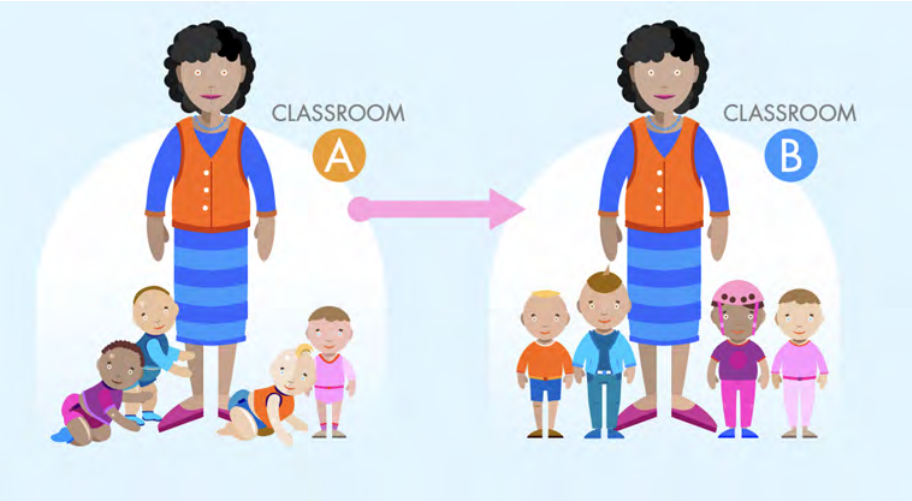


Figure 24.2.1: Continuity of care system #2. ([2])

3. Another continuity of care system involves children, of similar age, remaining with the same primary caregiver in the same room. As the children grow older, they stay in the same room with their caregivers, but the caregivers adjust the environment and materials as children's abilities and interests change. Figure 24.2.1 provides an illustration. In classroom 'A', the caregiver and infants are in an age-appropriate room. As the children grow, rather than change rooms, the classroom is adjusted to be age-appropriate for their developing abilities and interests. In this way, the children and caregiver can remain together and stay in the same classroom overtime. [2]

Figure 24.2.1: Continuity of care system #3. ([1])

Continuity of care is rooted in attachment theory research that supports the importance of consistent and secure relationships between caregivers and children, especially infants and toddlers. A classic study by Helen Raikes (1993) is strong evidence for the benefits of continuity of care. Raikes found that the longer infants remained with the same primary caregiver, the more likely the children were to develop a secure attachment. Specifically, of the infants who stayed with the same caregiver for over one year, 91% of them had a secure attachment, compared to infants who stayed with the same caregiver for 9 to 12 months (67% had a secure attachment) and 5 to 8 months (50% had a secure attachment). Toddlers in continuity of care classrooms are rated by their caregivers as having fewer challenging behaviors (Ruprecht, Elicker & Choi, 2016). Having a consistent and stable caregiver supports the development of a strong attachment between children and their primary caregivers (Barnas & Cummings, 1994). Infants and toddlers with more caregiver stability scored higher on social skills later in Kindergarten (Bratsch-Hines et al., 2020). Indeed, both parents and caregivers report that one of the main benefits of continuity of care is the increase in knowledge caregivers receive of individual children by working with them for a longer period of time (McMullen, Yun, Mihai & Kim, 2016).

Continuity of Care Benefits

Continuity of care not only benefits the relationship between caregivers and children, but also the relationship between caregivers and the children's families. More time together means caregivers and families can potentially develop a deeper understanding of each other with a trusting relationship enriched through experiences over time. Indeed, parents report how continuity of care creates a caregiver-parent relationship of trust and open communication (McMullen, Yun, Mihai & Kim, 2016). Both caregivers and parents reported that their experience with continuity of care created a mutual respect for each other and they both perceived their relationship more as a partnership (McMullen, Yun, Mihai & Kim, 2016).

Figure 24.2.1: Infants and toddlers in a mixed-age classroom. ([1])

Not only are there research supported benefits for implementing continuity of care, there are also research supported concerns for not implementing it. When infants and toddlers are transitioned into a new classroom, they exhibit increased distress and anxiety (Cryer et al., 2005; Field, Vega-Lahr & Jagadish, 1984; O'Farrelly & Hennessy, 2014; Schipper, IJzendoorn & Tavecchio, 2004). Other research emphasizes that transitioning from an infant to a toddler class may be experienced differently for each child and is greatly influenced by caregivers (Recchia, 2012; Recchia & Dvorakova, 2012).

Despite many organizations promoting the importance of continuity of care, few infant and toddler group care programs actually implement it as a practice (Aguillard, Pierce, Benedict & Burts, 2005; Choi, Horm & Jeon, 2018; Cryer, Hurwitz & Wolery, 2000). Research has revealed that programs accredited by NAEYC (National Association for the Education of Young Children) were just as unlikely to be practicing continuity of care as group care programs without an NAEYC accreditation (Aguillard, Pierce, Benedict & Burts, 2005). In a large national study with Early Head Start infant and toddler programs, only 29% of children experienced two years of continuity of care (Choi, Horm & Jeon, 2018). Thirty-four percent of children experienced changing primary caregivers at least once while 37% of children experienced changing primary caregivers between two to six times. Caregivers express both benefits and challenges associated with implementing continuity of care (Hegde & Cassidy, 2004; Longstreth et al., 2016). Most of the challenges caregivers express about continuity of care can be reduced and/or solved when accurate information is shared and with strategic planning (Garrity, Longstreth & Alwashmi, 2016; Longstreth et al., 2016; McMullen, 2017; Recchia & Dvorakova, 2018).

[1] Image by PublicDomainPictures on Pixabay.

[2] "Head Start Tip Sheet: Continuity of Care" is in the public domain.

[9] Image from Head Start ECLKC is in the public domain.

24.3: Conclusion

Conclusion to Continuity of Care

Continuity of care is a caregiving practice that has the potential to greatly benefit children, their families and caregivers. By keeping children and caregivers together for as long as possible (ideally through the first three years), respectful, trusting and secure relationships can be deeply formed. Although few group care programs implement continuity of care, by sharing accurate, research-based information and through strategic planning, more programs can strive toward this important caregiving practice.

24.4: References

References for Continuity of Care

- Aguillard, A. E., Pierce, S. H., Benedict, J. H., & Burts, D. C. (2005). Barriers to the implementation of continuity-of-care practices in child care centers. *Early Childhood Research Quarterly, 20*(3), 329-344.
- Barnas, M. V., & Cummings, E. M. (1994). Caregiver stability and toddlers' attachment-related behavior towards caregivers in day care. *Infant Behavior and Development, 17*(2), 141-147.
- Bratsch-Hines, M. E., Carr, R., Zgourou, E., Vernon-Feagans, L., & Willoughby, M. (2020). Infant and toddler child-care quality and stability in relation to proximal and distal academic and social outcomes. *Child Development, 91*(6), 1854-1864.
- Choi, J. Y., Horm, D., & Jeon, S. (2018). Descriptive study of continuity of care practice and children's experience of stability of care in Early Head Start. In *Child & Youth Care Forum* (Vol. 47, No. 5, pp. 659-681). Springer US.
- Cryer, D., Hurwitz, S., & Wolery, M. (2000). Continuity of caregiver for infants and toddlers in center-based child care: Report on a survey of center practices. *Early Childhood Research Quarterly, 15*(4), 497-514.
- Cryer, D., Wagner-Moore, L., Burchinal, M., Yazejian, N., Hurwitz, S., & Wolery, M. (2005). Effects of transitions to new child care classes on infant/toddler distress and behavior. *Early Childhood Research Quarterly, 20*(1), 37-56.
- Field, T. M., Vega-Lahr, N., & Jagadish, S. (1984). Separation stress of nursery school infants and toddlers graduating to new classes. *Infant Behavior and Development, 7*(3), 277-284.
- Garrity, S., Longstreth, S., & Alwashmi, M. (2016). A qualitative examination of the implementation of continuity of care: An organizational learning perspective. *Early Childhood Research Quarterly, 36*, 64-78.
- Hegde, A. V., & Cassidy, D. J. (2004). Teacher and parent perspectives on looping. *Early Childhood Education Journal, 32*(2), 133-138.
- Longstreth, S., Garrity, S., Ritblatt, S. N., Olson, K., Virgilio, A., Dinh, H., & Padamada, S. (2016). Teacher perspectives on the practice of continuity of care. *Journal of Research in Childhood Education, 30*(4), 554-568.
- McMullen, M. B. (2017). Continuity of Care with Infants and Toddlers. *Exchange*.
- McMullen, M. B. (2018). The many benefits of continuity of care for infants, toddlers, families, and caregiving staff. *Young Children, 73*(3), 38-39.
- McMullen, M. B., Yun, N. R., Mihai, A., & Kim, H. (2016). Experiences of parents and professionals in well-established continuity of care infant toddler programs. *Early Education and Development, 27*(2), 190-220.
- O'Farrelly, C., & Hennessy, E. (2014). Watching transitions unfold: A mixed-method study of transitions within early childhood care and education settings. *Early Years, 34*(4), 329-347.
- Raikes, H. (1993). Relationship duration in infant care: Time with a high-ability teacher and infant-teacher attachment. *Early Childhood Research Quarterly, 8*(3), 309-325.
- Recchia, S. L. (2012). Caregiver–child relationships as a context for continuity in child care. *Early Years, 32*(2), 143-157.
- Recchia, S. L., & Dvorakova, K. (2012). How three young toddlers transition from an infant to a toddler child care classroom: Exploring the influence of peer relationships, teacher expectations, and changing social contexts. *Early Education & Development, 23*(2), 181-201.
- Recchia, S. L., & Dvorakova, K. (2018). Moving from an infant to a toddler child care classroom. *Young Children, 73*(3), 43-49.
- Ruprecht, K., Elicker, J., & Choi, J. Y. (2016). Continuity of care, caregiver–child interactions, and toddler social competence and problem behaviors. *Early Education and Development, 27*(2), 221-239.
- Schipper, J. C. D., IJzendoorn, M. H. V., & Tavecchio, L. W. (2004). Stability in center day care: Relations with children's well-being and problem behavior in daycare. *Social Development, 13*(4), 531-550.

CHAPTER OVERVIEW

25: Caregiving Practices- Routines

25.1: Introduction

Introduction to Routines

Consistent routines, activities that happen at about the same time and in about the same way each day, provide comfort and a sense of safety to young children. Whether it is time to play, time for a snack, a nap, or a loved one to return, knowing what will happen next gives babies and toddlers security and emotional stability.

—Zero To Three (2010, p. 2)

25.2: Care Routines

Defining Routines in Care

Caregiving routines—arrival and departure, feeding, meals and snacks, diapering and toileting, dressing, and napping—provide a framework for the infant/toddler day. Routine care is far from routine. A significant amount of individualization occurs during routines; they offer caregivers and family child care providers many opportunities to observe and understand each child's ways and preferences and support development and learning across the domains(HHS, ACF, OCC, NITCCI, Infant/Toddler Curriculum and Individualization).[1]

During routine care, infants and toddlers have adults' undivided attention as they focus on meeting children's needs and getting to know them (Koralek, Derry, Amy Laura Dombro, and Diane Trister Dodge,2005). Routines offer opportunities to build relationships with each infant and toddler that promote attachment and trust. These are developmental milestones that are critical for children's sense of security and willingness to explore people and objects in their environments. Routines involve children's bodily needs, very intimate care, and potentially different perspectives from that of the family, so they should be highly individualized; in group care settings, each infant's and toddler's routine care is based on his or her own readiness and timetable for feeding, diapering and toilet learning, and sleep (Zero to Three, 2008). [1]

How the routine is carried out and when the routine occurs should be closely coordinated with children's families so that care is consistent between home and the program. Because these routines are so individualized, they should be carried out by the child's primary caregiver whenever possible. Families in home-based programs may individualize routine care for their infants and toddlers according to a combination of children's needs, family schedules, and cultural beliefs and practices. Home visitors can work collaboratively with families to address topics such as using routine care times to support their child's development and learning and changing routine care practices as children get older An important part of individualizing routines is using rituals. People often use the terms rituals and routines interchangeably, but they are not the same. According to Gillespie and Petersen, routines are "repeated, predictable events that provide a foundation for the daily tasks in a child's life . . . Individualizing a routine means that the sequence is the same but the actions and timing may vary to accommodate the needs of individual children"(Gillespie, Linda, and Peterson, 2012 p. 76). Rituals, in general, are "special actions that help us navigate emotionally important events or transitions in our lives as well as enhance aspects of our daily routines to deepen our connections and relationships" (Gillespie, Linda, and Peterson, 2012 p. 76). For infants and toddlers, a ritual is "a special practice that helps a child accept aspects of a routine, even an individualized routine, that are stressful" (Gillespie, Linda, and Peterson, 2012 p. 76). Rituals that adults develop with children and use at home or in group care can ease emotionally loaded situations such as separations (including going to sleep), feeding and meal times, and learning to use the toilet.[1]

Coordinating routine care between home and program may sometimes be challenging. Caregivers attitudes and beliefs about how routines should be carried out may differ from what families believe and do.

---

[1] Early Head Start National Resource Center. (2014). Individualizing care for infants and toddlers: Part 1 [Technical assistance paper no. 16] is in the public domain

25.3: The Daily Schedule

The Importance of Schedules

Many states require child care programs to have written daily schedules. The National Association for the Education of Young Children (NAEYC) encourages practices in which "the curriculum guides the development of a daily schedule that is predictable yet flexible and responsive to individual needs of the children" (NAEYC, 2015, p. 9). How do you develop a daily schedule for a group of infants and toddlers who are each on their own timetable? This is an important question because infants and toddlers have not yet developed the ability to manage their own feelings and behavior. For infant and toddler care caregivers, creating a daily schedule that is based on responsive care routines makes good sense. Early learning researchers widely agree that adults can best support early learning when a child's interests are central to the learning experience (Shonkoff & Phillips, 2000).[1]

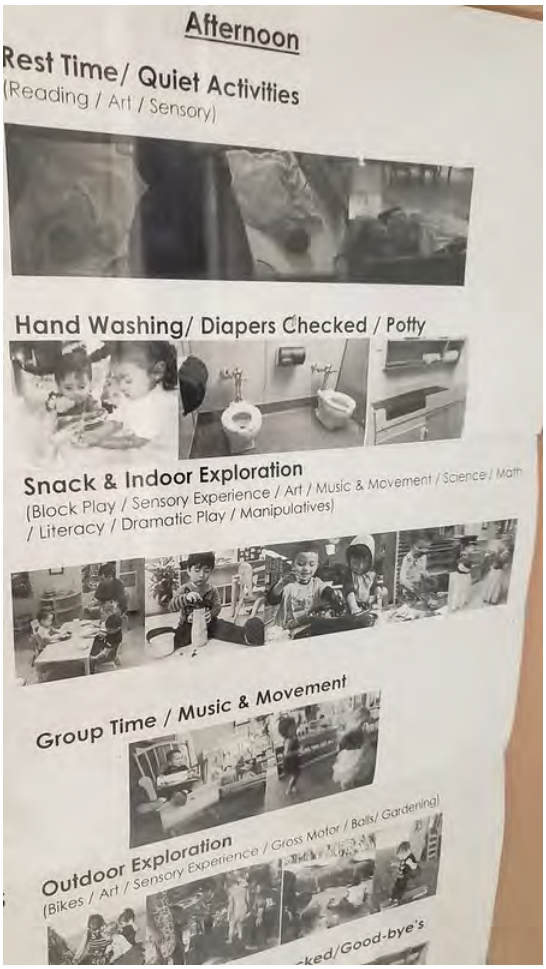


Figure 25.3.1: Afternoon schedule of Rest Time/ Quiet Activities in the reading/Art/Sensory area. Handwashing/Diapers Checked in the bathroom. Snack and Indoor exploration in the Block play/Sensory experiences/Art/Music and Movement/Science/math/Literacy/Manipulatives. Group Time/ Music and Movement and then Outdoor Exploration with bikes/art/sensory experiences/gross motor/balls/gardening. ([1])

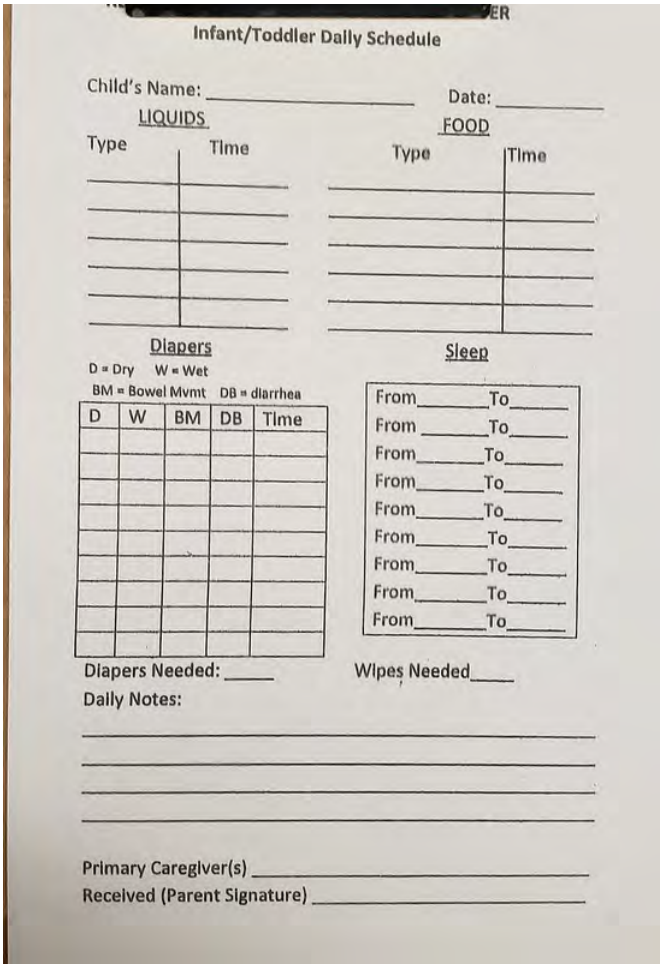
The daily schedule orders the events that take place each day. It outlines how the daily events are expected to flow, the order in which they happen, and for how long (although not necessarily the exact times).

Schedules are important because they :

- provide consistency and predictability, which help infants and toddlers develop a sense of trust and security;
- give caregivers, family child care providers, and home visitors a framework for planning and making good use of time spent with children; and
- provide a link between home and school, and reassure families, especially those whose children are in group care, about what their children are doing during the day. [1]

As you incorporate the unique care routines and rhythms of each infant and toddler in your care, you can begin to create individualized daily schedules, which is an important basis of high-quality caregiving (Raikes & Edwards, 2009). Keep in mind, to respond to changing individual needs of infants, it's important to allow room for flexibility during the day. Anything too rigid will create undue stress for babies and tension for the caregivers who try to adhere to a set plan. For example, very young infants, who are on their own sleep schedules, may sleep through outside time and be ready to play and engage while the older infants nap. This does not mean there is no order or system; you are still making sure that all the daily care routines are happening. However, if one infant needs to eat or sleep sooner than others, you can adapt. Maybe a 2-year-old with a new baby brother at home needs a little more cuddle time than he did last week. Or an infant needs breathing treatments at certain times in the day and you have adjusted the schedule to read books to him and other toddlers during his therapy.[1]

While consistency and predictability are important characteristics of schedules, flexibility is just as important. This means that schedules can be modified in the moment to meet individual children's needs or group needs, take advantage of "teachable moments," and maintain a consistent and an unhurried pace. Schedules can also be modified in the long term as children's needs and abilities change over time. [1]



Infant/Toddler Daily Schedule

Child's Name: _____ Date: _____

LIQUIDS

Type	Time

FOOD

Type	Time

Diapers

D = Dry W = Wet

BM = Bowel Mvmt DB = diarrhea

D	W	BM	DB	Time

Sleep

From_____To_____
From_____To_____
From_____To_____
From_____To_____
From_____To_____
From_____To_____
From_____To_____
From_____To_____
From_____To_____

Diapers Needed: _____ Wipes Needed_____

Daily Notes:

Primary Caregiver(s) _____

Received (Parent Signature) _____

Figure 25.3.1: A paper infant/toddler daily schedule for caregivers to fill out. Form includes p lace for Liquid type and time, Food type and time, Diapers changed when, and sleep schedule. The form also includes the option to record if diapers or wipes are needed and daily notes home. A place for caregiver signature and parent signature are at the bottom. ([1])

Other characteristics of schedules, in particular for group care settings, include:

- major events occurring in the same order every day;
- sufficient time for routine care and transitions from one event to the next;
- balance between active and quiet times;
- opportunities to be alone, with a familiar adult, and with small groups of children; and
- opportunities to spend time outdoors.

Infants follow individualized schedules for sleeping, eating, diapering, and playing. A one-size-fits-all schedule would not be appropriate for them. This means that caregivers and family child care providers will likely have as many schedules as they have infants. For example, at any given time, one infant may be napping, another getting her bottle, and a third playing with a soft block on the floor.23 Families are primary sources of information about when their children eat, nap, are most active, and so on; in culturally consistent care, the timing of these caregiving routines and awake times for play in a group care setting should match as closely as possible to when they occur at home. Cultural continuity, particularly for young children, allows for uninterrupted development of children's self-identity. Managing these individual schedules requires some planning. Knowledge about individual children can help staff predict when each child may get tired, get hungry, or need a diaper change; in turn, staff can take steps to prepare, such as get diapering supplies or cots out in advance or coordinate care responsibilities with another adult. [2]

Schedules for toddlers in group care may be more consistent and group oriented. For example, toddlers may eat meals together, go outside together, take naps at the same time, and come together for short times in small groups for stories, music, and movement experiences. Caregivers and family child care providers may create simple visual schedules with photos or drawings that show the daily events and when they occur to help children understand what happens and when. However, toddlers, still have individual timetables for routine care as well as times when they need to be away from the group or one-on-one with a familiar, trusted adult. Honoring toddlers' individual schedules and home culture is as important as honoring infants' schedules and home culture. Family input continues to play a central role.[2]

One important aspect of the daily schedule is transitions. Infants and toddlers experience many transitions (changes) during the day, for example, between routines and experiences, arrivals and departures, and going outside to play and coming back in. Home visits include transitions, too! Each child experiences and handles transitions differently; change is harder for some children than for others, so transitions can be some of the most challenging times of the day. Infants and toddlers rely on adults to provide a sense of safety and continuity as they experience change; individualizing transitions is one way to provide the stability infants and toddlers need.

---

[1] Image by Amanda Taintor is licensed CC BY-NC

[1] Early Head Start National Resource Center.(n.d) [Individualizing care for infants and tollders]. Is in the public domain

---

25.4: Tips for Creating Developmentally Appropriate Daily Schedules

Tips for Creating Developmentally Appropriate Daily Schedules

The following are characteristics of a schedule for infants and toddlers that supports responsive, individualized care. These ideas can help you create a daily schedule that is responsive and sensitive to each infant and toddler in your setting.[1]

Provide Consistency

Predictable daily routines support young children in knowing what to expect and what is expected of them, leading to fewer disruptive behaviors. Daily routines should flow in a consistent way that allow infants to focus on their play and learning. Opportunities to explore and practice skill-building allow children to build confidence in their abilities (Harms, Clifford, & Cryer, 1998).[1]

Include Experiences That Meet Individual Needs

This is particularly important for infants and toddlers who are not yet able to regulate their own needs and bodies to accommodate a group schedule. Regular caregiving routines such as diapering, sleeping, and feeding should happen when each child needs them, rather than going by the clock or a strict schedule (EHS NRC, 2014; Harms et al., 1998; NAEYC, 2015).

Provide Opportunities and Interactions to Foster Physical, Social, and Emotional Growth

You can support development in all areas during everyday interactions and activities. Consider an infant's diaper change. During this routine care you can support her social and emotional development by giving one-on-one attention that includes eye contact, smiling, talking about what is happening in the moment, and pointing out things that are familiar to the child (for example, "Oh! I see you're wearing your Bear diaper this morning. You like it when your mama gets the Bear diapers for you, don't you?"). In this simple exchange, the caregiver is not only supporting the child's social and emotional development but language and cognitive development as well (EHS NRC, 2014; Harms et al., 1998; NAEYC, 2015).[1]

Allow Long Amounts of Time for Free Play

Children learn through play (Fromberg & Gullo, 1992; Ginsburg, 2007; Meltzoff, Kuhl, Movellan, & Sejnowski, 2009; Piaget, 1962). Self-directed play gives children opportunities to practice what they have observed and learned about their world, test new ideas, and build skills in all areas of development. When children come together to play, it should be driven by their desire to be together, even if it means being near each other and doing separate things. Caregiver-initiated, whole-group experiences such as song time, dancing, or reading books can work well for older toddlers if they can choose whether or not to participate. Group gatherings should be limited in time, flexible, and account for the individual interests of all children. For example, in a family child care home with several toddlers, many of them like to be near the caregiver while she sings. One child goes to the book corner when this happens and she peeks over the shelves at the group. The child's mother has said that, at home, her little girl sings all of the songs, but in child care, she does not actually join the group until several months later, when she is ready (Harms et al., 1998; NAEYC, 2015).[1]

Provide Time and Support for Transitions

A well-designed schedule for infants and toddlers includes thoughtful transitions that support children as they move from one area of focus to another. Transition times are important and give many learning opportunities, just like every other part of the child's day (Harms et al., 1998; NAEYC, 2015).

Common transition times during a child's day in care include:

- Pick-up and drop-off times;
- Meal times;
- Diaper changes and toileting;
- Nap times;
- Movement from indoors to outdoors; and
- Joining or leaving group experiences (for older toddlers only).

Sample Schedules

On the following pages are two examples of written daily schedules for infants and toddlers, which are designed to be flexible and responsive to individual children. One includes times, and the other is organized by sections of the day. They both highlight the importance of less structure and more open time during the day for exploration and play. This open flow of the day allows caregivers to meet individual needs as they arise; interactions and experiences happen in the natural course of the day.[1]

Sample A: Infant and Toddler Schedule (Without Times)

Care routines such as diapering, toileting, naps, and mealtimes will be based on individual needs. Older toddlers are invited to have meals together.

Parents: Please let us know how your child is doing, and if you have any concerns, questions, or comments. We are listening!

- **Early day**
  - Diapering, naps, and mealtime as needed
  - Greetings and check-ins: We ask about how each child slept, ate, his or her mood, and any other details.
  - Exploration of materials/objects; sensory table or tray discovery
  - Reading and exploring books
  - Movement and free exploration and interaction
  - Outdoor stroller walk or play in yard
- **Midday**
  - Diapering, naps, and mealtime as needed
  - Quiet music, reading, and low lights
  - Exploring materials, objects, and books
  - Movement and free exploration and interactions
  - Outdoor play, including push toys, climbing equipment, and soft spaces on blankets or sand
- **Late day**
  - Diapering, naps, and mealtime as needed
  - Reading and exploring books
  - Exploring materials, loose parts, and objects
  - Movement and free exploration and interaction
  - Outdoor play
  - Goodbyes: We share observations of the child's day as well as details about meals, naps, diapering, and toileting.

Sample B: Infant Daily Schedule (With Times)

Mealtimes, diapering, and sleeping will be based on individual needs. We will adjust the schedule throughout the day to respond to your child's interests and needs, as well as to the weather conditions.

- **7:00–8:30: Arrival and greeting.**
  - Welcome families and learn about how the children are doing.
- **8:30–9:30: Outside time.** Possibilities include the following:
  - Exploring and following interests, such as touching leaves and talking about trees, clouds, and birds;
  - Snuggling, talking, and reading books together in the fresh air;
  - Listening and singing to rhythms; and
  - Rolling, climbing, and crawling.
- **9:30–11:30: Floor-time play.** Toys and objects available to explore.
  - Touching and feeling books and textures;
  - Talking, cuddling, and rocking;
  - Listening and singing to rhythms; and
  - Rolling, climbing, and crawling.
- **11:30–12:30: Sensory exploration.**
  - Materials with different textures, sounds, and colors.

- **12:30–2:30: Floor-time play.** Toys and objects available to explore.
  - Exploring and following interests, such as soft dolls, shakers, and stacking toys;
  - Touching and feeling books and textures;
  - Talking, cuddling, and rocking;
  - Listening and singing to rhythms; and
  - Rolling, climbing, and crawling.
- **2:30–3:30: Outside time.** Possibilities include the following:
  - Exploring and following interests, such as touching leaves and talking about trees, clouds, and birds;
  - Snuggling, talking, and reading books together in the fresh air;
  - Listening and singing to rhythms; and
  - Rolling, climbing, and crawling.
- **3:30–5:30: Floor-time play and departure.**
  - Review the day with parents, share observations, and provide information as needed.

---

[1] Early Head Start National Resource Center.(n.d) [Individualizing care for infants and tollders]. Is in the public domain

---

25.5: References

References for Care Routines

- Early Head Start National Resource Center. (2014). *Individualizing care for infants and toddlers: Part 1* [Technical assistance paper no. 16]. Retrieved from http://eclkc.ohs.acf.hhs.gov/hslc/tta-system/ehsnrc/docs/ehs-ta-16.pdf
- Early Head Start National Resource Center.(n.d) [Individualizing care for infants and tollders]. Retrieved from https://childcareta.acf.hhs.gov/infant-toddler-resource-guide/individualized-care-routines-and-daily-schedules.
- Fromberg, D. P., & Gullo, D. F. (1992). Perspectives on children. In L. R. Williams & D. P. Fromberg (Eds.),*Encyclopedia of early childhood education* (pp. 191–194). New York, NY: Garland Publishing.
- Gillespie, L., & Peterson, S. (2012). Rituals and routines: Supporting infants and toddlers and their families. *Young Children*, *67*(4), 76–77.
- Ginsburg, K. R. (2007). The importance of play in promoting healthy child development and maintaining strong parent-child bonds. *Pediatrics*, *119*(1), 182–191. doi:10.1542/peds.2006-2697
- Harms, T., Clifford, R., & Cryer, D. (1998). *Early childhood environment rating scale* (Rev. ed.). New York, NY: Teachers College Press.
- Meltzoff, A. N., Kuhl, P. K., Movellan, J., & Sejnowski, T. J. (2009). Foundations for a new science of learning. *Science*, *325*(5938), 284–288. doi:10.1126/science.1175626
- National Association for the Education of Young Children (NAEYC). (2015). NAEYC early childhood program standards and accreditation criteria and guidance for assessment. Standard 2: Curriculum. Washington, DC: Author.
- Piaget, J. (1962). *Play, dreams, and imitation in childhood*. New York, NY: W.W. Norton.
- Raikes, H., & Edwards, C. (2009). *Extending the dance in infant and toddler caregiving*. Baltimore, MD: Paul H. Brookes Publishing Company.
- Shonkoff, J. P., & Phillips, D.A. (Eds.) (2000). *From neurons to neighborhoods: The science of early childhood development. A report of the National Research Council*. Washington, DC: National Academies Press.

CHAPTER OVERVIEW

26: Inclusive Caregiving

26.1: Introduction

Introduction to Inclusive Caregiving

When caregivers think about inclusive caregiving, many people assume children with known or diagnosed special needs. Inclusive caregiving is for all children that have different abilities or privileges. Developmental delays can happen from genetic abnormalities, birth trauma, accidents, or several known or unknown reasons. The most important aspect of inclusive caregiving is remembering the human behind needs. Inclusion means that a child with sensory challenges, even if it is not yet diagnosed, should be given the effort and time to make their environment the best and most conducive. For example, as a caregiver, you notice that one of your children does not want to go to the sensory table, does not like to finger paint and shies away from any messy play. Although interested, something is stopping them from engaging. What can a caregiver do for a child like this to allow them to have access to all aspects of the classroom? Meet them where they are at! Try putting the playdough in a plastic bag for the child to explore. Put paint in a plastic bag! Use gardening gloves in messy play. This is one example of inclusivity. [1]

---

[1] Chapter 15: Families of Children with Special Needs or Special Health Care Needs by Krischa Esquivel; Emily Elam; Jennifer Paris; and Maricela Tafoya is licensed under a CC BY.

26.2: Overview

Overview of Inclusive Care

Children with disabilities or other special needs refer to children with a specific diagnosis and children who do not have a diagnosis but whose behavior, development, or health affect their family's ability to maintain child care services. The disability or special need may be as mild as a slight speech delay or as complex as a mixed diagnosis of motor challenges, vision impairment, and cognitive delays.[1] Special health care needs include a variety of conditions such as birth defects, neurological disorders, and chronic illnesses that can be life-threatening or impact daily living (e.g., cancer, sickle cell disease [or anemia], cystic fibrosis, hemophilia, AIDS, diabetes, juvenile rheumatoid arthritis).[1] [2]

Families of children with disabilities or other special needs have the same need for childcare as other families. However, families of children with disabilities or special needs often find the search for quality and affordable child care a more significant challenge as they face the reluctance of many child care providers to enroll their children. This situation makes it all the more important that child care providers strive to include all children in their programs not to increase the immense challenges that such families already face.[3]

Only about 10 percent of eligible infants and toddlers with developmental delays nationwide receive early intervention services, which are widely agreed to reduce delays and lessen the adverse effects of risk factors and disabilities on learning and development. California serves fewer children than the national average. Challenges arise from spotty screening, tenuous linkages to referral and evaluation, and the intricacies of crossing multiple agencies—sometimes without the knowledge of English—for families. [4]

Following the Individuals with Disabilities Education Act (IDEA), children ages 3-21 are entitled to a free, appropriate public education (FAPE) in the least restrictive environment (LRE). LRE requires that, to the extent possible, children with disabilities should have access to the general education curriculum, along with learning activities and settings available to their peers without disabilities. Corresponding federal legislation applied to infants and toddlers (children birth to 3) and their families specifies that early intervention services and supports must be provided in "natural environments," generally interpreted to mean a broad range of contexts and activities that generally occur for typically developing infants and toddlers in homes and communities.[5] [6]

Children with disabilities or other special needs and their families must be included in quality early childhood education programs that are the natural environments of their typically developing peers. Children learn from their interactions with other children and their surroundings while creating a sense of security and self-esteem from caring relationships with program providers and staff. Everyone benefits from quality early childhood education programs that provide inclusive care. Children who have a disability or special need get to know and interact with typically developing peers, while their families benefit from programs and services they need to achieve their parenting goals. Children who are typically developing benefit when they have the opportunity to get to know peers who are atypically developing in the classroom. Everyone has the opportunity to learn about other human beings regarding their strengths and challenges.

Figure 26.2.1: *Children of all abilities should be included in high-quality ECE classrooms.* (*[1]*)

Children and families want to be accepted and included in their community regardless of ability. They want to belong. But the kind of belonging they desire goes beyond simply "being together." They want full, unconditional membership in family and community. As Norman Kunc, a disability rights advocate, said so eloquently, "When inclusive education is fully embraced, we abandon the idea that children have to become 'normal' to contribute to the world. Instead, we search for and nourish the inherent

gifts in all people. We begin to look beyond typical ways of becoming valued members of the community and, in doing so, begin to realize the achievable goal of providing all children with an authentic sense of belonging."[6]

Children with disabilities or other special needs may present unique challenges, but the care they need is very similar to any child. Children with special needs spend most of their time doing what other children do. They have the same curiosity, desire to play, and need to communicate as their peers do. Childcare providers providing developmentally appropriate childcare, which is individualized to meet the needs of every child, already have many of the skills needed to serve children with disabilities or other special needs.[7]

Infant and toddler caregivers may be involved with families at the time when children's disabilities and developmental concerns are first identified and as interventions begin. This process can be emotional for families, but child care providers can offer valuable insight and be supportive partners. They can play a key role by working with children, families, and other professionals in the early intervention process. A caregiver who actively participates in children's development, learning, and growth supports families in important ways.[8]

---

[1] Family Partnerships and Culture by the California Department of Education is used with permission

[2] Chapter 15: Families of Children with Special Needs or Special Health Care Needs by Krischa Esquivel; Emily Elam; Jennifer Paris; and Maricela Tafoya CC BY.

[3] Inclusion Works! By the California Department of Education is used with permission ↵

[4] Author Nancy Hunt California State University. (n.d.). *Pace - identifying young children for early intervention in California*. Policy Analysis for California Education. CC BY

[5] DEC/NAEYC. (2009). Early childhood inclusion: A joint position statement of the Division for Early Childhood (DEC) and the National Association for the Education of Young Children (NAEYC). Chapel Hill: The University of North Carolina, FPG Child Development Institute. Retrieved

[6] Chapter 15: Families of Children with Special Needs or Special Health Care Needs by Krischa Esquivel; Emily Elam; Jennifer Paris; and Maricela Tafoya CC BY

[7] Child Development Resources by the California Department of Education is used with permission ↵

[8] U.S Department of Health and Human Services, Administration for Children and Families, n.d., Creating Inclusive Environments and Learning Experiences for Infants and Toddlers is in the pubic domain

---

26.3: What Programs Can Do To Be Inclusive of All Children

Implementing Inclusive Practices

Most children identified by special education professionals as having a disability have delays in learning and communication (over 70 percent of children from birth to age 14). Children who learn differently or have language delays commonly manifest special needs through their behavior in group settings. Early childhood educators can provide a language-rich environment and make accommodations based on the knowledge of the individual child.[1]

There are fewer children with more significant disabilities such as intellectual disabilities (formerly referred to as mental retardation), physical and mobility impairments, or multiple disabilities. Children with significant disabilities are likely to receive specialized services that may support success in a childcare setting. Children eligible for and who receive early intervention or special education services have individual plans with goals and strategies for caregivers and providers to use. For children under age three, the plans are called individualized family services plans (IFSPs); for children over age three, the plans are called individualized education programs (IEPs). When these plans are developed, early childhood educators can be essential members of an IFSP or IEP team.[1]

---

[1] Chapter 15: Families of Children with Special Needs or Special Health Care Needs by Krischa Esquivel; Emily Elam; Jennifer Paris; and Maricela Tafoya CC BY

26.4: Learning about Individual Children

Each Child is Unique

Information about a specific disability may give an early childhood educator ideas for how to support a child. However, when serving an individual child, the provider should focus on the child's needs, not the disability or its label. A child with cerebral palsy, for example, may walk with leg braces, use a wheelchair, have minor physical symptoms, or demonstrate a delay in using language. The possible variations within this one label are tremendous, indicating that no single label or diagnosis can provide enough information about a particular child. Early childhood educators need to learn beyond a textbook definition and ask questions with sensitivity and understanding—particularly in talks with parents.

Early childhood educators can go forward setting a tone of welcome and understanding. When a family member shares a child's diagnosis, a good follow-up question is often "And how does that affect _____'s development?" This approach can help assure a family member that the child care provider is sincerely concerned about the child's success and is interested in providing appropriate, individually tailored care. The response from the parent will help the child care provider determine what accommodations might be needed, what other questions may be appropriate to ask, and whether specialists are involved or needed. [1]

---

[1] Chapter 15: Families of Children with Special Needs or Special Health Care Needs by Krischa Esquivel; Emily Elam; Jennifer Paris; and Maricela Tafoya CC BY

26.5: Promoting Inclusive Practices

Inclusion in the Classroom

Inclusion embodies the values, policies, and practices that support the right of every child and their family, regardless of ability, to participate in a broad range of activities and contexts as full members of families, communities, and society. The desired results of inclusive experiences for children with and without disabilities and their families include a sense of belonging and membership, positive social relationships and friendships, and development and learning to reach their full potential. The defining features of inclusion that can be used to identify high-quality early childhood programs and services are:[1]

- Access – providing access to a wide range of learning opportunities, activities, settings, and environments
- Participation – even if environments and programs are designed to facilitate access, some children will need additional individualized accommodations and support to participate fully in play and learning activities with peers and adults.
- Supports – an infrastructure of systems-level supports must be afforded to those providing inclusive services to children and families.[13]

Even if children with disabilities are not currently enrolled in an early childhood education program, educators can still promote inclusive practices. One way is to have pictures, books, and materials that present children with disabilities in a general setting. How people are alike and different naturally arises in an early childhood education setting; a caregiver can take advantage of these opportunities to discuss them. Language use is also critical in developing an atmosphere of inclusion. The best practice is to use "person-first" language when one is talking about people with disabilities. This practice simply means putting the person before the disability: "a child with autism spectrum disorder" rather than "an autistic child."[2]

Exploring inclusion with families, colleagues, and children will suggest other ways to expand inclusive practices. For example, planning staff discussions on specific changes in philosophy, attitudes, and practices goes far toward including children with special needs in a childcare setting. Outside the immediate early childhood education program setting, adults with disabilities in a community might contribute to a care provider's expanding knowledge of issues related specifically to inclusion and to disabilities in general.[2]

---

[1] Introducing developmental disability through a disability studies perspecitve by Emily Brooks and Mariette Bates. This entry is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International license.

[2] Chapter 15: Families of Children with Special Needs or Special Health Care Needs by Krischa Esquivel; Emily Elam; Jennifer Paris; and Maricela Tafoya CC BY

26.6: Successful Inclusion of Children with Special Needs

Making Inclusion Work

As each child is unique, so is each early childhood education program. There is no magic formula for making inclusion work beyond the creativity, energy, and interest that most early childhood educators already bring to their work. Their uniqueness notwithstanding, every program can include children with disabilities successfully. And each makes it work child by child, day by day. A "can-do" attitude among the teachers helps to provide the necessary energy for coming up with solutions to the inevitable challenges. It also helps to have an enthusiastic attitude toward making inclusion work rather than simply fulfilling a legal obligation.[1]

Some children need small changes to the curriculum or minor support to get the most out of certain activities. These sorts of things may consist of fairly simple accommodations, such as providing a special place or quiet activity for a child who cannot participate in large-group activities or making available a special snack for a child who needs to eat more frequently than the typical meal or snack schedule.[1]

Figure 26.6.1: *Individual children's needs will help you decide what adaptations you need to make.* ([2])

Other children may require more specific adaptations that might not be readily apparent. A variety of community resources can help determine what those might be. The family, for example, is always the first and most important guide for what a child might need; after that, an area specialist or a local workshop might be. Beyond the immediate community, a world of literature in books, periodicals, and Websites devoted to disabilities and inclusion can inform an early childhood educator about appropriate adaptations for a child with a particular condition or need.[1]

Programs that begin with a high-quality, developmentally appropriate foundation; a positive attitude on the part of the care provider; appropriate adult–child ratios; supportive administrators; and adequate training for the provider will be in a good position to creatively solve problems for a child with disabilities or other special needs, exactly as it does for children who are typically developing. If a child already has an established diagnosis, trained intervention personnel may be available to assist in this process. One of the biggest roles of a care provider is to facilitate a sense of belonging and inclusion. Several helpful strategies are as follows:

- Start with the assumption that all children are competent.
- Adapt the environment so that it is developmentally appropriate, challenging, and fits the needs and interests of each child.
- While there may be a need to support a child's mastery of a specific skill, keep the whole child in mind, particularly the child's social-emotional experience.[1]

Consider the following questions when adapting an activity for a child with special needs:

- Does the child have an opportunity to be in control of the learning experience?
- Is there a balance between adult-initiated learning and child-initiated learning?
- Can the child make choices while learning the skill?
- Is the child able to initiate their own efforts to practice the skill, with support given by the child care provider?
- Is the child gaining self-confidence and showing the joy of accomplishment while learning?
- Is there room in the activity for the child to make discoveries?

[1] Chapter 15: Families of Children with Special Needs or Special Health Care Needs by Krischa Esquivel; Emily Elam; Jennifer Paris; and Maricela Tafoya CC BY

[2] Inclusion Works! By the California Department of Education is used with permission ↵

26.7: How to Make Adaptions to Materials to Meet the Needs of an Infant or Toddler

Materials and Inclusion

Choosing toys and materials carefully is essential, because the right toys and materials can give children with disabilities a chance to be engaged and to experience success. For infants and toddlers, child care providers typically offer a variety of toys, such as blocks, stacking or nesting cups, and simple shape sorters or puzzles designed for very young children to use. Also, including materials that encourage sensory exploration by using smells, sounds, sights, and textures enhances children's learning and development.[1]

Depending on the individual needs, some toys or materials might require simple adaptations to support the child's ability to use them. For example, attaching hook-and-loop fasteners (Velcro), large knobs, or handles may make it easier for a child with visual or physical-motor special needs to play with blocks or puzzles. Similarly, adding fabric or tabs to the edges of cardboard book pages can make it easier to turn pages. Of course, it's essential to be mindful of potential choking hazards when considering modifying materials.[1]

These are just a few simple and inexpensive strategies to ensure that all children can use materials successfully. Fortunately, family members and specialists familiar with an individual child's development are also a great source of information and ideas for making simple adaptations to support the child's success. Many toys and materials for infants and toddlers already have some of the simple adaptations mentioned above.[1]

Assistive technology can support a child's ability to participate actively in his or her home, childcare program, school, or other community settings. Using electronic toys, switches, or other devices in your child care environment may help an infant or toddler to take part fully in activities. Switches allow children who have limited hand function or muscle control to operate toys or materials that they could not play with otherwise. Sometimes a very young child will need equipment for positioning, such as a specialized chair or stander. Assistive technology and adaptations should be listed in the Individual Family Service Plan (IFSP) if a child has one.[1]

Thinking about how a child with special needs will explore and use your child care environment gives you a chance to consider the strengths of your environment and enhance it as needed.[1]

---

[1] U.S Department of Health and Human Services, Administration for Children and Families, n.d., Creating Inclusive Environments and Learning Experiences for Infants and Toddlers is in the pubic domain

---

26.8: Collaborating for Inclusion

Working Together

Early childhood educators may need to expand how they reach out to families and link with specialists to meet the needs of children with differing abilities and learning characteristics. These two groups of people have vital information to share and can serve as resources to support children in a program. Their suggestions invariably enrich efforts at inclusion. Specialists themselves may even be able to visit a care facility and offer some on-site guidance.

Figure 26.8.1: *Collaboration provides valuable support and insight.* (.*[1]*)

Providing inclusive early childhood education does not mean a caregiver—or even a group of caregivers—has to do the work alone. Everyone has a role to play. The primary role of an early childhood educator is to nurture and support the child's development in a loving and caring manner. Partnerships formed with other adults caring for the child—the parents, health-care providers, or specialists—can complement the efforts of all concerned, especially when everyone concentrates on a particular strength. When the expertise of many are combined, ideas develop and strategies emerge better than those any one person could have developed alone. The result is the essence of true collaboration.[2]

For collaboration to be successful, the following elements are essential:

- Respect for the family's knowledge and experience with the child. They are the first and best resource and should be included in planning and implementing care of their child.
- Clear and regular communication, both informal or planned meetings.
- Time is reserved for collaboration, recognizing that everyone is likely to be pressed for time.
- Everyone has an investment and active involvement.
- Collaborative efforts to provide the appropriate assessments and support services for the child.

More information about identifying children with special needs and providing inclusive care can be found in the publication *inclusion Works* by the California Department of Education.[2]

Figure 26.8.1: *All children need to be able to participate in the early childhood education environment fully*. [2]

[1] Infant/Toddler Learning and Development Program Guidelines by the California Department of Education is used with permission ↵

[2] Chapter 15: Families of Children with Special Needs or Special Health Care Needs by Krischa Esquivel; Emily Elam; Jennifer Paris; and Maricela Tafoya CC BY

26.9: Inclusive Play

Inclusion and Playing

The literature points out that young children move from less complex types of play, such as solitary play, to more complex, partner-dependent types of play, such as parallel play, associative play, or cooperative play (Rubin et al., 1976; Jamison et al., 2012). Typically, developing children can progress from simple to more complex types of play without special teacher support. However, children with disabilities may experience restrictions in attending and in being engaged in activities requiring more complex levels of social play (Sigafoos et al., 1999). They may need adequate support from their environments to spend more time engaged in more complex social interactions with their peers. Literature shows that the social development of children with disabilities and their later social success can be significantly influenced by early interventions targeting social play between children with disabilities and their typically developing peers (Ivory and McCollum, 1999; Craig-Unkefer and Kaiser, 2002; Guralnick et al., 2006). As key elements of children's social environments, both peers and teachers can actively facilitate participation in all types of social play. In fact, beside children's characteristics, a diversity of environmental factors which can affect children's social play are highlighted in the literature, namely classroom characteristics (e.g., toys characteristics, the existence of learning/activity centers), and the types of teacher interactions (Ivory and McCollum, 1999; Guralnick et al., 2006).[1]

[1] Coelho V and Pinto AI (2018) The Relationship between Children's Developmental Functioning and Participation in Social Activities in Portuguese Inclusive Preschool Settings. *Licenced* **(CC BY)**.

26.10: Specific Considerations

Autism Spectrum Disorder -ASD

During the last two decades, research has made tremendous progress with regard to early identification and diagnosis of ASD. As a result, in many cases, ASD can now be reliably diagnosed between 18 and 24 months of age (Ozonoff S, Young GS, Landa RJ, Brian J, Bryson S, Charman T, et al, 2015). Advances in best practices related to early identification are reflected in a 2006 policy statement published by the American Academy of Pediatrics (2006), asserting that Primary Care Providers (e.g., family physicians, pediatricians) administer formal screening tests during every well-child visit scheduled at 18 and 24 months, independent of known risk factors or reported concerns. Moreover, Primary Care Providers are urged to promptly refer children for Early Intervention services as soon as ASD is seriously considered as a possibility for diagnosis.

Among the children with a documented clinical ASD diagnosis, children's median age at first diagnosis was 51 months. The median age of children's first comprehensive developmental evaluation was 40 months, with 44% being first evaluated at or prior to 36 months, and 37% being first evaluated later than 48 months.

The intersection between (1) the complex ECE system in the US, and (2) characteristic delays in ASD diagnoses has important implications for children's access to inclusive ECE environments. On one hand, many children who are eventually diagnosed with ASD are enrolled in ECE programs prior to receiving a formal diagnosis. Thus, ECE teachers serve as an important source of social and professional support during a time when parents begin to recognize concerns about their child's social-communication development, navigate the diagnostic process, and begin to access ASD-specific resources. ECE teachers begin to implement individualized instruction and classroom adaptations prior to children's ASD diagnoses in many instances. On the other hand, because most children with ASD do not receive their formal ASD diagnosis until they are 4 years of age or older, the Pre-K and kindergarten years are often the first realistic opportunity for implementing formal special education services in inclusive classroom settings.[1]

---

[1] Siller M, Morgan L, Wedderburn Q, Fuhrmeister S and Rudrabhatla A (2021) Inclusive Early Childhood Education for Children With and Without Autism: Progress, Barriers, and Future Directions. Is licensed CC B

26.11: Conclusion

Conclusion to Inclusive Caregiving

Teachers will have children in their classrooms with diagnosed and undiagnosed special needs, including those related to their health. Early childhood programs have legal obligations to provide inclusive programs and inclusion benefits for everyone involved (children with special needs, their peers that do not have special needs, families, and teachers).

Having a solid foundation in developmentally appropriate practice, which includes the importance of learning about and meeting the needs of each individual child, goes a long way to providing inclusive early education. Support, accommodations, and collaboration are essential to providing inclusive early childhood education programming.[1]

---

[1] Chapter 15: Families of Children with Special Needs or Special Health Care Needs by Krischa Esquivel; Emily Elam; Jennifer Paris; and Maricela Tafoya is licensed under a Creative Commons Attribution 4.0 International License, except where otherwise noted.

26.12: Additional Resources

Additional Resources for Inclusive Caregiving

Complete self-assessment of inclusive practices in your program using a checklist such as one listed here:

- Checklists for Providing/Receiving Early Intervention Supports in Child Care Settings: Use these checklists to assess your practices to promote learning and development. Provided by the Family, Infant and Preschool Program Center for the Advanced Study of Excellence in Early Childhood and Family Support Practices; part of the J. Iverson Riddle Developmental Center.
- Inclusion Planning Checklist: Center-Based Early Care and Education Programs: Review this checklist for suggested ways to create responsive and effective inclusive environments in child care centers. Provided by SpecialQuest Birth–Five: Head Start/Hilton Foundation Training Program.
- Using the Head Start Parent, Family, and Community Engagement Framework in Your Program: Digital Markers of Progress: Track your program's progress in promoting effective family engagement to support positive outcomes for families and children's development and learning with this tool based on the Head Start Parent, Family, and Community Engagement Framework and Performance Standards.

26.13: References

References for Inclusive Caregiving

- The Future of Education by ACT Government Education is licensed under Creative Commons Attribution 4.0 International unless otherwise stated. ↵
- American Academy of Pediatrics. Identifying infants and young children with developmental disorders in the medical home: an algorithm for developmental surveillance and screening. *Pediatrics.* (2006) 118:405–20. doi: 10.1542/peds.2006-1231
- Image by Leigh Blackall is licensed under CC BY 2.0 ↵
- Family Partnerships and Culture by the California Department of Education is used with permission ↵
- A Guide to Culturally Sensitive Care by the California Department of Education is used with permission ↵
- Inclusion Works! Creating Child Care Programs That Promote Belonging for Children with Special Needs by the California Department of Education is used with permission ↵
- Coelho V and Pinto AI (2018) The Relationship between Children's Developmental Functioning and Participation in Social Activities in Portuguese Inclusive Preschool Settings. *Front. Educ.* 3:16. doi: 10.3389/feduc.2018.00016 This is an open-access article distributed under the terms of the **Creative Commons Attribution License (CC BY)**.
- Craig-Unkefer, L. A., and Kaiser, A. P. (2002). Improving the social communication skills of at-risk preschool children in a play context. *Top. Early Child. Spec. Educ.* 22, 3–13. doi:10.1177/027112140202200101
- Introducing developmental disability through a disability studies perspecitve by Emily Brooks and Mariette Bates. This entry is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International license.
- Child Development Resources by the California Department of Education is used with permission ↵
- Chapter 15: Families of Children with Special Needs or Special Health Care Needs by Krischa Esquivel; Emily Elam; Jennifer Paris; and Maricela Tafoya is licensed under a Creative Commons Attribution 4.0 International License, except where otherwise noted.
- *Chapter 11: Looking at Diversity, Equity and Inclusion by Krischa Esquivel; Emily Elam; Jennifer Paris; and Maricela Tafoya is licensed under a Creative Commons Attribution 4.0 International License, except where otherwise noted.*
- Family Partnerships and Culture by the California Department of Education is used with permission ↵
- Guralnick, M. (2008). International perspectives on early intervention: a search for common ground. *J. Early Intervention* 30, 2. doi:10.1177/1053815107313483
- Nancy Hunt California State University. (n.d.). *Pace - identifying young children for early intervention in California*. Policy Analysis for California Education. Retrieved May 10, 2022, from https://edpolicyinca.org/publication...ion-california is licensed CC BY
- Inclusion Works! By the California Department of Education is used with permission ↵
- · Infant/Toddler Learning and Development Program Guidelines by the California Department of Education is used with permission ↵
- The Glossary of Education Reform by the Great Schools Partnership is licensed under CC BY-NC-SA 4.0 ↵
- Ivory, J. J., and McCollum, J. A. (1999). Effects of social and isolate toys on social play in an inclusive setting. *J. Spec. Educ.* 32, 238–243. doi:10.1177/002246699903200404
- Jamison, K. R., Forston, L. D., and Stanton-Chapman, T. L. (2012). Encouraging social skill development through play in early childhood special education classrooms. *Young Except. Child.* 15, 2. doi:10.1177/1096250611435422
- Foundations of Education and Instructional Assessment. **Authored by**: Jennifer Kidd, Jamie Kaufman, Peter Baker, Patrick O'Shea, Dwight Allen, and the students of Old Dominion University's ECI301. **Provided by**: Old Dominion University. Is licesensed CC-BY-SA
- Definition for Diversity. (2019). Queensborough Community College. Retrieved from https://www.qcc.cuny.edu/diversity/definition.htm ↵
- *Early Childhood Inclusion by DEC/NAEYC—Permission to copy not required—distribution encouraged (page 2)* ↵
- Rubin, K. H., Maioni, T. L., and Hornung, M. (1976). Free play behaviors in middle- and lower-class preschoolers: Parten and Piaget Revisited. *Child Dev.* 47, 2. doi:10.1111/1467-8624.ep12189769
- Sigafoos, J., Roberts-Pennell, D., and Graves, D. (1999). Longitudinal assessment of play and adaptive behavior in young children with developmental disabilities. *Res. Dev. Disabil.* 20, 147–161. doi:10.1016/S0891-4222(98)00038-9
- Siller M, Morgan L, Wedderburn Q, Fuhrmeister S and Rudrabhatla A (2021) Inclusive Early Childhood Education for Children With and Without Autism: Progress, Barriers, and Future Directions. *Front. Psychiatry* 12:754648. doi:

10.3389/fpsyt.2021.754648 This is an open-access article distributed under the terms of the **Creative Commons Attribution License (CC BY)**

- Thought Leaders. (2018). Equity in Education: What it Is and Why it matters. Retrieved from https://www.thinkingmaps.com/equity-education-matters/ ↵
- Diversity, Equity, and Inclusion by Bethany Theme is licensed under CC BY 4.0 ↵
- Ozonoff S, Young GS, Landa RJ, Brian J, Bryson S, Charman T, et al. Diagnostic stability in young children at risk for autism spectrum disorder: a baby siblings research consortium study. *J Child Psychol Psychiatry.* (2015) 56:988–98. doi: 10.1111/jcpp.12421
- U.S Department of Health and Human Services, Administration for Children and Families, n.d., Creating Inclusive Environments and Learning Experiences for Infants and Toddlers is in the pubic domain
- *Policy Statement on Inclusion of Children with Disabilities in Early Childhood Programs by the US Department of Health and Human Services & the US Department of Education is in the public domain (page 2)* ↵
- Diversity and Opportunity by U.S. Department of Education is in the public domain. ↵

CHAPTER OVERVIEW

27: Indoor Environment

27.1: Introduction

Introduction to Indoor Environment

The environment in which infants and toddlers spend their days is often overlooked and requires the same level of attention as all other aspects of care. Health and safety concerns need consideration, but planning must also prioritize how the environment fosters, supports, and encourages building and sustaining relationships.

27.2: The Impact of Our Environment

Environment Effect

Are there certain places you like to visit? A favorite restaurant, a sporting arena, or a good friend's home? What qualities of those places make you feel welcome or secure? What makes you want to go back? Thinking about these places, you might remember the people around you, the room's color, the presence of sunlight, sounds and smells, furniture, accessories, or temperature.

Now consider places you don't like to spend time. Maybe the dentist's office, the airport or a noisy restaurant. What makes these environments less pleasant for you? In some settings, we feel relaxed and comfortable. In others, we feel tense, overwhelmed, and confused. The environment has a powerful effect on us. It influences how we feel, what we do, and the ways we respond. Some of us dislike places where we feel we cannot control or predict our experiences. In some spaces, we may feel we don't belong or are not appreciated.

Just like adults, infants and toddlers are affected by their environments, even if they cannot tell us directly how they feel. It is our job as caregivers to ensure learning spaces make infants and toddlers feel welcome, secure, and ready to learn. (The Ohio State University for the US Department of Defense's Office of Family Policy/Children and Youth, 2021)

A childcare environment is one of the child's most valuable teachers and impacts every facet of a program. Research conducted with the Early Childhood Environment Rating Scale (ECERS) (Sylva et al. 2010) and the Classroom Assessment Scoring System (CLASS) (Howes et al. 2008; Mashburn et al. 2008) indicates physical environment, social-emotional climate, and social interactions all influence a program's overall quality: high-quality physical environments enhance young children's well-being and development. All environments communicate messages. In childcare programs, these messages may convey caregivers' beliefs and values about young children, how children learn, the role of families, and the importance of community. A program's environment should convey to all children that they belong and are safe. [1]

---

[1] California Department of Education. (2019). *Infant/Toddler Learning and Development Program Guidelines, Second Edition.* Sacramento: California Department of Education. Is used with permission.

27.3: Key Environment Elements

What to Include

There is substantial agreement internationally about what is essential in providing for children's developmental needs in center-based childcare (e.g., Lamb and Ahnert 2006). Universally recognized core elements required for children's positive development are: safe and healthy care settings, developmentally appropriate stimulation and opportunities for learning, positive interactions with adults, and the promotion of individual emotional growth and positive relationships with other children (Cryer et al. 2002) (Verner et.al, 2016). Spaces for infants and toddlers can be organized to support a variety of exploration and routines. Most often, the arrangement of play spaces supports different types of learning and experiences, such as: (Lally, Stewart, and Greenwald 2009)

- Small-muscle activity
- Sensory perception
- Large-motor activity
- Creative expression

Additionally, caregivers need space for infant and toddler routines: greetings, departures, eating and feeding, sleeping, diapering, and toileting.

Other areas of exploration to consider when creating an environment include block play, fantasy play, multilevel areas, quiet areas to explore books, and cozy areas (WestEd, n.d.). Dividing the room into areas creates an organized and meaningful environment.

Figure 27.3.1: Infant Environment (Image by Community Playthings is used with permission)

Image by Community Playthings is used with permission

Not only do the types of experiences an environment supports need consideration, but the infant and toddler environment should also:[1]

- Ensure safety
- Promote health
- Provide comfort for children and adults
- Be convenient for children and adults
- Be child-sized
- Maximize flexibility
- Encourage movement
- Allow for choice
- Ensure accessibility

These concepts help programs focus on the overall impact of the entire environment on infants, toddlers, and the adults who care for them.[2]

---

[1] California Department of Education (CDE Press). *Development Foundations: Social-Emotional Development* . Is used with permission

[2] California Department of Education (CDE Press). *Development Foundations: Social-Emotional Development* . Is used with permission

27.4: Key Environment Elements

Safety

Creating spaces for infants and toddlers that ensure safety is one of the most important considerations when designing an environment. Safe settings enable infants' and toddlers' freedom of exploration and support their developing sense of self. For health and safety reasons, it is essential that eating, food preparation, sleeping, and diapering areas are separate from play areas.

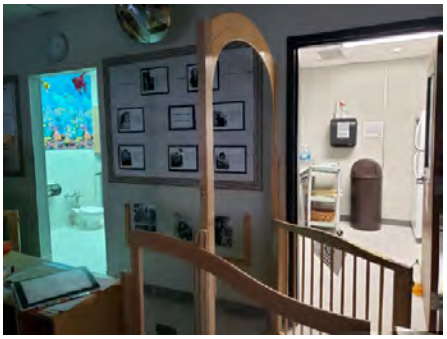


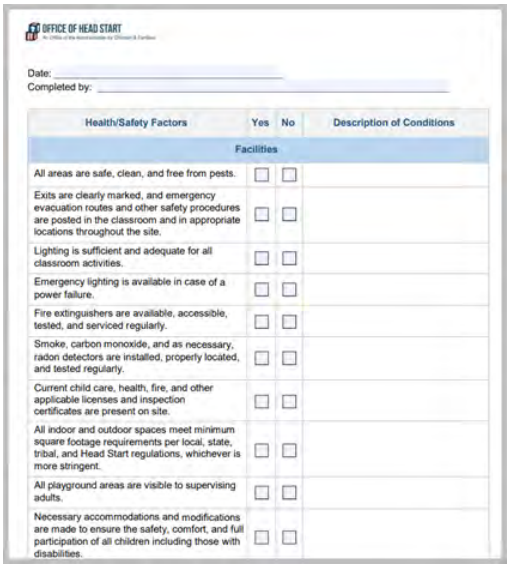
Figure 27.4.1: Toileting and Kitchen area should be separate for health and safety ([1]

Safe environments allow a caregiver to spend less time monitoring infants' and toddlers' safety and frees them up to spend more time on interactions and building relationships. When the environment constantly causes a caregiver to move the infant to a safer location, the child's learning and engagement are interrupted. Instead, set the environment to allow freedom of movement and engagement without excessive restrictions.

Figure 27.4.1: Two infant environments with well-defined areas and freedom of choice for infants. ([2])

As infants and toddlers move around and explore their environment, they will move toys from place to place. As a result, the floor is often strewn with toys. Be mindful that, when toys are scattered, infants' investigation might be interrupted, stopped, or create a potential hazard. Caregivers should periodically pass through the environment, remove items not being engaged with, and return them to designated storage areas. This practice maintains a safe and inviting play space and keeps toys accessible to the infants.[3] With older infants and toddlers, building in time for children to help with cleanup before transitioning to another activity supports responsible caretaking of their environment.

Keeping the environment safe and in adherence to specific licensing regulations and restrictions can be difficult, if not impossible, to keep in memory. Checklists allow regular safety assessments of indoor and outdoor environments. This documentation helps caregivers keep track of these details and maintain a safe environment.[4]



OFFICE OF HEAD START

Date: _____

Completed by: _____

Health/Safety Factors	Yes	No	Description of Conditions
Facilities			
All areas are safe, clean, and free from pests.	☐	☐	
Exits are clearly marked, and emergency evacuation routes and other safety procedures are posted in the classroom and in appropriate locations throughout the site.	☐	☐	
Lighting is sufficient and adequate for all classroom activities.	☐	☐	
Emergency lighting is available in case of a power failure.	☐	☐	
Fire extinguishers are available, accessible, tested, and serviced regularly.	☐	☐	
Smoke, carbon monoxide, and as necessary, radon detectors are installed, properly located, and tested regularly.	☐	☐	
Current child care, health, fire, and other applicable licenses and inspection certificates are present on site.	☐	☐	
All indoor and outdoor spaces meet minimum square footage requirements per local, state, tribal, and Head Start regulations, whichever is more stringent.	☐	☐	
All playground areas are visible to supervising adults.	☐	☐	
Necessary accommodations and modifications are made to ensure the safety, comfort, and full participation of all children including those with disabilities.	☐	☐	

Figure 27.4.1: Health and Safety Screener ([4]

An easy way to create a safe environment and foster relationship building is to meet appropriate group size and child-to-adult ratio limits (Gonzalez-Mena, & Widmeyer Eyer, 2012). Smaller group sizes and lower child-to-adult ratios create and maintain a safe environment for all infants and toddlers.[5] As a baseline, California has licensing requirements to ensure the safety of children in early childhood programs. In California, community care licensing states that infant centers serving children from birth to age 2 need to have a minimum ratio of 1 fully qualified infant teacher to 4 infants. In a room with more than 4 infants, up to a maximum of 12 infants, there must be 1 fully qualified teacher responsible for the direct care and supervision of a maximum of 4 infants. If a fully qualified teacher supervises aides, each aide can be accountable for the direct care and supervision of a maximum of 4 infants. (*Teacher-to-Child Ratios in Child Care Centers* 2016) Many programs go beyond minimum state requirements to ensure children's safety and prevent accidents and injuries.[6]

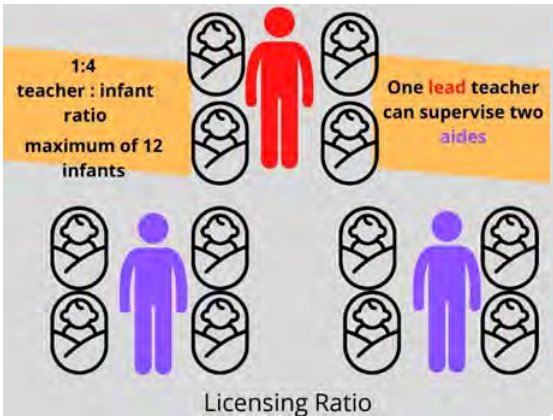


Figure 27.4.1:Licensing Ratio Infant Room[1]

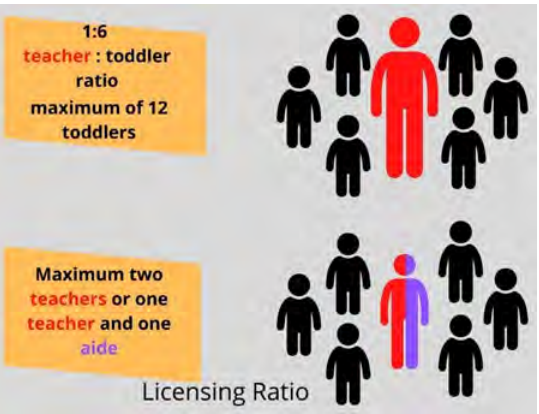


Figure 27.4.1: Licensing Ratio Toddler Component [1]

The Program for Infant Toddler Care recommends ratios of 1 adult to 3 or 4 children and a total group size of 6 to 12 children, depending on their ages. The guiding principle is the younger the child, the smaller the group (*Small Groups in Center-Based Programs* n.d.). A helpful resource for research-based recommendations for group size and ratios is Caring for Our Children FOURTH EDITION National Health and Safety Performance Standards Guidelines for Early Care and Education Programs by the National Resource Center for Health and Safety in Child Care and Early Education, and the Head Start Program Performance Standards.[5]

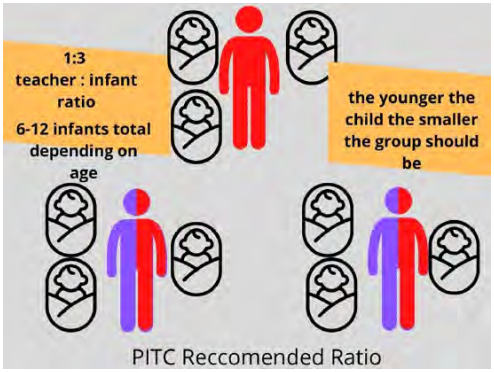


Figure 27.4.1: PITC Reccomended Ratio. ([1])

Safety Of Equipment, Materials, And Furnishings

Equipment, materials, furnishings, and play areas should be sturdy, safe, in good repair, and meet the recommendations of the Consumer Product Safety Commission (CPSC). While not an exhaustive list, programs should attend to the following safety hazards:

- Openings that could entrap a child's head or limbs
- Elevated surfaces that are inadequately guarded
- Lack of specified surfacing and fall zones under and around climbable equipment
- Mismatched size and design of equipment for the intended users
- Insufficient spacing between equipment
- Tripping hazards
- Components that can pinch, sheer, or crush body tissues
- Equipment that is known to be hazardous
- Sharp points or corners
- Splinters
- Protruding nails, bolts, or other parts that could entangle clothing or snag skin
- Loose, rusty parts
- Hazardous, small parts that may become detached during normal use or from reasonably foreseeable abuse of the equipment and that present a choking, aspiration, or ingestion hazard to a child
- Strangulation hazards (e.g., straps, strings, etc.)
- Flaking paint
- Paint that contains lead or other hazardous materials
- Tip-over hazards, such as chests, bookshelves, and televisions

Plastic bags that are large enough to pose a suffocation risk, as well as matches, candles, and lighters, should not be accessible to children. [7]

[1] Image by Amanda Taintor is licesned CC BY-NC

[2] Infant Environment by Above & Beyon Child Care and Education Center,MI is used with permission

[3] California Department of Education (CDE Press). *Development Foundations: Social-Emotional Development* . Is used with permission

[4] Office of Head Start and Office of the Administration for Children and Families. (n.d.). Health and Safety Screener: is in the public domain

[5] U.S. Department of Health & Human Services: Administration for Children and Families. (n.d.). Nurturing Environments. is in the public domain.

[6] California Department of Education (CDE Press). *Development Foundations: Social-Emotional Development* . Is used with permission

[7] U.S Department of Health & Human Services: Administration for Children and Families. ECLKC *Safety of equipment, materials, and furnishings* is in the public domain

27.5: Key Environment Elements- Health

Health

A healthy environment decreases the possibility of contracting and spreading illness and enhances infants' and toddlers' overall well-being (Lally, Stewart, & Greenwald, 2009).[1]

Health concerns must be an integral part of routine care practices, such as washing hands, using gloves, and washing toys. Even well-designed environments that meet the highest standards still require an attentive caregiver to remain healthy. In some cases, staff may need training on the specialized procedures for the health care needs of a child or on making special physical accommodations.[2] Programs should follow a routine schedule of cleaning, sanitizing, and disinfecting. Cleaning, sanitizing, and disinfecting products should not be used near children, and adequate ventilation should be maintained during use.[3]

Figure 27.5.1: Washing hands must be part of routine care to maintain a healthy environment. ([1])

[1] U.S. Department of Health & Human Services: Administration for Children and Families. (n.d.). Nurturing Environments. is in the public domain.

[2] California Department of Education. (2019). *Infant/Toddler Learning and Development Program Guidelines, Second Edition.* Sacramento: California Department of Education. Is used with permission.

[3] U.S Department of Health and Human Services: Administration for Children & Families. *Routine cleaning, sanitizing, and disinfecting*. ECLKC. Is in the public domain

[4] Image by Amanda Taintor is licensed CC BY-NC

27.6: Key Environment Elements- Lighting and Comfort

Lighting and Comfort

An infant/toddler program should utilize a mixture of lighting. Incandescent lighting provides softer light and can be used to focus on areas of learning. Lamps, skylights and natural lighting from windows provide additional lighting options. If fire code allows drape fabric over bright lights to reduce their effect, especially in areas where infants are staring up at lights.

Figure 27.6.1: Natural lighting creates a warm comfortable environment (Image by Jenny Allen is used with permission)

Figure 27.6.1: Overhead light[1]

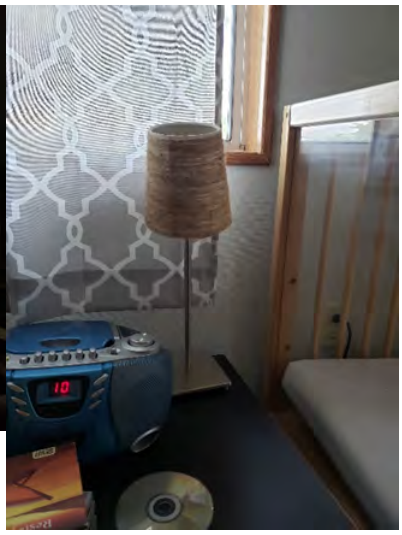


Figure 27.6.1: Small Lamp[1]

Figure 27.6.1: Lamp in Toddler Classroom [1]

Comfort

A comfortable environment everyone can enjoy contributes significantly to a program's quality. Arrange furnishings and equipment so that adults can comfortably observe, supervise, and interact with infants.[2]

Although the focus of supportive learning environments for infants and toddlers is on the children, it is essential to create a physical space supportive of educators who spend much of their day on the floor interacting with infants. (The Ohio State University for the US Department of Defense's Office of Family Policy/Children and Youth, 2021) When caregivers can sit comfortably on the floor, attention is spent engaging in responsive interactions with infants and toddlers rather than finding a comfortable position.[3]

Figure 27.6.1: Creating a comfortable space ([4])

A comfortable environment where adults and children can relax encourages teachers to sit with infants and creates an atmosphere conveying emotional and physical safety to all. Offer places for children and adults to snuggle, like a glider or rocking chair or couch, where adults can hold children in their laps for comforting and quiet interactions.[1]

Figure 27.6.1: Caregiver finds a comfortable place to read with toddlers on the ground. ([1])

Having 1 or 2 adult sized chairs in the room (e.g., a rocker or a sofa chair) can visually communicate to family members (who may be less comfortable in a kid-sized environment) that they are welcome. These adult chairs can serve as a space where family members can read a book to their child during pick-up or drop-off times, provide space for mothers to visit and nurse, and help build a home-like atmosphere in the room. Remember, children's own homes are not all child sized. (The Ohio State University for the US Department of Defense's Office of Family Policy/Children and Youth, 2021)

Figure 27.6.1: Create a comfortable place for caregivers to join activities. [1]

Figure 27.6.1: A comfortable space for caregivers and parents [6]

Figure 27.6.1: A comfortable space for caregivers and parents ([1])

[1] Image by Amanda Taintor is licensed CC BY-NC

[2] California Department of Education (CDE Press). *Development Foundations: Social-Emotional Development* . Is used with permission

[3] Office of Head Start and Office of the Administration for Children and Families. (n.d.). Health and Safety Screener: is in the public domain

[4] Image by Amanda Taintor is licensed CC BY-NC

[5] U.S. Department of Health & Human Services: Administration for Children and Families. (n.d.). Nurturing Environments. is in the public domain.

[6] Image by Kids Work Chicago Day Care is in the public domain

27.7: Key Environment Elements- Convenience

Convenience

Organizing the environment so adults, infants, and toddlers can easily access play materials helps infants and toddlers realize they can do things on their own. It empowers children to try out ideas and use new materials. When organizing for easy use, think about storing similar materials together. Similar materials are things that go together or are necessary for certain activities. For example, baby dolls could be stored near blankets or other dramatic play items like play dishes and spoons. Soft blocks could be stored near objects like nesting cups or stacking rings so that infants and toddlers can combine these materials in their exploration.

For example:

- Storing books on a shelving unit that allows children to see the entire front covers may ignite greater interest in reading and make it easier for children to choose a book that sparks their interest.
- Storing simple wooden puzzles on a puzzle rack makes it easier for children to select a puzzle and return it to its place when they finish playing.

Figure 27.7.1: Shelving with open front to encourage interest [1]

Figure 27.7.1: Books on a low shelf encourage infants to engage with the books[1]

Storage types, including bins, baskets, and containers, affect how easily children can access materials and put them away.

Figure 27.7.1: Tissues boxes allow easy access to materials. [3]

Figure 27.7.1:Open basket also allows easy access to materials.[3]

Storage bins should be without lids for any materials children need to access themselves. They should be made of lightweight material (e.g., plastic vs. metal) and not too large or too heavy so that children can handle them independently. Clear plastic bins allow children to see the materials inside easily. Use containers that are large enough to accommodate materials without tipping over. Baskets should be free of anything that could poke or scratch children and woven tight enough so the contents cannot fall out through the holes.

Figure 27.7.1: Open shelves with open baskets make access easy for infants and toddlers[3]

Figure 27.7.1: Open Bins creates opportunities for easy access. [3]

Storage space for adult personal items (e.g., purse, coat) may help reduce safety concerns of both parents and caregivers. If possible, caregivers should have a quiet area (e.g., lounge) to spend breaks and recoup their physical and emotional energy. Such space can also be used for private conversations between caregivers and parents. (The Ohio State University for the US Department of Defense's Office of Family Policy/Children and Youth, 2021) Some environments might be limited in space: program managers and caregivers will need to think creatively about storage space for personal belongings or areas to recuperate.

Figure 27.7.1:Locked personal storage areas ([3]

[1] Infant Environment by Jennie Powell is used with permission

[2] Infant Environment by Above & Beyond Child Care and Education Center, MI is used with permission

[3] Image by Amanda Taintor is licesned CC BY-NC

27.8: Key Environmental Elements- Meeting Individual Needs- Child Size and Flexibility

Individual Needs- Child Size and Flexibility

Caregivers must create a flexible environment that is easily arranged to meet infants' individual needs and preferences.[1] Infants and toddlers grow and develop quickly and at their own pace. Environments must meet their current developmental needs, as well as emerging skills, while keeping in mind the appropriateness and safety of the space and furniture. The space and furnishings should come together to create a learning environment tailored to meet the needs of developing infants and toddlers.

Figure 27.8.1: Toddler Environment. ([2])

Caregivers can support the natural desire of infants and toddlers to actively explore their environment with their whole bodies by knowing the progression of developmental milestones. This knowledge helps caregivers better understand and predict what interactions, materials, and experiences will be safe, engaging, and most supportive to promote learning and development.

Figure 27.8.1: Environment with active exploration opportunities. ([3])

Evaluating the environment and making appropriate changes is an ongoing process that addresses infants' and toddlers' unique needs and values their developing skills and interests. An example of a flexible environment includes low chairs and tables where toddlers can eat or work on simple art projects or puzzles. These features allow easy movement and create flexible spaces.

Figure 27.8.1: Low tables and chairs meet the developing needs of infants and toddlers.[1]

Figure 27.8.1: A low table allows access to infants of difference development needs. [4]

The infant and toddler childcare environment is "… never determined once and for all. Planning, arranging, evaluating, and rearranging is an ongoing process as caregivers strive for quality and find what works best for them and for the children as they grow and change" (Gonzalez-Mena & Eyer, 2012, p. 285).

Figure 27.8.1: Large foam blocks can be configured to provide access to a wide range of developmental needs. ([4])

Family childcare can be an excellent example of creating flexible environments to meet the needs of various development abilities and chronological ages while accommodating the adults who utilize the space.

Commitment to ongoing reflection and adaptation enhances the quality of infant and toddler spaces and supports children's continual exploration and learning (Bergen, Reid, & Torelli, 2009)[1]

---

[1] Office of Head Start and Office of the Administration for Children and Families. (n.d.). Health and Safety Screener: is in the public domain

[2] Toddler Environment by Above & Beyond Child Care and Education Center,MI is used with permission

[3] Infant Environment by Jennie Powell is used with permission.

[4] Image by Amanda Taintor is licensed CC BY-NC

27.9: Key Environmental Elements- Movement And Choice

Movement And Choice

Like adults, infants and toddlers become frustrated when they cannot easily move through an environment or find what they need. Infants and toddlers learn about and experience life through sensory and motor explorations. They touch, taste, smell, observe, and move in the world around them to make meaning and build concepts. The floors, ceiling, lighting, walls, and furniture all contribute to the learning of infants and toddlers. To fully benefit from the environment, infants and toddlers require safe freedom of uninhibited movement as much as possible throughout the day. Freedom of movement supports children's growth by allowing space for practicing physical skills as they need and want. (Lally, Stewart, & Greenwald, 2009). [1]

An environment allowing infants and toddlers to move around freely helps them fully explore the space and do what comes naturally, including crawling, scooting, running, climbing, jumping, and walking. Caregivers should avoid placing infants in restrictive devices, such as swings, bouncy seats, or highchairs for extended periods (or at all if possible). Restrictive devices inhibit natural movement and prevent children from using their muscles to roll, scoot, and pull themselves up.

Figure 27.9.1: Restrictive devices are not recommended for use in group care ([2])

Clear pathways for infants and toddlers allow them to move easily through the room while also creating a defined space for protected exploration. The furnishings and equipment should allow a variety of movement choices so infants can crawl through, pull up on and, as they develop physical skills, climb on and jump off.[3]

Figure 27.9.2: Large foam blocks provide various movement opportunities. ([4])

Soft, thick floor coverings, such as vinyl mats, help mobile infants feel comfortable moving on the floor.

Figure 27.9.3: Large plastic mats provide additional comfort for infants moving on the floor.

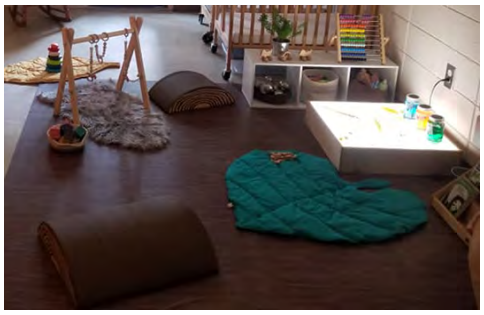


Figure 27.9.4: Soft mats on the floor create more comfort for mobile and non-mobile infants. [5]

Adding unique and exciting features such as tunnels encourages further motor skills and exploration development.

Figure 27.9.5: A tunnel with plastic balls adds fun and playful experiences. [6]

Figure 27.9.6: Add tunnels for more movement opportunities. ([7])

For toddlers, slopes, stairs, or small ladders allow the opportunity for safe vertical movement. Offering infants and toddlers a variety of choices throughout the day helps them stay safely interested and engaged.[8]

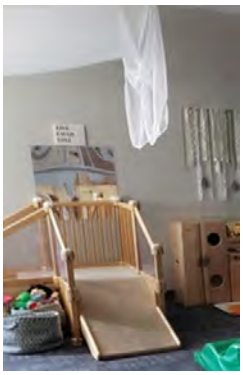


Figure 27.9.7: Provide ramps for additional movement opportunities.[4]

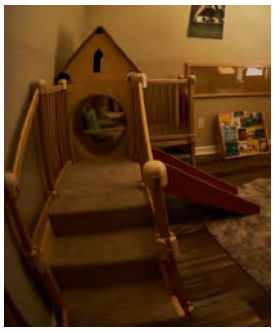


Figure 27.9.8: Stairs and slides create additional movement choices. [9]

A positive environment allows children to move freely without hearing "no" as they explore, make choices and interact with their surroundings.[10] Young children can follow their interests and develop their abilities within an environment that is respectful and encouraging of them.[1] When children feel supported and engaged in an “environment of yes”, they are less likely to exhibit behaviors that are challenging to adults.[11]

For infants and toddlers, every aspect of the world is exciting and engaging. Environments should support them in discovering that they can find and use materials independently. When infants and toddlers spend their days in a well-organized environment with clear choices, they find fascinating materials and can concentrate their efforts on exploring and learning. Storing materials on low, open shelves lets children see the materials available, make a choice, and return the item with less adult support. As soon as children can creep or crawl to materials, they should be encouraged to select and access the materials they are interested in playing with on their own. (The Ohio State University for the US Department of Defense's Office of Family Policy/Children and Youth, 2021) A disorganized or overstimulating environment creates difficulty for infants and toddlers to focus on a particular environmental aspect. Too many options can be overwhelming.

Arrange the environment so that infants and toddlers can concentrate on the things that interest them. Creating a space that protects young infants from the movement of older children allows exploration with confidence. Well-defined areas protected from traffic patterns let toddlers play without interruption. It is also essential to consider ways to provide appropriate risk-taking opportunities as young children seek out challenges as they grow and learn.[1]

Figure 27.9.9: Consider adding a low bench outside for additional movement opportunities. ([4])

When children learn to use signs and symbols in their environment it promotes independence. Caregivers support independence by carefully labeling objects and the places where things belong. The best labels use written words plus pictures or parts of the object (like a puzzle piece on a shelf that contains wooden puzzles). Labeling not only helps children learn to access toys and eventually clean up independently, but it also creates a print-rich environment. Caregivers discover they give fewer directions and reminders when appropriate labels are used. When children can engage independently with materials, caregivers have more time for interacting and expanding learning opportunities.

Figure 27.9.10: Use labels [4]

Figure 27.9.11: Label shelves with both words and pictures.[4]

[1] California Department of Education. (2019). *Infant/Toddler Learning and Development Program Guidelines, Second Edition.* Sacramento: California Department of Education. Is used with permission.

[2] Image by Paul Ma from Pixabay

[3] Office of Head Start and Office of the Administration for Children and Families. (n.d.). Health and Safety Screener: is in the public domain

[4] Image by Amanda Taintor is licensed CC BY-NC

[5] Young infant environment by Chantel Hunter with Turning Sun isi used with permission.

[6] Image by Gurpreet Bhogal is licensed CC: BY-NC

[7] Image by Molly Ram is licensed CC: BY-NC

[8] U.S. Department of Health & Human Services: Administration for Children and Families. ECLKC Nurturing Environments. is in the public domain.

[9] Image by Green Tree Community School, LLC is used with permission.

[10] The California Infant/Toddler Curriculum Framework by the California Department of Education is used with permission (2012)

[11] U.S Department of Health and Human Services: Administration for Children and Families. *Responsive Learning Environments*. ECLKC. Is in the public domain.

27.10: Key Environmental Elements- Engagement

Engagement

Offering items of beauty or wonder in the classroom invites infants' and toddlers' exploration and engagement by using provocations. A provocation is a picture, experience, or item that provokes thought, interest, questions, or creativity (Edwards, 2002). Provocations can help "provoke" young children to use, think about or see materials in new ways. A good classroom design provides options to incorporate provocations easily. Inspiration for provocations will often come from children's current interests or emerging developmental skills (e.g., crawling or grasping).

Provocations could be:

- **Pictures**: Including pictures of their interests can help extend the exploration of specific concepts and send the message that children's ideas are valued. Use photos of authentic items as much as possible. In conjunction with personal storage and children's artwork, photos also communicate that this space belongs to the children.
- **An event or experience**: For example, nature walks outdoors or a classroom "picnic."
- **Books**: Strategically placing books relevant to children's current interests throughout the room can change play and engagement. For example, a book on construction sites next to the blocks.
- **Items from nature**: This can include items collected from outside, such as leaves, pinecones or a vase of fresh flowers.
- **Simple changes in the display**: For example, a child-safe mirror on the floor for children to see themselves as they crawl over it, or doll babies in dramatic play with small bowls and spoons are an invitation to the older infants and toddlers to "feed" the dolls. Display changes can also include rearranging climbing equipment to offer new challenges or incorporating different textures and colors on the floor.

Figure 27.10.1: Example of Loose Parts.[1]

Figure 27.10.2: Example of Loose Parts ([1])

Figure 27.10.3: Example of Loose Parts ([2])

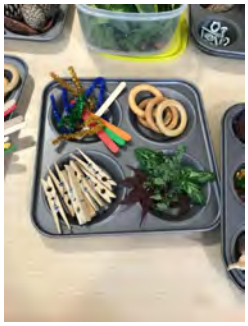


Figure 27.10.4: Example of Loose Parts[2]

Provocations guide, help, and inspire infants and toddlers to engage with certain materials or spaces. However, they should never dictate what children do or how they engage with the materials. For example, perhaps some empty paper towel tubes and scarves are set up for children to explore by pushing the scarves through the tubes, but instead, the children enjoy throwing the scarves in the air and watching them fall (The Ohio State University for the US Department of Defense's Office of Family Policy/Children and Youth, 2021).

[1] Image by anonymous **is used with permission.**

[2] Image by Stephanie Ashworth is used with permission.

27.11: Key Environmental Elements- Welcoming Families

Welcoming Families

An open-door policy that encourages families to come into the room and interact with their children and the caregivers sends the message that families are always welcome.

Ask family members about ways to help the program feel more like home for their children.[1] The environment and materials should reflect the cultural and linguistic diversity of the children and families served. It is crucial for teachers and program leaders to consciously consider the cultural context of their environments and the cultural messages their program sends. Staff and families can work collaboratively to create familiar settings and experiences for the children.

Programs can create a climate of respect for each child's culture and language through authentic, meaningful connections to the young children's experiences in their homes and communities. Environment design is a critical piece of this objective. These genuine connections enhance learning and a sense of belonging, especially for culturally diverse children. All aspects of the program, including the environment, must reflect or represent the families' cultures, customs, and languages (including the teachers, other staff, and volunteers).

Some ways to create an inclusive environment include (but are not limited to):

- Displaying family artifacts and pictures of the family members' unique talents (for example, musical or artistic) prominently throughout the environment
- Incorporating environmental print that reflects the languages of the children into learning activities and routines
- Ensuring play materials, room decorations, and celebrations reflect the various backgrounds of the children in the program and other racial and ethnic groups in the community
- Choosing materials that reflect the cultures and languages of children and families enrolled in the program by displaying photographs of the children and families to reflect families' homes and everyday lives.[1]

Welcoming families should also include providing a comfortable space for nursing mothers to feed their babies. For some centers, a genuinely private space might be difficult to create. Communicating with nursing mothers about areas close by, even an administrator's office, lets mothers know they are welcome, and the program supports the choice to breastfeed.

---

[1] Office of Head Start and Office of the Administration for Children and Families. (n.d.). Health and Safety Screener: is in the public domain

---

27.12: Supporting Development

The environment needs to be safe, support health, be comfortable and convenient, and support development across domains.

Sensorimotor Development

Infants and toddlers learn about and experience life through sensory and motor explorations. They touch, taste, smell, observe, and move through the world around them to make sense of it. Children from birth to 3 years of age live directly through their senses. Therefore, the environment in which infants and toddlers are placed has a tremendous impact. —Lally, Stewart, & Greenwald, 2009, pp. 1.[1] An environment supportive of sensorimotor development includes areas of diverse physical exploration: vertical spaces, small spaces and multi-height obstacles to navigate. Caregivers must go beyond using sensory tables and allow children full body exploration of the environment using their senses. As infants and toddlers move around the environment, caregivers should talk with the child about the use of their senses in exploring and invite the infant or toddler to explore materials or substances using their senses.

Figure 27.12.1: Sensory development can be supported in the outdoor environment as well as the indoor environment. ([2])

Language And Communication Development Through Literacy-Rich Environments

Arrange the environment to make it easy for infants to communicate with adults, look at books, listen to stories from books, engage in fingerplays, sing, and participate in other activities. By using low shelves, dividers, and other furniture, children can view one another easily to foster communication between peers and teachers.

Figure 27.12.1: Easily accessible books support a literacy-rich environment ([3]

Figure 27.12.1: Low seating next to accessible books encourages literature engagement ([4])

Efforts to foster communication and language development also promote emergent literacy in infants and toddlers. It is essential to provide a learning environment that offers easily accessible and age-appropriate books: creating an environment where books are readily available means infant and toddler caregivers can model engaging in books as part of the curriculum. When infants are interested in looking at books with their teachers, it is important for teachers to embrace such opportunities.[5]

Cognitive Development

When preparing an environment to support cognitive development, consider novel items, provocations, predictability, and familiarity. Infants enjoy searching for favorite and familiar toys. Finding everyday items gives them a sense of predictability and competence, the feeling of "I know this!" or "I know where to find that." Infants also enjoy new, inviting objects to pique their curiosity. Provide a primary selection of toys each day, and store the toys in consistent, predictable, and labeled locations in indoor and outdoor play environments; this will help the infants know where to find specific toys. Rotate new items into the play areas regularly to support curiosity. Base the rotation of play materials on careful observation and documentation of infants' play rather than a predetermined schedule. Use interesting arrangements to engage and extend the learning of a curious toddler.[5]

Social-Emotional and Relationship Development

Environments affect everyone to varying degrees. Spaces may influence infants and toddlers more than older children and adults since young children cannot change their environment or move to another area (Lally, Stewart, & Greenwald, 2009).

The spaces a child inhabits introduce the places where people feel welcome, meet, rest, and eat. When these places are familiar ones, similar to the child's home, the environment can help an infant feel safe and connected to the place.

A well-designed environment sets the tone for intimacy that will strengthen the quality of relationships and interactions.[6]

Making thoughtful and careful decisions about a child’s surroundings creates a nurturing, relationship-supporting environment in center-based and home-based childcare settings. Creating an environment that promotes respectful and responsive relationships is crucial to infants' and toddlers' growth and development.[7] Young children develop unique relationships with teachers and rely on these relationships for security and support in the learning environment.[8] Including pictures of the children and their families, providing personal storage space, and displaying children’s artwork communicates to infants and toddlers the space belongs to them. When hanging pictures or adding decorative touches, place them at the children’s eye level to reinforce that they are valued members of the classroom space. Consider taping photos to the floor so mobile infants can see them as they move through the room. (The Ohio State University for the US Department of Defense’s Office of Family Policy/Children and Youth, 2021)

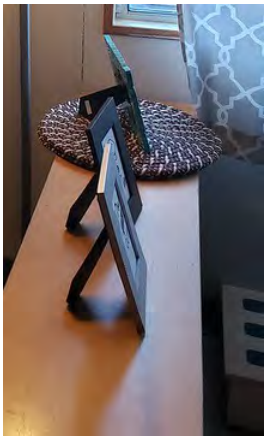


Figure 27.12.1: Framed pictures are excellent ways to highlight children's families in accessible ways. ([3])

Figure 27.12.1: Create documentation in your environment at eye levels in accordance with their intended audience. ([3])

Another aspect of a relationship-supporting environment is a home like atmosphere. Young children spend many hours in the program setting. Therefore, it should become a home away from home: a place of community and togetherness. Children are more likely to feel they can be themselves and have a sense of belonging when their classroom environment is like their homes. Family childcare homes already provide this atmosphere and do not look like miniature childcare centers. [7]

There are many ways to add personal touches to a classroom to create a home like feel.

- Use light and color to create a pleasing, calming and inviting effect. Create natural or soft lighting with windows or lamps. Spending extended periods of time in the presence of bright lights and bright colors can be overwhelming.
- Use fabric and other sound-absorbing materials to reduce unwanted noise.
- Utilize soft furniture, such as a couch or large armchair.
- Incorporate nontoxic plants.
- Decorate with throw pillows or cushions, area rugs and repurposed furniture.
- Display family photos of the children and staff.
- Use inexpensive frames to hang children's artwork on the walls.
- Decorate in neutral paint colors

In addition to places for privacy and quiet areas

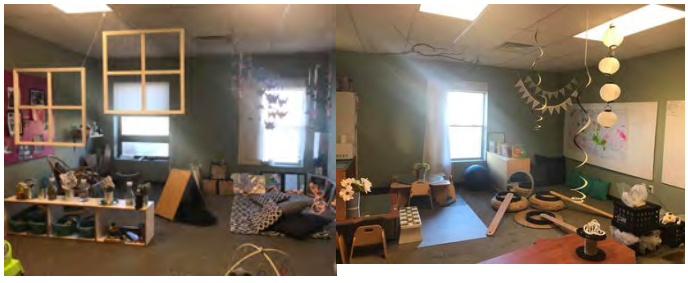


Figure 27.12.1: Home like infant environments. [9]

---

[1] Office of Head Start and Office of the Administration for Children and Families. (n.d.). Health and Safety Screener: is in the public domain

[2] Image by Amanda Taintor at Clovis College Child Development center is licensed CC: By-NC

[3] Image by Amanda Taintor at Reedley College Programs for Children Lab School is licensed CC: By-NC

[4] Image by Amanda Taintor is licensed CC: By-NC

[5] The California Infant/Toddler Curriculum Framework by the California Department of Education is used with permission

[6] California Department of Education. (2019). *Infant/Toddler Learning and Development Program Guidelines, Second Edition.* Sacramento: California Department of Education. Is used with permission.

[7] U.S. Department of Health & Human Services: Administration for Children and Families. (n.d.). Nurturing Environments. is in the public domain.

[8] California Department of Education. (2019). *Infant/Toddler Learning and Development Program Guidelines, Second Edition.* Sacramento: California Department of Education. Is used with permission.

[9] Image by INSPIRE BILINGUAL EARLY LEARNING CENTER in Taos NM

27.13: Division and Definition of Space

When designing an infant or toddler classroom or family childcare program, it is crucial to create defined, purposeful spaces.

Learning Areas

A learning area within an infant-toddler room creates nurturing learning experiences, with each area supporting different developmental domains. Examples might include an area for climbing or grasping to assist with gross or fine motor development or a section for exploration of specific ideas (e.g., a block area to explore cause-and-effect and balance). Although learning areas may primarily support specific development or interests, we know that infants learn holistically in all domains. Learning areas should include exciting possibilities, while also serving multiple functions. Sensory exploration by infants and toddlers will happen in all care and learning areas and need not be contained to a specific area with that label. In addition, a cozy book area provides young children with early literacy experiences and provides a quiet, calm space to relax alone or with a caregiver. The learning environment should be accessible and adaptable for children with disabilities and other special needs.

Some examples of learning areas:

- Reaching, grasping, and kicking areas (various hanging materials)
- Climbing area (stairs, platforms, risers, low cubes)
- Mirror area
- Blocks, building, and construction area
- Soft toy area
- Books and language areas
- Dramatic play area (play kitchen, dress-up materials)
- Messy area (art and expressive materials, sand and water table)
- Sound area (chimes, instruments, music, CDs and player)
- Sensory area (scented items, natural materials)

Figure 27.13.1: Create easily accessible art areas. ([1])

PageIndex{2}\): sensory area for toddlers with a variety of objects. ([2])

Figure 27.13.3:A mirror by loose parts is an additional way to create provocation of loose parts. ([3])

Carefully consider the arrangement of neighboring learning areas. It can be helpful to place quieter learning areas next to one another or near the napping space. Anticipating how infants and toddlers may want to use materials between areas offers them freedom to move materials from one learning area to another. This also gives infants and toddlers the opportunity to take charge of their learning and make their ideas come to life. For example, moving a dinosaur from the block area to the dramatic play area to be "washed" in the play sink offers toddlers a way to express their budding imaginations.

Figure 27.13.4: Use light tables with a variety of objects to future sensory interest. ([1])

For rooms with only young infants, setting up specific learning areas may not be appropriate, as the entire room forms the learning area for infants. However, caregivers should offer various experiences and materials for infants and toddlers and rotate materials or rearrange spaces as children's developmental needs change. Providing too many materials at one time may overstimulate children.

Figure 27.13.5: Infant environment. ([5])

Even though caregivers create learning areas, infants and toddlers love to explore and should be allowed the freedom to carry toys and materials from one area of the room to another. Rather than limit movement between spaces, recognize the value in these behaviors and find ways to support this natural exploration of materials and space. Exploring and moving materials is an excellent topic for creating documentation for analysis and reflection when creating curriculum. What trends are observed in the movement of materials from one area to another? What do the infants and toddlers do with the moved materials? [6]

Display Areas

Children's art can be displayed in ways that communicate "This is a child's place" and "You belong and what you create is valued." Displays of children's art should be aesthetically pleasing and at their eye level, without making the environment overstimulating or visually cluttered. When documentation panels are displayed at infant and toddler eye level, they allow infants and toddlers the opportunity to revisit their learning in a format that is easy to visually observe and provides visual prompts for caregivers to have conversations revisiting the experience. Viewing documentation invites curiosity and confidence as infants and toddlers revisit their work and contemplate their accomplishments (Malaguzzi,1998).

Figure 27.13.6: Many infant and toddler furniture makes it easy to add documentation to it at eye-level. ([7])

Entrance and Family Communication Area

Design an environment that displays interest in and respect for all the families in the program. It is essential to talk with families every day at drop-off and pick-up times to exchange information about their children's experiences at home and in the program. Support open communication by having a space in the environment for each child, such as a cubby, bin, or clipboard. In the parent area (or a place that is easily accessible), provide daily notes for families that describe how their children's meals, naps, diapering/toileting, and play occurred throughout the day. Space for parents to leave notes (if there isn't an opportunity to share information in person) can also be included.

Create a space to post important information for families, such as a class calendar, parenting tips, or photos of children exploring in the program. In center-based care, a bulletin board somewhere in the room or in the hallway outside the room is a great place to post this information.

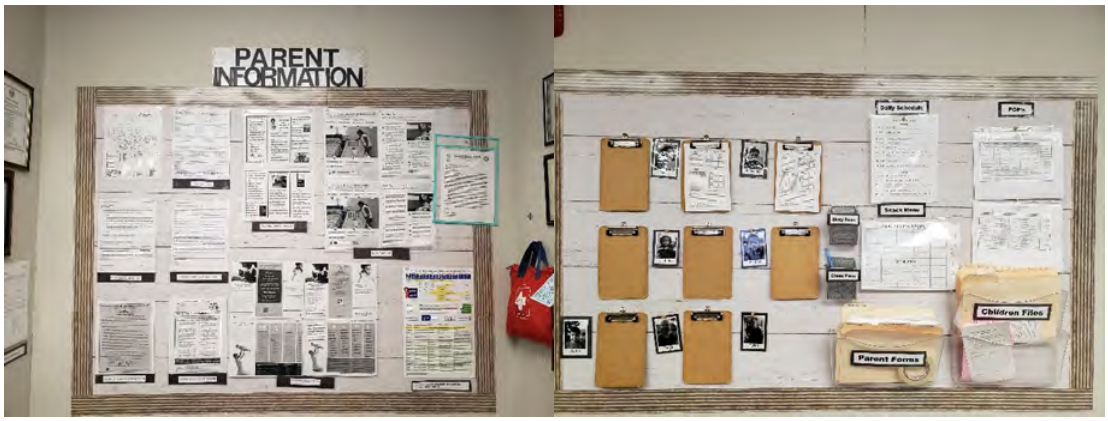


Figure 27.13.7: Various ways to communicate with families. [7]

Family childcare providers might use a refrigerator door or hang a whiteboard near the front entrance.

Whether family childcare or center-based care, place communication areas away from the flow of traffic, where families can easily see them and talk with staff and other families without interrupting or interfering with the exploration of other infants and toddlers in the room.[8]

Sleeping and Napping

Napping spaces must feel safe, secure, and peaceful like the bedroom in a home. Separate napping places from areas where large-motor activities occur, preferably in spaces with limited traffic. Different sleeping areas, within line of sight of caregivers, for young infants help keep their schedules while still being monitored.

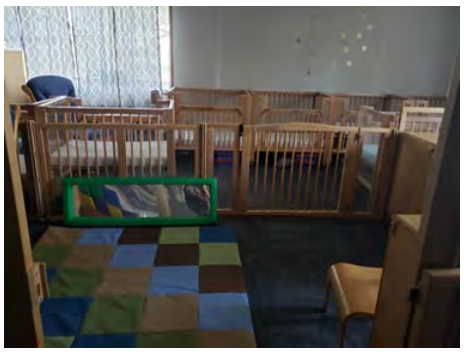


Figure 27.13.8: A separated nap area with clear line of sight. ([7])

Inside areas should be well ventilated. Use a dimmer switch to turn the lights down low or off if possible. In rooms that do not allow for differentiation of lighting, explore safe ways to cover or dim the lights above sleeping areas.

To create a more home like and peaceful space, include some plants and soundless hanging mobiles in the area for children to view. In some cases, a radio or white-noise machine can mask traffic, construction, or other significant noises that interfere with sleep.

If utilizing an outdoor napping space, select a well-shaded area.

Have mats, cots, or cribs that feel cozy and comfortable, and are child sized. A firm, fitting mattress in a sturdy crib, in which all pillows, fluffy quilts, comforters, sheepskin, stuffed toys, and other soft products are removed, reduces risk factors for Sudden Infant Death Syndrome (SIDS) in young infants under 8 months old. Each infant and toddler should have a spot to sleep. Label cribs or find a consistent area for a toddler to nap. Allowing toddlers to sleep in the exact location each day helps support routine and clear expectations of the routine. Toddlers will know where to go and when it's time for a nap. Port-a cribs save space but are not very sturdy. Cots made to stack and store, or mats work well for toddlers.

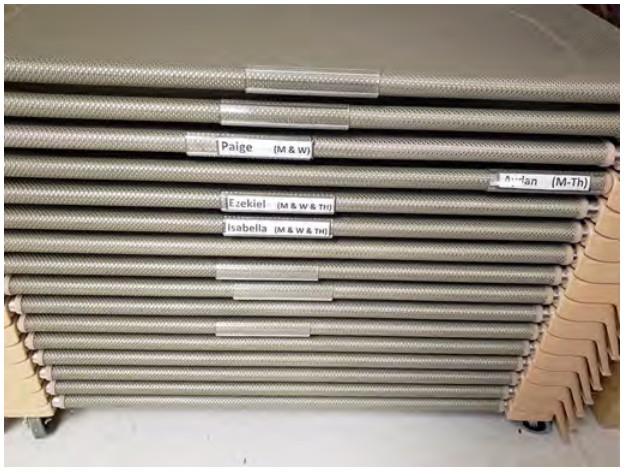


Figure 27.13.9: Label cots for health and safety. ([7])

When covered with a blanket, cots are comfortable. If the sleeping area is part of a large room, set it off from activity areas with a divider at least 4 feet high. When permitted by fire codes, fabric banners hung from the ceiling can act as soft walls. A corner works best because there are 2 existing walls to work with. Use many fabrics – cushions, pillows, blankets, quilts – to absorb sound. Put up wall hangings but keep colors and patterns neutral and low-key. Storage for bedding must be accessible but out of children's reach. The best storage has compartments, each labeled with the child's name and big enough for the child's blanket, favorite toy, and sheet. *Lally, Steward, and Greenwald*,

Figure 27.13.10: Second set of sheets labeled with child's name under the shared crib. ([7])

Diapering and Toileting Areas

The diapering and toileting area should contain changing tables, sinks, and storage for supplies. Toileting is something children learn to do for themselves when developmentally appropriate for their unique timeline. The diapering and toileting setup will make that learning easy or difficult. Store all the diapers and needed supplies nearby. Include a foot-operated, motion-sensitive wastebasket next to the diaper changing area lined with a plastic liner for easy disposal. Diapering surfacea should be about 36 inches high. Make the surfaces easy to wash to help keep it germ-free. Supplies for cleaning and disinfecting should be readily available but out of reach of children.

When using diaper table paper, keep the roll at the end of the changing surface so the old piece is easily thrown away. Clean and disinfect the surface, then roll out a new piece. The whole diapering setup needs to be close to a sink to promote handwashing and must also be separate from the food preparation area. Diaper tables should have a 3-inch lip to prevent an infant from rolling off the table.

Figure 27.13.11: Diapering area with separate detached sink, storage area above for each child's changing supplies. ([7])

If toddlers are using bathrooms with toilets, child sized toilets are preferable. Although flush toilets are preferred, “potty areas” also work if they are in a well-ventilated place near a bathroom with running water and away from the food area. Toileting sites must be easily accessible to supervise toddlers. Provide more than 1 potty as 2 or 3 toddlers can sit on potties simultaneously; the children can interact and learn from each other. Do not clean potties in the same sink where handwashing occurs. Instead, empty used potties into a toilet and wash in a utility sink. Keep toilet paper, paper towels, liquid soap, handwashing facilities, and sanitizing supplies near the potty.

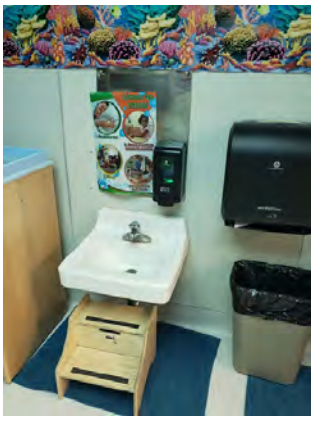


Figure 27.13.12: Steps add access for different developmental needs. ([7])

When toddlers use a bathroom, they must have a teacher with them. The bathroom should be out of bounds or locked when not in use to keep toddlers from playing in there. Bathrooms with half walls provide a sense of privacy while allowing teachers to supervise visually both inside and outside of the bathroom area. Half walls also provide a visual connection for other children when their primary care teacher cares for another child. The toileting area is often neglected when setting up the environment. Small touches can make this area inviting and friendly. Create an attractive and cheerful toileting area for toddlers; this may be a space they spend a lot of time in if they are potty training. Put pictures on the wall and use color to brighten the area (Lally, Stewart, and Greenwald 2009).

Mealtime

Eating areas for toddlers who can feed themselves encourage the development of fine motor skills. When planning these areas, use preventative measures to ensure safe and healthy experiences for infants and toddlers.

Design an area for meals that includes appropriately sized furniture for infants and toddlers as well as comfortable seating for caregivers, and nursing mothers. When arranging this area, consider what feels comfortable holding a child, feeding her a bottle, and sitting next to her at a table while she feeds herself.[8]

Figure 27.13.13: Family eating style. ([4]

Eating areas require accessible storage and easy-to-clean surfaces. Children need low, comfortable places to eat. Arrange a place for caregivers to sit with children while they eat. Low tables for up to 4 children work well and can be used for arts and crafts activities at other times. Consider tables that stack or fold out from the wall: they can be used for mealtimes, then stored away to enlarge the play space.

Young infants should be fed one at a time in the infant caregiver's arms in a comfortable adult sized chair with necessary items nearby on a table or shelf.

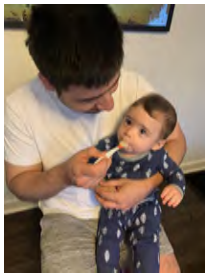


Figure 27.13.14: Lap feeding can be more comfortable for young infants. ([9])

Several options are available for feeding older infants. Ideally, meals and snacks are served at a child sized table with small chairs and stools. When an infant begins to climb onto and sit on the stools, it is a sign that they are ready for low tables that they can get into and out of on their own. Leave a stool in the play area so infants can practice getting on and off.

For mobile infants, use child sized tables and chairs. A table for infants aged 12 to 18 months should be about 12 to 14 inches high. Toddlers need a table 16 to 18 inches tall to comfortably sit and eat, as well as to stand while engaging in messy play. When toddlers are seated, their feet should touch the floor. If their feet cannot touch the floor, the children will not feel stable while sitting and will have trouble using their hands and arms easily. Tables should be below chest height.

Toddlers will enjoy sitting in groups of 2 to 4 at small tables. Serve the food family style unless toddlers bring their lunches. When children and adults eat together, they engage in social time, helping to strengthen and support relationships.

Figure 27.13.15: Toddlers enjoy exhibiting their growing independence and skills through self-feeding. ([1]

Natural wood tables sealed with a high gloss coating are easy to clean. Sturdy chairs or backless stools are best to allow infants to move easily and independently during mealtime. Backless stools work well for mobile infants and toddlers who can approach the stool from the back and straddle it in a comfortable wide-legged position. Legless cube chairs take up a lot of space but can also be used for other purposes when turned over. Stackable chairs or stools also allow for a more flexible environment (Lally, Stewart, and Greenwald 2009).

Places for Privacy

Constantly being with other people for many hours each day can be emotionally draining for anyone, but it is especially so for infants and toddlers who are still developing the ability to regulate their emotions and calm themselves. Like adults and older children, infants and toddlers sometimes need time and space to break from the group. This need for privacy can be met by offering spaces limited to 1 or 2 children. A cozy corner with pillows, soft toys or books, or a quiet play area can help children calm themselves. Create these private spaces while still ensuring good visibility and children's safety. (The Ohio State University for the US Department of Defense's Office of Family Policy/Children and Youth, 2021)

Figure 27.13.16: Small private area. ([5])

Storage And Shelves

Infant and toddler learning spaces require a lot of materials. Toys, books, and other resources are regularly rotated in and out of active use. It is essential to plan for at least 4 kinds of storage in an infant and toddler learning space: open storage infants and toddlers can easily access, closed storage for caregiver materials, personal storage for belongings, and display storage for children's art and work (Dodge et al., 2010).

- Open storage: For materials that are in active use, caregivers should carefully label and store them on open, easily accessible shelves. Open storage will help children build independence, and toddlers can avoid frustration when they easily find what they want and need.
- Closed storage: Tools such as adult office supplies, cooking utensils, or cleaning fluids need to be stored securely when not in use. Designate and carefully label secure locations for these items; doing so helps caregivers maintain inventory and ensure children's safety.
- Personal storage: Infants and toddlers also need individual spaces for personal things, such as diaper bags, clothing, supplies, and creations. Space for favorite items (e.g., stuffed animal, favorite blanket) can help infants and toddlers feel secure. When spaces are easily accessible for toddlers, they can retrieve personal items when needed.Even if young infants cannot access a personal space independently, individual spaces personalize the learning environment and help parents feel confident their children are treated and cared for as individuals with unique qualities and needs.
- Child display: Storing and displaying artwork and portfolios sends powerful messages to children about the value of their work.

[1] Infant Environment by Above & Beyond Child Care and Education Center,MI is used with permission

[2] Image by Ms Linh Le Reggio is used with permission

[3] Image by Sarah Jensen is used with permission

[4] Image by Amanda Taintor at Clovis College Child Development Center is licensed CC: By-NC

[5] Infant Environment by Above & Beyond Child Care and Education Center,MI is used with permission

[6] U.S Department of Health and Human Services: Administration for Children and Families. *Responsive Learning Environments*. ECLKC. Is in the public domain.

[7] Image by Amanda Taintor at Reedley College Programs for Children Lab School is licensed CC: By-NC

[8] U.S. Department of Health & Human Services: Administration for Children and Families. ECLKC Nurturing Environments. is in the public domain.

[9] Image by Rachel Klippenstein-Gutierrez is licensed CC BY-NC

[10] California Department of Education. 2011. California Preschool Curriculum Framework, Volume 2. Sacramento: California Department of Education. Is used with permission

[11] Image by Nina Kuchkovskiy is licensed CC: BY-NC

[12] California Department of Education. (2019). *Infant/Toddler Learning and Development Program Guidelines, Second Edition.* Sacramento: California Department of Education. Is used with permission.

27.14: Supporting Special Needs Children

Supporting Special Needs Children

Learning materials should be accessible to all children, including those with physical or sensory disabilities. When young children are supported in movement and sensory exploration, they learn about themselves and the environment. Program leaders should turn to family members and specialized service providers for guidance on appropriate ways to make environmental adaptations that support the full participation of all children. Caregivers may need to consider the physical space or pathways within learning areas to ensure that infants or toddlers with physical disabilities can easily move around and participate, and caregivers can comfortably move them throughout spaces and join with them. All children, but particularly children with social or behavioral needs or specific developmental disabilities, may benefit from a designated area where they can easily access materials that help them soothe themselves and where they can spend some minutes alone. (The Ohio State University for the US Department of Defense's Office of Family Policy/Children and Youth, 2021)

All children within a program benefit from opportunities to play alongside peers with diverse abilities; they learn the essential values of inclusion, empathy, respect, and acceptance.[1]

Family members may have disabilities or other delays as well: adjust and accommodate adults as needed.

Figure 27.14.1: A toddler and preschooler with cochlear implants. ([1])

To support access to the environment for infants and toddlers:

- Plan developmentally appropriate environments, interactions, and experiences for all children.
- Arrange alternative opportunities to move for children with physical challenges.
- Communicate with family members and specialized service providers involved with the family about the proper use of adaptive equipment or alternative movement opportunities for a child with a disability or other delay.
- Avoid the use of restrictive equipment that limits children's free movement and isolates them from other children.
- Represent diversity of abilities whether children with identified delays are enrolled in the program or not.[1]

[1] California Department of Education. 2011. California Preschool Curriculum Framework, Volume 2. Sacramento: California Department of Education. Is used with permission

[2] Image by Nina Kuchkovskiy is licensed CC: BY-NC

[3] California Department of Education. (2019). *Infant/Toddler Learning and Development Program Guidelines, Second Edition.* Sacramento: California Department of Education. Is used with permission.

27.15: Conclusion

Conclusion to Indoor Environment

The teacher's intentional design of the learning environment increases opportunities for children to have engaging and meaningful interactions with adults and peers. Along with interactions, learning experiences, and routines, the learning environment is central to infant and toddler caregivers' planning and implementation of curriculum.[1]

[1] California Department of Education. (2019). *Infant/Toddler Learning and Development Program Guidelines, Second Edition.* Sacramento: California Department of Education. Is used with permission.

27.16: References

References for Indoor Environment

- Bergen, D., Reid, R., & Torelli, L. (2009). *Educating and caring for very young children: The infant/toddler curriculum* (2nd ed.). New York, NY: Teachers College Press.
- California Department of Ed. (2016). Teacher-to-Child Ratios in Child Care Centers. Community Care Licensing Division of the California Department of Social Services. Retrieved January 31, 2022, from https://ccld.childcarevideos.org/chi...-care-centers/.
- California Department of Education. (2019). *Infant/Toddler Curriculum Framework.* Sacramento: California Department of Education. Retrieved from https://www.cde.ca.gov/sp/cd/re/documents/itguidelines2019.pdf
- California Department of Education. (2019). *Infant/Toddler Learning and Development Program Guidelines, Second Edition.* Sacramento: California Department of Education. Is used with permission.
- California Department of Education. 2011. California Preschool Curriculum Framework, Volume 2. Sacramento: California Department of Education.
- California Department of Education. (2009). California Infant/Toddler Learning & Development Foundations: Social-Emotional Development. Sacramento: California Deaprtment of Education (CDE Press).
- Cryer, D., Tietze, W., & Wessels, H. (2002). Parents' perceptions of their children's child care: A cross-national comparison. *Early Childhood Research Quarterly, 17*, 259–277.
- Chapter 2: Toddler Development by Dr. Susan Eliason is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License, except where otherwise noted.
- Dodge, D., Rudick, S., & Berke, K. (2006). *The Creative Curriculum for Infants, Toddlers and Twos*, (2nd ed.). Washington DC: Teaching Strategies, Inc.
- Gonzalez-Mena, J., & Eyer, D. W. (2012). *Infants, toddlers, and caregivers: A curriculum of respectful, responsive, relationship-based care and education* (9th ed.). New York, NY: McGraw-Hill Education.
- Howes, C., M. Burchinal, R. Pianta, D. Bryant, D. M. Early, R. M. Clifford, and O. Barbarin. 2008. "Ready to Learn? Children's Pre-Academic Achievement in Pre-Kindergarten Programs." Early Childhood Research Quarterly 23 (1): 27–50.
- *Infant /Toddler Caregiving A guide to setting up Environments 2nd edition. J. Ronald Lally, Jay Steward, and Deborah Greenwald. Developed collaboratively by the California Department of Education and WestEd.*
- Lally, J. R., Stewart, J., & Greenwald, D. (2009). *A guide to setting up environments* (2nd ed.). Sacramento, CA: California Department of Education and WestEd.
- Lamb, M.E., & Ahnert, L. (2006). Nonparental childcare: Context, concepts, correlates and consequences. In W. Damon & R.M. Lerner (Eds.) & K.A. Renninger & I.E. Siegel (Vol. Eds.), *Handbook of child psychology*, Vol. 4, *Child psychology in practice* (6th ed., pp. 950-1-16). Hoboken, NJ: Wiley.
- Mashburn, A. J., R. C. Pianta, B. K. Hamre, J. T. Downer, O. A. Barbarin, D. Bryant, M. Burchinal, D. M. Early, and C. Howes. 2008. "Measures of Classroom Quality in Pre-Kindergarten and Children's Development of Academic, Language, and Social Skills." Child Development 79 (3): 732–49.
- Office of Head Start and Office of the Administration for Children and Families. (n.d.). Health and Safety Screener:. Retrieved from Head Start: Early Childhood Learning and Knowledge Center: https://eclkc.ohs.acf.hhs.gov/sites/default/files/pdf/chs-certification-fillableform.pdf
- The Ohio State University for the US Department of Defense's Office of Family Policy/Children and Youth. (2021). Infants & Toddlers Learning Environments. Retrieved 2021, from Department of Defense Child Development Virtual Laboratory School: https://www.virtuallabschool.org/taxonomy/term/11671
- Program for Infant Toddler Care. (n.d.). *Small Groups in Center-Based Programs*. Retrieved January 31, 2022, from https://www.pitc.org/about/see-it-pr...based-programs.
- Sylva, K., E. Melhuish, P. Sammons, and I. Siraj-Blatchford, eds. 2010. Early Childhood Matters: Evidence from the Effective Pre-school and Primary Education Project. Oxford: Routledge.
- Sylva K, Siraj-Blatchford I and Taggart B (2010) ECERS-E: The Early Childhood Environment Rating Scale Curricular Extension to ECERS-R. New York: Teachers College Press
- U.S. Department of Health & Human Services: Administration for Children and Families. (n.d.). Nurturing Environments. (C. C. Network, Producer) Retrieved from Infant/Toddler Resource Guide: https://childcareta.acf.hhs.gov/infa...topic-overview

- U.S Department of Health & Human Services: Administration for Children and Families. (2020, January 28). *Safety of equipment, materials, and furnishings*. ECLKC. Retrieved February 5, 2022, from https://eclkc.ohs.acf.hhs.gov/health...ls-furnishings
- U.S Department of Health and Human Services: Administration for Children & Families. (2019, February 8). *Routine cleaning, sanitizing, and disinfecting*. ECLKC. Retrieved February 5, 2022, from https://eclkc.ohs.acf.hhs.gov/health-services-management/caring-our-children-basics/routine-cleaning-sanitizing-disinfecting
- U.S Department of Health and Human Services. (2021, December 9). *Responsive Learning Environments*. ECLKC. Retrieved February 5, 2022, from https://eclkc.ohs.acf.hhs.gov/public...g-environments
- Vermeer, H.J., van IJzendoorn, M.H., Cárcamo, R.A. *et al.* Quality of Child Care Using the Environment Rating Scales: A Meta-Analysis of International Studies. *IJEC* **48,** 33–60 (2016). https://doi.org/10.1007/s13158-015-0154-9. This article is distributed under the terms of the Creative Commons Attribution 4.0 International License
- WestEd. (n.d.). Family childcare and center based PITC PARS© user's guide. Unpublished user's guide.

CHAPTER OVERVIEW

28: Outdoor Environment

28.1: Introduction

Introduction to Outdoor Environment

Research shows that today's young children spend less time outdoors engaging in active play and exploring the natural world (Clements, "Status of Outdoor Play," 68; Ginsberg, "*No Child Left Inside*," 3–5; Hastie and Howard, "Prescription for Healthy Kids"; The Henry J. Kaiser Family Foundation, "*New Study*"; Thigpen, "Outdoor Play: Combating Sedentary Lifestyles," 19–20). Researchers have identified several reasons for this decline, including:

- Adult fears about crime and safety
- Increased use of television, computer games, DVDs, and smartphones and tablets with digital media
- More time spent indoors in structured activities
- Childcare arrangements with limited free time
- Loss of natural habitats

An increasing number of educators, health/mental health professionals, and other child advocates agree that this trend adversely affects young children's health and development. Richard Louv, a child advocacy expert, worries that children are disconnecting from the natural world, a condition he calls "nature deficit disorder" (Louv, 2008) According to his research, nature deficit disorder contributes to a rise in obesity, depression, and attention disorders. As young children "spend less and less of their lives in natural surroundings, their senses narrow, physiologically and psychologically ...." (Louv, Introduction).

Whether children live in urban, suburban, or rural communities, the outdoor world provides new opportunities to observe, discover, and learn. In an outdoor environment, children's cognitive capacity to appreciate beauty, express creatively, and perceive sensory patterns and variety expand to all new heights. (Torquati & Barber,2005)[1]

---

[1] U.S Department of Health and Human Services. *Supporting outdoor play and exploration for infants and toddlers.* ECLKC. is in the public domain.

28.2: Benefits of Outdoor Play and Exploration

Why Outside?

Early childhood education research has established the importance of learning through direct experiences (Torquati, J., & Barber, J., 2005). Theorists such as Montessori and Waldorf offer direct educational practices at their centers (Hutchison, D. 1998). The philosophy of the schools of Reggio Italy and Howard Gardner also understood and expounded upon the complementary nature of science and the aesthetic experience of young children (Edwards, C., L. Gandini, & G. Forman. 1998., Gardner, H. 1999).

Outdoor play and exploration benefit children in many ways. Researchers have identified some general positive outcomes (Moore Marcus; 2008 White, 2004), including:

- Increased creativity and imagination
- Development of a sense of wonder, which is an essential motivator for lifelong learning
- Increased social interactions between children
- Enhanced opportunities to make decisions, solve problems and collaborate with peers, which also promote language and communication skills
- Improved awareness, reasoning, and observation skills
- Positive effects on children's ability to focus and pay attention [1]

Health Benefits of Spending Time Outdoors

There is strong evidence that young children experience significant health benefits from spending time outdoors. For example:

- Young children are more likely to engage in the kinds of vigorous, physical play that strengthens their hearts, lungs, and muscles because they tend to play harder and for more extended periods outside (Thigpen, 2007).
- Regularly spending time outdoors increases opportunities for infants and toddlers to crawl, toddle, walk, climb, and run freely. In addition to improving large motor skills, vigorous physical activity improves children's overall fitness level.
- Spending time outdoors strengthens young children's immune systems. They experience fewer illness-related absences from childcare when they have daily opportunities to play outside (Sennerstam,2007)
- Spending time outdoors provides access to vitamin D (Einstein College of Medicine, 2009). There is increasing concern that infants, toddlers, and older children are deficient in vitamin D. This vitamin is necessary for calcium absorption and strengthening teeth and bones.
- Spending time outdoors positively affects young children's sleeping patterns. Natural sunlight helps regulate and balance sleep-wake cycles (Dewar, 2008).
- Children who play outdoors are less likely to be nearsighted. Direct exposure to the bright, natural light of the outdoors may stimulate developing eyes in important ways, such as "maintaining the correct distance between the lens and the retina—which keeps vision in focus" (Aamodt and Chang, 2011).
- Time spent outdoors provides children with protection against life stressors and helps them develop a general sense of peace and well-being (White,2004).
- There is some evidence that playing in the dirt exposes children to a specific type of bacteria that may reduce anxiety and improve the ability to learn new tasks (American Society of Microbiology, 2009). The Outdoor Curriculum

Spending time outdoors every day is a rich and vital part of the curriculum for infants and toddlers. From the very beginning, young children satisfy their curiosity by exploring with their senses. Being outside "presents a new world of sights, sounds, smells, and tactile experiences"(Thigpen,2007).[1]

Social and Emotional Benefits of the Outdoor Environment

Infants and toddlers learn to play together when they take turns using pails and shovels, share a ride in a wagon, and chase each other. Through direct, hands-on experiences, young children learn to be gentle with living things and each other. "Deep bonds can form between children or child and adult when they share experiences with nature. When children have daily opportunities to care for plants, trees, animals, and insects, they practice nurturing behaviors that help them interact in kind and gentle ways with people as well." [2](Rosenow,2011;4.)

Gross Motor and Fine Motor Benefits of the Outdoor Environment

Because outdoor play spaces are often more varied and less structured than indoor spaces (Burdett and Whitaker, 2005), infants and toddlers have more freedom of movement to develop their gross motor skills in novel ways. These may include crawling or rolling on grassy hills, standing and balancing on bumpy or unlevel surfaces, and jumping over puddles and sidewalk cracks. Small-motor muscles develop as children use a pincer grasp to pick up and fill containers with natural objects and materials or hold paintbrushes as they paint walls with water (Trister et al., 2015; Post et al., 2011). Children develop perceptual skills as they move their bodies through space in different ways and at different speeds and as they observe the world from different perspectives (e.g., lying on their backs on a blanket, standing on top of a hill, or swinging back and forth in a swing) (Post et al., *Tender Care and Early Learning*, 253).[1]

Cognitive Benefits of the Outdoor Environment

Contact with the outdoors helps infants and toddlers learn concepts such as cause and effect and problem-solving. As they practice dressing and undressing, infants and toddlers learn which clothes to wear for different types of weather. (Trister Dodge et al., *The Creative Curriculum*, 180.) They understand that the sun dries puddles and melts snow and that wind makes things move. Infants and toddlers learn important science concepts as they explore and discover the properties of natural objects and materials. STEM topics such as science, technology, and math are reinforced as children notice how things are the same and different, experiment with using tools (e.g., shovels and sticks), and predict whether and where they will see worms after it rains.

Language and Literacy Benefits of the Outdoor Environment

As adults talk or sign with infants and toddlers about the outdoor environment, infants and toddlers learn new words; as they begin to talk, they use those words to identify interesting things they see and ask questions. Noticing and discriminating sounds is a foundational skill for later literacy development. In the outdoor environment, infants notice different sounds and learn to identify and tell them apart. Books take on an extended role when adults help children connect ideas in books with real-life experiences, such as comparing fictional animals with live animals outdoors. (Trister Dodge et al., *The Creative Curriculum*, 180). Adding books and other resources to the indoor environment helps create curiosity and connect indoor and outdoor environments (Torquati, J., & Barber, J. 2005).

---

[1] U.S Department of Health and Human Services. *Supporting outdoor play and exploration for infants and toddlers.* ECLKC. is in the public domain

28.3: Considerations for Creating Safe and Stimulating Outdoor Play Spaces

Safe but Stimulating

It is important to know what makes a good outdoor play space for infants and toddlers. Outdoor play spaces should be treated as an extension of the indoor environment. Suitable outdoor play spaces:

- Provide safe and stimulating places to play and explore
- Accommodate the differing needs, skills, and interests of young infants, mobile infants, and toddlers, including those with suspected delays and identified disabilities
- Support nurturing adult-child interactions
- Accommodate adult needs for comfort
- Reflect staff and family beliefs, values, and culture
- Incorporate natural elements and native plant life

Easy access to the outdoors is desirable to accommodate the daily rhythms of toddlers. Access to a playground allows caregivers to respond to a child's changing needs, but in many centers, time on the playground is rigidly scheduled and may not accommodate the toddlers' needs. Programs can individualize their outdoor play spaces: caregivers, other staff, and even families consider what they want infants and toddlers to experience in the outdoor space. They decide on the materials, equipment, and other design elements that support these experiences. Whether programs modify an existing space or create a new one, designing outdoor play spaces provides an excellent opportunity to involve families and collaborate with local resources and partners. Programs may find partnership opportunities with agricultural extension agencies, plant nurseries, landscape professionals, playground architects, artists, civic organizations, and businesses.

Center-based outdoor play spaces should be designed according to the guidelines in the most recent edition of the *Public Playground Safety Handbook* from the U.S. Consumer Product Safety Commission (CPSC). Home-based programs that provide socialization spaces with outdoor areas or public playgrounds during socializations may also look at the Public Playground Safety Handbook for relevant information. Family childcare providers who have backyards can review *Outdoor Home Playground Safety Handbook*.

All programs can review relevant sections of the Caring for Our Children (CFOC) special collection, *Caring for Infants and Toddlers in Early Care and Education (I/T)*.

A Closer Look at Safety Considerations

Safety is perhaps the most common concern that interferes with active participation in outdoor play. Infants and toddlers are budding scientists. They actively investigate the world using their senses and appear to possess no fear when exploring with their hands, mouths, or bodies. Infants and toddlers are just beginning to understand what is and is not safe and how to protect themselves. They need responsible adults to minimize outdoor health and safety risks and eliminate the most dangerous hazards so they can explore and play safely.

Risk and Challenge

As caregivers consider safety, it is important to realize that no one can eliminate every possible risk. Minor bumps, cuts, scrapes, and bruises are commonplace. Some risk-taking is important and necessary for young children's growth and development. (Almeras, *Creating a Nature-Based Culture*, slides 34–36.) Risk-taking teaches young children what is and is not possible. It also sets the stage for managing challenging situations later in life. What is considered safe or unsafe depends partly on children's ages and developmental levels (e.g., sand is deemed safe for toddlers but not for young infants, even with close supervision).

Reducing risk does not mean limiting play equipment or enforcing rules that restrict young children's movement or ability to explore the environment. An ideal outdoor play space encourages children to challenge themselves while also presenting little risk for injury: ideally, an area with high challenge but low risk. Studies show high challenge, low risk playgrounds are the best at promoting the goals of outdoor learning. Children get more physical activity; develop better physical, cognitive, and social skills, including respect for others; and are happier and more resilient. (Farmer, et al., "Change of School Playground Environment on Bullying: A Randomized Controlled Trial.")

Outdoor Policies

Balancing outdoor play and exploration with safety means first implementing active supervision for all children, then reaching a common understanding with all adults of what it means to keep infants and toddlers healthy and safe while providing appropriate challenges. This includes identifying the benefits of risk-taking and defining reasonable risks.

Here are examples of what to include in outdoor policies:

- Requirements related to Active Supervision (U.S Department of Health and Human Services, Administration for Children and Families, Office of Head Start, *Active Supervision*.) are essential in keeping children safe outdoors. For example, caregivers need to:
- Maintain a 1:4 staff-child ratio at all times.
- Use mobile phones or walkie-talkies to communicate between adults outdoors and indoors quickly and easily and, if necessary, emergency services.
- Position themselves to see and hear children and use the time to observe children and engage with them rather than visiting with each other. During socialization, parents should interact one on one with their child.
- Continually scan the outdoor play space to know where everyone is and what they are doing, and count children frequently, especially during transitions to and from the outdoor space.
- Use what they know about each child's interests and skills to predict what they will do.
- Create challenges children are ready for and support them in succeeding.
- Offer different levels of assistance or redirection depending on each child's needs.

Weather-related policies define when it is acceptable to take children outside. Outdoor experiences can occur in all kinds of weather conditions, including rain, snow, heat, cold, and wind, if common-sense precautions and safety procedures are taken. For example:

- Monitor air quality. Some air quality levels pose significant health and safety risks for young children and adults.
- Do not take children outside when there are blizzards, lightning, thunderstorms, or extremely hot or cold temperatures.
- Know the appropriate types of child and adult clothing for different weather conditions. Whenever possible, provide extra outdoor clothing for children and adults. The lack of proper clothing often reduces the time spent outside rather than the weather condition itself. (Williams, "Exploring the Natural World," 21).
- Use shade, sunscreen, and protective clothing for infants younger than 6 months, bug repellent, and other protective substances.
- Ensure safe, sanitary water play and sandboxes.
- Arrange appropriate storage of medications when children are outdoors (e.g., EpiPens® and inhalers for children with allergies and asthma). Medications should always be readily accessible.
- Identify steps for handling insect bites and stings.
- Research what to include in outdoor first aid kits.

In addition to outdoor policies, there are other important safety practices and procedures to consider. [1]

Weather

To stay up to date on current conditions:

- Check the Air Quality Index at http://airnow.gov and subscribe to EnviroFlash. This service from the U.S. Environmental Protection Agency and state or local environmental agencies provides daily emails about local air quality. Poor air quality can negatively affect children with asthma and other special health care needs.
- Check the forecast for the UV Index to limit exposure to the sun on days when the Index is high.
- Sign up to receive hourly weather forecasts from the National Weather Service on a computer or mobile phone.

Sunscreen

Children need protection from the sun's harmful ultraviolet (UV) rays whenever they're outdoors. Shade and sunscreen protect children from sun exposure and can help to reduce the risk of some skin cancers.

According to the Centers for Disease Control and Prevention (CDC), even a few significant sunburns can increase the risk of skin cancer later in life. (Centers for Disease Control and Prevention (2016). Make Summer Safe for Kids. Retrieved from https://www.cdc.gov/family/kids/summer/index.htm) The American Academy of Pediatrics recommends the following guidelines (American Academy of Pediatrics (2015). Sun Safety: Information for Parents About Sunburn & Sunscreen. Retrieved from

https://www.healthychildren.org/English/safety-prevention/at-play/Pages/Sun-Safety.aspx) regarding sun safety and the selection and application of sunscreen:

- If possible, use play areas that provide shade to help children stay cool.
- Protect infants under 6 months from direct sunlight by keeping them in a shady spot under a tree, umbrella, or stroller canopy.
- Limit children's sun exposure between 10 a.m. and 4 p.m. when UV rays are the strongest.
- Encourage families to dress children in cool clothing such as lightweight cotton pants and long-sleeved shirts. A hat will protect their faces, ears, and the back of their necks.
- Obtain written permission from children's parents/guardians to use sunscreen with an SPF (sun protection factor) of at least 15. Choose a broad-spectrum sunscreen to screen out UVB and UVA rays
- Apply sunscreen at least 30 minutes before going outdoors to allow ample time for absorption into the skin. Children will need sunscreen reapplication every 2 hours if they are outside for more than an hour and more frequently if playing in the water.
- For children older than 6 months, apply sunscreen to all exposed areas, including children's ears (if they are wearing a cap instead of a hat).
- For children younger than 6 months, use sunscreen on small body areas, such as the face and the backs of the hands, if protective clothing and shade are not available.

Hydration

Toddlers and preschool children cannot regulate their body temperatures well and need additional water when hot. Provide regularly scheduled water breaks to encourage all children to drink during active play, even if they don't feel thirsty. Caregivers may offer additional breast milk or formula to infants as water is not recommended, especially for infants younger than 6 months of age, see CFOC Standard 4.2.0.6.

Water Safety

Water play is a favorite activity for many young children throughout the year. Families may ask about opportunities for children to engage in outdoor water play during the summer months. CFOC does not recommend using portable wading pools as they do not permit adequate sanitation control and promote the transmission of infectious diseases. Sprinklers, hoses, or small individual water basins are safer alternatives than wading pools. Always use active supervision when children play in or around water.

If using water tables, ensure staff clean and sanitize the water tables and use toys safely. All children should wash their hands before and after play. It is best to provide an individual basin for children with cuts, scratches, or open sores on their hands.

Insects and Insect Repellent

Protect children and adults from insect bites by checking for and removing insect nests under slides, in bushes, and in the ground. Ensure there is no standing water near play areas for mosquitoes to lay their eggs. Check for ticks after outdoor play. The CDC provides instructions about Tick Removal. To prevent insect bites on children, programs may consult with their local health department, Health Services Advisory Committee, or a childcare health consultant about using insect repellant when local insects are likely to carry diseases. Obtain written permission from children's parents/guardians before applying insect repellant and follow the instructions on the label. These products often use different levels of a chemical called DEET. "The AAP recommends that repellents should contain no more than 30% DEET when used on children. Insect repellents also are **not recommended** for children younger than 2 months." (American Academy of Pediatrics (2012). Choosing an Insect Repellent for Your Child. Retrieved from https://www.healthychildren.org/English/safety-prevention/at-play/Pages/Insect-Repellents.aspx).

---

[1] U.S. Department of Health and Human Services, ECLKC. *Active Supervision*. is in the public domain

---

28.4: When Availability of Outdoor Play Space Is an Issue

Finding Space

Outdoor play and exploration experiences may take place in different spaces and areas. However, some programs face challenges with limited or lack of outdoor play space or few safe places to go. In these situations, it is especially important to provide infants and toddlers with experiences connecting them with nature and opportunities for active outdoor play and exploration.

Although there may be no easy answers, it is still important to determine what outdoor accommodations might be reasonable and appropriate for programs and families with less-than-ideal circumstances. Here are some possible options: Greenman and Lindstrom, *Caring Spaces, Learning Places*, 299; Greenman et al., *Prime Time*s, 298, 322

- Use sidewalks as paths for wheeled toys and equipment.
- Use sides of buildings as art walls.
- Provide "loose parts" to transform the space.
- Add logs, tree stumps, and smooth boulders to create new spaces and encourage large motor experiences.
- Use neighborhood resources such as recreation centers, parks, open fields, and school or public playgrounds. Create a "playground-in-a-box" (e.g., a wheeled utility cart filled with blankets, a parachute, milk crates, balls, and other toys and equipment to take to more open space).
- Take children on short outings using wagons, buggies, and strollers. Allow children who can walk to do so for at least part of the time, so they get the benefit of physical exercise.
- Locate and use community gardens.
- Plant nonpoisonous flowers in boxes or create small gardens in washtubs that are safely accessible to children and adults (American Academy of Pediatrics; American Public Health Association; National Resource Center for Health and Safety in Child Care and Early Education; and Maternal and Child Health Bureau, Department of Health and Human Services, *Caring for Our Children* (CFOC), "Even Plants Can Be Poisonous.").
- Hang bird feeders, wind chimes, and banners where children can see them.
- Bring nature inside. Consider putting buckets or other containers outside when it rains or snows, and then bring them in to see how much was collected. When possible, open windows (no more than 4 inches and use safety guards) to allow fresh air to come in. Provide safe, age and developmentally appropriate natural objects and materials for infants and toddlers to explore. These can include pinecones, small tree cookies (i.e., cross-sections of branches that show growth rings), twigs, leaves, snow, dirt, acorns, rocks, and shells. Closely supervise these explorations: it is developmentally appropriate for very young children to put objects in their mouths. Things considered safe for older toddlers to explore are not safe for younger children.
- Draw children's attention to natural events they can see through the window, such as rain, snow, lightning, or wind blowing trees or leaves. Invite children to touch windowpanes to see if they are warm or cold. Point out and describe changes in outdoor conditions (e.g., how the amount of shady or sunny places changes depending on the time of day or how the light changes when clouds cover the sun).

28.5: Strategies for Maximizing Outdoor Learning Opportunities for Infants and Toddlers

Using Outdoor Time Wisely

The outdoors offers rich learning opportunities for infants and toddlers. Whether in outdoor play spaces, backyards, parks, or on front stoops, these opportunities take shape and place through relationships and interactions between caring, supportive adults and children. Infants and toddlers take their cues from the significant adults in their lives. They are more likely to respond positively and explore the outdoor environment when adults plan for, model, and support those explorations. Because staff and families play an essential role in connecting infants and toddlers to nature and the outdoors, program leaders must consider ways to facilitate and strengthen adult engagement with outdoor play and exploration.

Loose Parts

Caregivers can use "loose parts" Dempsey and Strickland, "Why to Include Loose Parts"; Greenman et al., *Prime Times*, 297 to enhance outdoor play opportunities for infants and toddlers. The term refers to "easily moved materials that children may use while playing." Dempsey and Strickland, "Why to Include Loose Parts." For infants and toddlers, loose parts are toys and materials that are safe, not fixed in place, and can be used in many ways. They are materials that children collect, put together, mix, separate, stack, fill and dump, and line up. Indoor toys, equipment, and materials brought outside are considered loose parts, as are natural materials such as tree cookies, stones, twigs, seedpods, leaves, water, and sand. Other ideas for loose parts include:

- Fabric
- Containers
- Polyvinyl chloride (PVC) pipes
- Sponges
- Wagons
- Small sleds
- Plastic milk crates
- Backpacks
- Wide, sanded boards that are short enough for toddlers to pick up, carry, or drag

Loose parts are important for several reasons. Dempsey and Strickland, "Why to Include Loose Parts." They:

- Encourage children to manipulate the environment and provide opportunities for creativity and problem-solving.
- Provide children with age-appropriate materials. Because these materials can be used in a variety of ways, each age group uses the materials in different and appropriate ways.
- Add novelty into the outdoor play environment. This is important for cognitively higher levels of play, such as symbolic play.
- Foster a wide variety of play behaviors, such as dumping and filling; lifting, moving, and carrying; and pretend, parallel, and cooperative play.

28.6: Create a Program Culture that Supports Outdoor Play and Exploration

Culture and the Outdoors

One way to build support and understanding of the importance of outdoor experiences is to develop a philosophy statement describing the program's beliefs. [1]Almeras, *Creating a Nature-Based Culture*, slides 24, 32. A defined philosophy statement and policies supported by program leadership can guide program practices by providing a framework for planning and teaching. Consider the following process for developing a philosophy statement.

- Ask for input from staff and families. Provide information and resources as needed to facilitate the conversation.
- Involve staff and families in writing and reviewing the statement to increase consensus and support.
- Once a statement is finalized, translate the statement into families' home languages. Post the information where families and staff can see it. Consider including it in newsletters and other documents that describe the program.
- Share and discuss the statement during new staff and family orientations, staff and parent meetings, home visits, and group socialization.[1]

---

[1] U.S Department of Health and Human Services. *Supporting outdoor play and exploration for infants and toddlers.* ECLKC. is in the public domain

---

28.7: Conclusion

Conclusion to Outdoor Environment

Outdoor play and exploration matter to infants and toddlers. Time spent outdoors helps them connect with and develop an appreciation for the natural environment. It offers crucial health and developmental benefits and valuable experiences that are simply not available indoors. With thoughtful planning and supportive practices and policies, programs can provide infants and toddlers with opportunities for active outdoor play, nature exploration, and connections with trusted adults in many ways, even in circumstances that are less than ideal. Working together, EHS and MSHS leaders, staff, and families can offer rich learning opportunities that support children's development and build a foundation for engaging with and learning from nature.[1]

[1] U.S Department of Health and Human Services. *Supporting outdoor play and exploration for infants and toddlers.* ECLKC. is in the public domain

28.8: References

References for Outdoor Environment

- Albert Einstein College of Medicine. "Millions of U.S. Children Low in Vitamin D." *Einstein* (Aug. 3, 2009).
- Aamodt, Sandra; Sam Chang. "The Sun Is the Best Optometrist." *New York Times* (June 20, 2011).
- American Society for Microbiology. "Can Bacteria Make You Smarter?" *ScienceDaily (May 25, 2010).*
- Almeras, Bethe. *Creating a Nature-Based Culture in Your Program*. Early Childhood Investigations Webinars. Sept. 28, 2011.
- American Academy of Pediatrics. "Sun Safety and Protection Tips from the American Academy of Pediatrics" (2018).
- Burdett, Hillary L.; Robert C. Whitaker. "Resurrecting Free Play in Young Children: Looking Beyond Fitness and Fatness to Attention, Affiliation, and Affect." *Archives of Pediatric & Adolescent Medicine 159* (2005): 46–50
- Clements, Rhonda. "An Investigation of the Status of Outdoor Play." *Contemporary Issues in Early Childhood 5, No. 1* (2004): 68–80.
- Dewar, Gwen. "Newborn Sleep Patterns: A Survival Guide for the Science-Minded Parent." *Parenting Science* (2008–2017).
- Dempsey, Jim; Eric Strickland. "Staff Workshop Teacher Handout: The 'Whys' Have It! Why to Include Loose Parts on the Playground." *Scholastic* (April 1999).
- Early Head Start National Resource Center. News You Can Use: Outdoor Spaces. Washington, DC: Department of Health and Human Services, Administration for Children and Families, Office of Head Start, March 2012.
- Edwards, C., L. Gandini, & G. Forman. 1998. The hundred languages of children: The Reggio Emilia approach- Advanced reflections. 2nd ed. Greenwich, CT: Ablex.
- Farmer, Victoria L.; Sheila M. Williams, Jim I. Mann, Grant Schofield, Julia C. McPhee, Rachael W. Taylor. "Change of School Playground Environment on Bullying: A Randomized Controlled Trial." *Pediatrics 139, No. 5* (2017): 1–12.
- Frank Porter Graham Child Development Institute. "Playground Information to Use with the Environmental Rating Scales." Chapel Hill, NC, n.d.
- Ginsburg, Kenneth. "No Child Left Inside: Reconnecting Kids with the Outdoors." Testimony of Kenneth Ginsburg, MD, MS Ed, FAAP, on behalf of The American Academy of Pediatrics to the Natural Resources Subcommittee on National Parks, Forests and Public Lands and Subcommittee on Fisheries, Wildlife and Oceans, May 24, 2006.
- Ginsburg, Kenneth. "No Child Left Inside: Reconnecting Kids with the Outdoors." Testimony of Kenneth Ginsburg, MD, MS Ed, FAAP, on behalf of The American Academy of Pediatrics to the Natural Resources Subcommittee on National Parks, Forests and Public Lands and Subcommittee on Fisheries, Wildlife and Oceans, May 24, 2006.
- Gardner, H. 1999. Are there additional intelligences? The case for naturalist, spiritualist, and existential intelligence. In Education, information , and transformation, ed. J. Kane, 111-31. Englewood Cliffs, NJ: Prentice Hall.
- Hastie, Kyla; Shani Howard. "A Prescription for Healthy Kids: Nature & Play." *AthensParent.com* (March/April 2007).
- Head Start Body Start. "Outdoor Play Benefits." Reston, VA: Head Start Body Start, National Center for Physical Development and Outdoor Play, n.d.
- The Henry J. Kaiser Family Foundation. "New Study Finds Children Age Zero to Six Spend as Much Time With TV, Computers and Video Games as Playing Outside." Washington, DC: Kaiser Family Foundation. Oct. 28, 2003.
- Huh, Susanna Y.; Catherine M. Gordon. "Vitamin D Deficiency in Children and Adolescents: Epidemiology, Impact and Treatment." *Reviews in Endocrine & Metabolic Disorders 9* (2008): 161–170.
- Keeler, Rusty. Natural Playscapes: Creating Outdoor Play Environments for the Soul. Redmond, WA: Exchange Press, 2008.
- Lally, J. Ronald; Jay Stewart, Deborah Greenwald. A Guide to Setting Up Environments. 2nd ed. Sacramento, CA: California Department of Education and WestEd, 2009.
- Louv, Richard. *Last Child in the Woods: Saving Our Children from Nature-Deficit Disorder*. Chapel Hill, NC: Algonquin, 2008.
- Louv, Richard. Excerpt from *Last Child in the Woods*: Introduction. Chapel Hill, NC: Algonquin, 2008
- Milano, Kim. "Prevention: The First Line of Defense Against Childhood Obesity." *Zero to Three 28, No. 1* (2007): 6–11.
- Moore, Robin C; Clare Cooper Marcus. "Healthy Planet, Healthy Children: Designing Nature into the Daily Spaces of Children." In Biophilic Design: The Theory, Science, and Practice of Bringing Buildings to Life. Hoboken, NJ: Wiley (2008): 153–203.
- Orr, David. *The Biophilia Hypothesis*. Washington, DC: Island Press, 1995.
- Post, Jacalyn; Mary Hohmann, Ann S. Epstein. *Tender Care and Early Learning: Supporting Infants and Toddlers in Child Care Settings*. 2nd ed. Ypsilanti, MI: HighScope Press, 2011.

- Rosenow, Nancy. “Learning to Love the Earth ... and Each Other.” *Spotlight on Young Children and Nature*. Washington, DC: National Association for the Education of Young Children (2011): 4–7.
- Sennerstam, Roland B. “Absence Due to Illness Among Toddlers in Day-Care Centres in Relation to Child Group Structure.” *Public Health 111, No. 2* (2007): 85–88.
- Shillady, Amy. “Introduction.” *Spotlight on Young Children and Nature*. Washington, DC: National Association for the Education of Young Children (2011): 2–3.
- Thigpen, Betsy. “Outdoor Play: Combating Sedentary Lifestyles.” *Zero to Three 28, No. 1* (2007): 19–23.
- Trister Dodge, Diane; Sherrie Rudick, Kai-leé Berke. *The Creative Curriculum for Infants, Toddlers & Twos, Vol. 2.* 3rd ed. Washington, DC: Teaching Strategies, 2015.
- Torquati, Julia; Mary M. Gabriel, Julie Jones-Branch, Jennifer Leeper Miller. “Environmental Education: A Natural Way to Nurture Children’s Development and Learning.” *Spotlight on Young Children and Nature*. Washington, DC: National Association for the Education of Young Children (2011): 8–14.
- University of Illinois at Urbana-Champaign. “For Kids with ADHD, Regular ‘Green Time’ Is Linked to Milder Symptoms.” *ScienceDaily* (Sept. 15, 2011).
- U.S. Department of Health and Human Services, Administration for Children and Families, Office of Head Start, National Center for Early Childhood Health and Wellness. *Active Supervision*. Washington, DC, n.d.
- U.S. Department of Health and Human Services, Administration on Children and Families, Office of Head Start. *Head Start Program Performance Standards, 45 CFR Chapter XIII*. Washington, DC, 2016.
- U.S Department of Health and Human Services. (2021, November 12). *Supporting outdoor play and exploration for infants and toddlers*. ECLKC. Retrieved February 5, 2022, from https://eclkc.ohs.acf.hhs.gov/learni...fants-toddlers is in the public domain
- White, Randy. “Young Children’s Relationship with Nature: Its Importance to Children's Development & the Earth's Future.” *White Hutchinson Leisure & Learning Group*, 2004.
- Williams, Alyson E. “Exploring the Natural World with Infants and Toddlers in an Urban Setting.” *Spotlight on Young Children and Nature*. Washington, DC: National Association for the Education of Young Children (2011): 20–23.

CHAPTER OVERVIEW

29: Introduction to Observation

29.1: Introduction

Introduction to Observation

What is observation? One online dictionary (Dictionary.com,2019) gives the following definitions for observation (noun):

- An act or instance of noticing or perceiving
- An act or instance of regarding attentively or watching
- The faculty or habit of observing or noticing
- The information or record secured by such an act

Observation informs responsive care and teaching practices, learning experiences, environments, routines, and schedules.[1]

There is more to observing than watching what infants do, though. Observing involves focus and purpose. Stetson, Jablon, and Dombro (2009) defined observation as "watching and listening to learn about individual children" (Stetson et al., 2009). Caregivers watch and listen to children and families to learn about each child's development and figure out how each child is learning. Many describe observation as paying close attention to a child's behaviors, interactions, activities, and interests and noticing all aspects of the child's development (National Infant & Toddler Child Care Initiative, 2010). Both definitions stress the importance of observing to learn.

Whether we realize it or not, we constantly observe when working with infants, toddlers, and families. For many caregivers, observation becomes second nature, part of what we do. We regularly take in information, and consciously or not, these observations inform our work and interactions.[2]

---

[1] U.S Department of Health and Human Services ECLKC Child observation: The heart of individualizing responsive care for infants and toddlers is in the public domain

[2] U.S Department of Health and Human Services ECLKC *Look at Me! Using Focused Child Observation with Infants and Toddlers* is in the public domain.

29.2: Why We Observe

Why?

There are important reasons why caregivers observe infants and toddlers.

The most common purposes behind caregiver observation include to:

- Learn about children to individualize care and the curriculum, including interactions, teaching practices, learning experiences, routines, and schedules
- To measure and track children's progress in acquiring skills and concepts over time as part of the ongoing assessment cycle.

When caregivers are intentional about observing children, they can better understand how young children think, feel, and learn about the world around them. In turn, these understandings aid caregivers in making decisions about providing responsive and informed care.

Respectful observation reflects a belief that young children's behaviors have purpose and meaning and are worth attending to. The crucial part of observation involves a great deal of thinking beforehand (Cagliari, 2004). Caregivers who believe young children have goals and intentions ask themselves essential questions:

- Why does this child do what he does?
- What is he trying to communicate or accomplish?
- How should I respond to support this child?
- What could I do to support them?"[1]

Observation becomes one tool in seeking answers to these questions. It provides opportunities to engage in a "pedagogy of listening" (Cagliari, 2004). We often silo contexts for observation by separating our observation time into two distinct categories: observation of what the child is doing now and observation to reflect on later. But a caregiver is a "participating observer" (Cagliari, 2004). As the children actively build knowledge, caregivers watch and listen, and while observing, the caregiver can find "strategies that will consequently guide the activities onward" (Cagliari, 2004). Observing from a respectful point of view helps us make essential discoveries about children, such as what they are like as individuals, how they react to other children and adults, what tasks are easy or hard for them, and how they convey their wants and needs (Dichtelmiller and Ensler, 2004). These discoveries allow caregivers to be responsive to each child's interests and needs.[2]

Observations are conducted every day in early childhood classroom environments. Caregivers are constantly surveying the environment. Forms of intentional observations are: completing safety checks to ensure the equipment and materials are safe for the children to use and daily health screenings to ensure children are healthy enough to participate in activities. Intentional caregivers use their observations to plan and implement curriculum, set up engaging learning environments, monitor the children's social interactions, track behaviors, communicate with families, and assess each child's progress and development. Through purposeful and planned observations, intentional caregivers can:

- Evaluate program and caregiver effectiveness
- Make improvements to ensure quality practices
- Plan and implement developmentally appropriate curriculum
- Measure and assess a child's development
- Develop respectful family partnerships
- Understand cultural practices
- Choose learning strategies to support and accommodate the diverse needs of children
- Ensure ethical conduct and professional standards of practice.[3]

---

[1] U.S Department of Health and Human Services ECLKC *Look at Me! Using Focused Child Observation with Infants and Toddlers* is in the public domain.

[2] U.S Department of Health and Human Services ECLKC Child observation: The heart of individualizing responsive care for infants and toddlers is in the public domain

[3] Peterson, G., & Elam, E. (2021). Observation and Documentation - The Key to Intentional Teaching. In *Observation and Assessment in Early Childhood Education* is licensed under CC BY.

29.3: Guidelines when Observing Children

Things to Keep in Mind

Caregivers observe, record, and capture moments in a child's development every day. The artifacts gathered are used to plan curriculum, assess growth, and change the environment. In the article "Who is Watching? Thinking Ethically about Observing Children," the authors highlight some of the ethical tensions that can arise within early childhood settings when trying to balance the rights of children, the responsibilities of caregivers, and the role of students training as future caregivers.[1]

When observing and documenting young children:

- Take every precaution to maintain confidentiality and ensure privacy.
- Be respectful and keep a reasonable amount of space between you and the child to minimize interference in playing and learning.
- Be attuned to children's body language, temperament, and communication styles.
- See each child as a unique individual with individual perspective, set of feelings, interests, and way of socializing, along with their cultural context, belief system, and values.
- Share information with the child about what you have observed, when appropriate.
- Collect photos and other observation methods in a non-intrusive manner.
- Ensure observation evidence and pictures are used only for the purposes intended.
- Handle photographs and data with care and sensitivity and store information securely.
- Realize that a child's reactions, behaviors, and conversations may not be what you expect, and therefore you should refrain from being judgmental or tainted by your cultural biases.[1]

---

[1] Peterson, G., & Elam, E. (2021). Observation and Documentation - The Key to Intentional Teaching. In *Observation and Assessment in Early Childhood Education* is licensed under CC BY.

29.4: Accurate Observations for Accurate Documentation

The importance of Accuracy

Observation is like a photograph—it captures a moment in time. As an observer, you are like the photographer, focusing on some things, ignoring others. Like the photographer, you bring your ideas, preferences, and perceptions to the act of observing. (Jablon et al.,2007)

It takes practice to become a good observer. For caregivers, an essential aspect of being a respectful observer involves knowing that what they notice and how they interpret their observations about infants and toddlers may be influenced by many things. Culture, temperament, the presence of a delay or disability, personal experiences and relationships, professional knowledge, and even community values and messages in the media affect how caregivers and families see and experience children. Our gut reactions and carefully considered opinions influence our observation behaviors (Cagliari, 2004).

These lenses through which caregivers observe and interpret cause influence, even though they may not always be conscious of them. For example, two adults may see an infant fuss but interpret what the fussy behavior means and respond differently based on their own experiences, education, and culture (Cagliari, 2004). Observing young children involves self-awareness, and this awareness evolves.

Every person comes from a culture, and every family's culture is unique. Culture—attitudes, beliefs, expectations about people and events—shape caregivers as humans and early childhood professionals. For example, some cultures consider it respectful to look someone in the eye when speaking or being spoken to, while others consider it respectful to look down when someone is speaking. A caregiver whose culture values looking someone in the eye when speaking may think that a child or family member whose culture values eyes down when someone speaks is ignoring them or disrespectful. This interpretation can then influence the words used in observation.

Traits such as temperament (e.g., being cautious, outgoing, or sensitive; requiring order), personal interests and preferences, and feelings (e.g., what makes us feel excited, apprehensive, uncomfortable) also affect how adults relate to children. These traits may help them feel closer to children with similar characteristics. They may pay more attention to children with similar characteristics and observe them more frequently than other children. These traits may also drive adults away from children whose attributes are different. Caregivers may pay them less attention or interpret their behaviors more negatively. For example, a caregiver who has a high tolerance for bright lights, environmental noise, and excess materials on shelves and walls may have difficulty figuring out that those same things may overstimulate an infant who cries frequently.[1]

---

[1] U.S Department of Health and Human Services ECLKC Child observation: The heart of individualizing responsive care for infants and toddlers is in the public domain

29.4.1: Objective vs. Subjective

Two Important Terms to Know

Intentional caregivers must understand the importance of objective and not subjective observation. The dictionary defines objective as: not influenced by personal feelings or opinions in considering and representing facts, contrasted with the definition of subjective: based on or influenced by personal feelings, tastes, or opinions (Dictionary.com, retrieved 2022). Scientists use objective evidence over subjective evidence to reach sound and logical conclusions, just as infants are born scientists (Babies are Born Scientists, 2012), observing caregivers are scientists as well.

Objective observation is without personal bias and the same by all individuals. Humans are biased by nature, so they cannot be completely objective; the goal is to be as unbiased as possible. A subjective observation is based on a person's feelings and beliefs and is unique to that individual.[1]

Observing objectively means writing down all you see and hear and recording only those behaviors directly observed. For most, this is much more difficult than the simple definition implies. It takes practice for caregivers to become skilled in separating the facts they observe from their opinions, biases, or reflections during the observation.

Objective vs Subjective

Objective Observations	**Subjective Observations**
Objective observations are based on what we observed using our senses; we record what we see, hear, taste, touch, and smell.	Subjective observations are often influenced by our past events, personal experiences, and opinions and can be biased based on our cultural backgrounds
Objective information is based on the facts we gather. If we don't see it, we don't report it. We write only details and provide vivid descriptions	Subjective information is based on our opinions, assumptions, personal beliefs, prejudiced feelings or can be based on suspicions, rumors, and guesses
Results are more likely to be valid and reliable from child to child	Results are often inconsistent and vary from child to child
Objective Terms to use: Seems to be; Appears to	Subjective Words to Avoid: Just; because; but; always, never; can't; I think; happy, intelligent, helpful, pretty, angry, shy, likes, loves, hates, sad

Additional Resources:

Clearing Your View: Staying Objective in Observation | ECLKC (hhs.gov)

[1] Johnson, Chris, & Affolter, M. (2017). Understanding Science is licensed CC BY-NC-SA

29.4.2: Recognizing and Removing Bias

Bias Observations

Search the word bias on an internet search engine. You will get a definition similar to: "prejudice in favor of or against one thing, person, or group compared with another, usually in a way considered to be unfair."

It is important to realize we might not be fully aware of all our biases, even if we are aware of some. Our biases are at play in our interpretations of behaviors we often observe without recognizing their influence. For example, when a child says, "give me some milk!" Our first response might be, "how do you ask?" We might not realize that manners (or lack of them) influence our reactions in a specific way. Caregivers must recognize how they feel towards the child's behavior influences how we see them and thus what we choose to observe and document.[1]

Common Subjective Mistakes to Avoid When Writing Observation Evidence

- Making Conclusions: "Billie can't do anything by himself because he is the youngest in a large family, and they do everything for him"; "Sharon's parents are getting a divorce, so she is sad"
- Making Assumptions: "Annie never shares"; "Denise always hits Thomas"
- Labeling: "Rosie is mean"; "Jeff is such a good boy"
- Comparing: "Tommy can't ride the bike as well as Sam"; "Zoey was the best listener at circle time."
- Focusing on Feelings or Emotions/Mood: "Max looks so sad today"; "Jax looks so happy as he slides down the slide."
- Adding Opinions/Subjective: "Martha likes playing dress-up; she is in the dramatic play area every day."; "Suki is shy and never says anything during circle time." (put in your parking lot). [2]

To the extent possible, caregivers need to acknowledge biases and the influences of our cultural lens and then remove those from observations and be intentional in removing them from the documentation. The necessity to remove subjective and sometimes biased observations does not automatically imply "wrong-ness." The subjective thought could align with the caregiver's cultural, personal, or religious values. What a person believes is often what makes us unique (remember the definition of objective?), but those unique views and reflections do not belong in our objective observation or documentation. Biases get in the way of what behavior is happening. When you first begin to document your observations, a helpful exercise is to physically write down the subjective thoughts into a separate area; some choose to label this the "parking lot" or select another label identifying it as a place to move subjective observations. As you complete more observations, the act of moving subjective thoughts out of the way of our objective observations will become easier. [3]

---

[1] Recognizing Your Biases is shared under a CC BY license and was authored, remixed, and/or curated by Gina Peterson and Emily Elam.

[2] Peterson, G., & Elam, E. (2021). Observation and Documentation - The Key to Intentional Teaching. In *Observation and Assessment in Early Childhood Education* is licensed under CC BY.

[3] U.S Department of Health and Human Services ECLKC Child observation: The heart of individualizing responsive care for infants and toddlers is in the public domain

---

29.4.3: Labeling vs. Describing Behaviors

The Words we Use

The practice of labeling behaviors versus describing what is observed is another practice that can create subjective observations. Understanding the difference between these two terms can be difficult. We often provide personality or even temperament traits when we fall into quickly labeling instead of describing observed behavior. An objective observation does not give one-word labels such as strong-willed, aggressive, temperamental, sweet, friendly, or bad. Instead, we describe the directly observed behaviors that led to the (often biased) label—describing the behaviors yields richer and more helpful information for later assessment or curriculum development.

29.4.4: Interpreting Mood

Observing Emotions

It can take a lot of practice to "un-train" ourselves from recording the mood we interpret versus the actual behavior we see. A great way to start is to think about a list of emotions you might try to use in your documentation. Examples most typically used are: Happy, Sad, Angry, Mad. When we use the words happy, sad, and angry in our documentation, we interpret the mood from observed behaviors. Let's take a look at the mood happy. If a caregiver documents the child is "happy," they observe a specific behavior that makes them make the statement. The child might be smiling, laughing, giggling, or jumping excitedly. When we only document the word "happy," we don't know the demonstrated behavior. How about sad? If I document "the child was sad." Does another person reading my documentation know exactly what behavior the child is exhibiting? No, they wouldn't. You could guess, but you can't say if you were right, and a guess then violates another critical consideration of observation: Accuracy. If we describe the mood of sad, we might document it as, "the child began to softly cry into their hands, turning the face away from their peers." Does that description allow you to picture what is going on much more accurately?

29.5: Observation and Documentation Do's and Dont's

Whether performing a planned or spontaneous observation, caregivers can use the tips below to observe objectively.

Observation and Documentation DOs:

- Note the date, time, setting,
- Note the child (or children) involved
- Record only the facts – in a concise (to the point) manner
- Record the facts in the order as they occur and precisely as you see it
- Collect vivid details and quotes
- Use a variety of Observation Methods
- Observe with an open heart, an open mind, and a clear lens, free of bias
- Be attentive and alert, and use all your senses
- Note what the child CAN DO rather than what he cannot do

Observation and Documentation DON'Ts

- Do not interfere or pressure the children to perform
- Do not assume or state your opinion while recording evidence
- Do not record anything you do not see
- Do not label behaviors, actions, or feelings
- Avoid using subjective, biased, or judgmental terms
- Avoid using exaggerations and conditional words
- Do not summarize information
- Avoid using generalizations or vague terms
- Keep a low profile and respect the children's space while they are playing [1]

---

[1] Observation and Documentation Dos and Don’ts is shared under a CC BY license and was authored, remixed, and/or curated by Gina Peterson and Emily Elam.

29.6: Setting Up Systems for Ongoing Observations

Intentional Observation

Infants and toddlers typically do not demonstrate what they know and can do "on-demand" (i.e., when the observer wants them to). However, caregivers can still intentionally capture and record what children do and say by setting up a system for carrying out observations.

There is no one right way to do this. An observation system in a center-based classroom with two caregivers may look different from the system that a family childcare provider who works alone uses. Observation systems are not static; they should be revisited as caregivers become more proficient in observing children and growing and developing.[1]

Here are some general strategies to consider when developing a system:

Plan times to observe a child

To capture the depth and breadth of children's skills, abilities, and interests, observe at different times of the day and in other settings. For example, observe children:

- Across environments (e.g., indoor and outdoor) and different times of the day (e.g., morning and afternoon)
- During routines (e.g., mealtimes, diapering and toileting, naptime, dressing, arrival, and departure)
- As they engage in play experiences and move from one play experience to another
- As they interact with other children and adults

Develop a plan to make sure each child is observed regularly (e.g., once a day or week). When using an observation method that requires stepping back for a period to observe, such as a running record, coordinate that observation time with another adult to ensure children are supervised, and teacher-child ratios are maintained.

Repeat observations over time. A single observation does not provide enough information to determine what a child knows and can do entirely. Children's behaviors are not always consistent. Many factors (e.g., illness, lack of sleep, hunger, changes at home, changes in the daily schedule, staff changes, the developmental process) can influence what children do and say from day to day, and even from hour to hour. So, multiple observations are needed.

Plan for spontaneous observation opportunities

Although this may sound like a contradiction, it is not. Often, infants and toddlers do and say new and unexpected things. These behaviors may occur during unplanned observation times. To prepare for unplanned observation:

- Put note-taking materials (e.g., writing tools, index cards, sticky notes, mailing labels, note pads, clipboards, and paper) in strategic places around the room, in the pocket of a smock or apron.
- Make sure cameras and audio and video recording devices are in working order, are fully charged, and are easily accessible.[1]

When you've completed your observation, find time to file them as quickly as possible. This time could be at naptime, planning time, beginning or end of the day, or the end of each week. Do not wait too long; observations can quickly pile up or get lost during a busy day or week.[2]

---

[1] Head Start | ECLKC under the U.S. Department of Health and Human Services. *Child Screening & Assessment. Retrieved from Setting Up Systems for Ongoing Observations*:

[2] US Department of Health and Human Services ECLKC Child observation: The heart of individualizing responsive care for infants and toddlers is in the public domain

---

29.7: Family and Observation

Partnering with Families

Talk with families about why and how observations are completed in the program. Provide relevant information—both verbally and written in the families' home languages—about child development so families can better understand what they observe. Invite them to share what they observe about their children verbally, through pictures and photographs, or in writing (e.g., notes in journals that go back and forth between home and the program, email, or text exchanges as allowed by program communication policies).[1]

[1] Head Start | ECLKC under the U.S. Department of Health and Human Services. *Child Screening & Assessment. Retrieved from Setting Up Systems for Ongoing Observations*:

29.8: Conclusion

Conclusion to Introduction to Observation

As an intentional caregiver, you will want to plan systematic observations to document each child's unique qualities, interests, developmental strengths, needs, learning approaches, and play preferences. As you gather the evidence, you will want to be as objective as possible, recognizing your biases and removing them from your observations.

29.9: References

References for Introduction to Observation

- Cagliari, P. (2004). The Role of Observation, Interpretation and Documentation in Understanding Children's Learning Process. *Innovations in Early Education: the International Reggio Exchange*, *11*(4), 1–5.
- Dichtelmiller, Margo L.; Laura Ensler. "Infant/Toddler Assessment: One Program's Experience." *Spotlight on Young Children and Assessment*. Washington, DC: National Association for the Education of Young Children (2004): 17–21
- Head Start| ECLKC. (2021). *Look at Me! Using Focused Child Observation with Infants and Toddlers*. U.S. Department of Health & Human Services. Retrieved January 29, 2022, from https://eclkc.ohs.acf.hhs.gov/video/...fants-toddlers.
- Head Start| Early Childhood Learning & Knowledge Center (Ed.). (2020, April 10). Child observation: The heart of individualizing responsive care for infants and toddlers. Child Observation: The Heart of Individualizing Responsive Care for Infants and Toddlers. Retrieved January 29, 2022, from https://eclkc.ohs.acf.hhs.gov/child-...ndividualizing is in the public domain
- Head Start | ECLKC under the U.S. Department of Health and Human Services. (2019, December 3). *Child Screening & Assessment*. Retrieved from Setting Up Systems for Ongoing Observations: https://eclkc.ohs.acf.hhs.gov/child-...g-observations
- Jablon, Judy R., Amy Laura Dombro, and Margo L. Dichtelmiller. *The Power of Observation for Birth Through Eight, 2nd Ed.* Washington, DC: Teaching Strategies and National Association for the Education of Young Children, 2007.
- Johnson, Chris, & Affolter, M. (2017). Understanding Science. essay, Salt Lake City Community College. This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License.
- National Infant & Toddler Child Care Initiative. *Infant/Toddler Curriculum & Individualization*. Washington, DC: U.S. Department of Health and Human Services, 2010.
- National Infant & Toddler Child Care Initiative. *Infant/Toddler Development, Screening, and Assessment*. Washington, DC: U.S. Department of Health and Human Services, 2010.
- National Science Foundation, Babies are Born Scientists (2012). Retrieved January 29, 2022, from https://www.nsf.gov/news/news_summ.jsp?cntn_id=125575.
- "Observation." *Dictionary.com*. Accessed Feb. 19, 2019.
- Peterson, G., & Elam, E. (2021). Observation and Documentation - The Key to Intentional Teaching. In *Observation and Assessment in Early Childhood Education*. essay. Retrieved January 29, 2022, from https://socialsci.libretexts.org/Boo...ional_Teaching. "Observation and Documentation - The Key to Intentional Teaching" is licensed under CC BY.
- Stetson, Charlotte, Judy Jablon, and Amy Laura Dombro. Observation: The Key to Responsive Teaching Workbook with DVD. Washington, DC: Teaching Strategies, 2009.

CHAPTER OVERVIEW

30: Documentation

30.1: Introduction

Introduction to Documentation

A foundation for high-quality care includes using information collected through observation and documentation to assess infant and toddler development and support developmentally appropriate curriculum creation. According to NAEYC (2009), there needs to be an organized information collection system to guide classroom decisions. Caregivers' observation and the documentation created from those observations make infant and toddler learning visible (Rinaldi 2001), a concept first brought to light by the schools of Reggio Emilia, Italy. Through detailed descriptive notes, photos, recordings, and drawings, caregivers reflect on an infant or toddler's ideas, intentions, or feelings during play. When we document infant and toddler learning and collect key artifacts, we create tangible evidence to share with the infant and toddler, their families, administrators, and other stakeholders. Observing infants and toddlers at play reveals much about their process of information gathering and making sense of their world. Rinaldi (1994, 59) explains that young infants and toddlers "ask us to listen, to observe, and support them and to render them visible." Caregivers "render them visible" by recording what they see infants and toddlers do or say, then reflecting on and interpreting those observations. When infants and toddlers take action to explore different possibilities, they are testing their own hypotheses (Gopnik, Meltzoff, and Kuhl 2000; Gopnik 2009). Observing, reflecting, and creating documentation on infants' and toddlers' actions or a verbal toddler's explanations serves as a window into their curious and creative minds.[1]

[1] Early Education and Support. Best Practices for Planning Curriculum for Young Children: The integrated nature of learning is in the public domain

30.2: Getting Started

Where to begin?

There are different ways to begin documenting observations: there is no one-size-fits-all approach. Trying a few different strategies may be helpful, especially if you are new to the process. The structure of a program and individual preferences of caregivers can influence which documentation strategy fits best.

Whether you are doing a planned or spontaneous observation, keeping essential tools nearby supports successful implementation.

When possible, keep the following items close at hand:

- ***Something to write on***– paper, sticky notes, color-coded index cards, clipboard, notebook
- ***Something to write with*** – colored ink pens, sharpie markers
- ***Something to record with*** – photo camera, video camera, tape recorder

A caregiver must be poised to document as events occur. By carrying these items around in an apron pocket or placing them strategically around the room for quick access, a caregiver will always be within reach of useful tools for creating documentation. [1]

---

[1] Office of Child Care: Child Care Technical Assistance Network, Infant/Toddler Resource Guide: Planning for Infants and Toddlers. Observation, Documentation, and Reflection

---

30.3: Observation and Documentation While Participating

Being Present

One of the critical challenges for infant and toddler caregivers is observing and recording their observations while providing care. Learning how to address this challenge takes time and a sound support system. Caregivers can develop plans together for observing and recording behavior within the context of daily routines and events. Some caregivers take turns; others have systems such as cameras and note cards placed around the indoor and outdoor areas so they can take quick notes or photos in the moment. There are many ways to participate and observe at the same time. Infants and toddlers become accustomed to caregivers who take notes and photos; the process of observing and recording behavior becomes a regular part of daily routines. Documentation from caregivers who are involved daily with infants and toddlers is the most useful because the caregiver understands the infant's and toddler's context: everything from how the infant or toddler slept the night before to his current interests. Infant and toddler caregivers who observe regularly are better able to provide care and education that connects with each infant and toddler.[1]

[1] The California Infant/Toddler Curriculum Framework by the California Department of Education is used with permission

30.4: Types of Documentation

"We, as adults, feel the need to describe things to give words and categories to types of behaviors and dimensions of knowledge. We must be able to do this without separating the strands the infants have woven together" – Paola Cagliari

Exploring Documentation Options

There are many ways to record and document infant and toddler learning. Caregivers should utilize several methods as part of their regular documentation routines. The tools and strategies caregivers use to document force choices to be made: caregivers must take time to intentionally choose the best documentation tool for the intended communication. Infant and toddlers have the right to explain their creativity and their way of seeing the world. Caregivers must respect the different processes infants and toddlers use to build their knowledge and choose documentation with this in mind: it is crucial to find strategies to understand the processes of knowledge exploration and sustain, not suffocate, these processes (Cagliari, 2004).

The following methods are the most common for collecting and recording data:

Narrative or Open Methods

- Anecdotal notes
- Running records
- Daily log
- Home-School Journal

Closed Methods

- Checklists
- Frequency counts
- Time or event samples

Authentic Documentation

- Work samples
- Taking photos, videotaping, or audio recordings

Anecdotal Records

Anecdotal records (sometimes referred to as specimen records) describe what infants and toddlers do and say. They are brief, focused notes about one event or incident from an infant or toddler's day. The key to creating an anecdotal record is to concentrate on one specific event or activity. When creating an anecdotal record, capturing the beginning, middle, and end of a particular event is often referred to as the ABCs.

A= Antecedent: what happened before the event

B= Behavior: the specific behavior being captured

C= Consequence: what happened after the behavior

Anecdotal records offer a window of opportunity into an infant or toddler's actions, interactions, and reactions to people and events. When caregivers later analyze this collection of narratives, the anecdotal records can showcase an infant or toddler's progress over time. (University of Washington, EarlyEdU Alliance, 2020).

Running Records

The primary goal for running records is to "obtain a detailed, objective account of behavior without inference, interpretations, or evaluations" (Bentzen, 2009, p.112). Running records contain many elements of an anecdotal record but go further than one specific narrative. The details recorded in a running record contain elements resembling an ethnography. An ethnography is the in-depth study of everyday practices of people's lives: it produces a detailed description of the studied group at a particular time and location. These descriptions document the behavior or cultural event in question and the context in which it occurs (Scheib et al., 2021). These elements can also be present in a running record. The attitudes, perspectives, and motivations describe the entire situation. Documenting the whole situation in a running record requires much more information than an anecdotal record (Swim & Douville-Watson, 2011). Good documentation includes the ability to close your eyes and "see" the images in your mind as they are

described in the running record (Bentzen, 2009). This level of detail also applies to anecdotal records. To complete a running record, caregivers often schedule a day, time, and setting to observe a specific infant or toddler or group of infants and toddlers. Although not necessary, caregivers decide on the observation's purpose, reason, or focus (e.g., cognitive skills, social interactions, play patterns).[1]

In both an anecdotal record and a running record, a caregiver may create 2 separate categories in their documentation. One category contains the objective factual observation, while a separate section records the caregiver's inferences. Inferences are conclusions that an observer draws from the interpretation of objective observations. (Wittmer & Petersen, 2010)

Daily Logs

Most infant and toddler programs create daily logs for each infant and toddler. These logs usually contain information like feeding amounts and times, naps, and diaper changes. They can also include quick notes about milestone behaviors noticed, an activity the infant or toddler engaged in, or an overall synopsis of the infant or toddler's day. Daily logs are not the place to comment on concerns or problem behaviors. Behaviors of concern are recorded on other forms of documentation, and if needed, a conversation occurs with the family at a scheduled time.

Individual Journals and Home-School Journals

The use of individual journals is great practice for creating consistent and consecutive records of events and development for an individual infant or toddler. Personal journals can be made from any materials: inexpensive composition notebooks are frequently implemented.

Caregivers should spend a few minutes at the end of every day jotting notes about the infant or toddler. These notes can replicate the daily log records or include more in-depth description. Caregivers do not need to record in every individual journal every day. A practice of spending a few minutes at the end of the day documenting in a few individual journals will make it possible for even the busiest of caregivers to create valuable documentation for assessment and curriculum development. Journals (and other forms of documentation) can also be used during family-caregiver conferences or move with the infant or toddler to the next classroom. Home-school journals contain the same elements as an individual journal, but also function as a communication tool to send information back and forth between school and home. Families are encouraged to write and respond to the caregiver's observations or notes (Swim & Douville-Watson, 2011). Home-school journals create involvement and connection for family members who might not otherwise have the opportunity to engage with the childcare center.

Checklists and Other Tools

Tools such as checklists and frequency counts quickly record information about the occurrence of specific behaviors or skills. A significant feature of these tools is that the behaviors or skills are already identified and defined. Caregivers record the observed behavior or skill by using check or tally marks or noting the date on which the skill or behavior was seen. (McAfee et al., 2016) These documentation tools are classified as closed types because they do not provide any details of the observation and should never be used exclusively for curriculum development or assessment purposes.

Documentation Panels

Documentation panels contain photos, transcripts of conversations, caregivers' notes, and artifacts from one infant or toddler or a group of infants and toddlers (Klien, 2008). Documentation panels move beyond bulletin boards or art displays because they function as intentional communication (Tarini, 1997). They attempt to communicate the complexity of an infant or toddler's experience, as well as the learning taking place during those experiences (Helm & Beneke, 2003).

When documentation panels are displayed at infant and toddler eye level, they allow infants and toddlers the opportunity to revisit their learning in a format that is easy to visually observe and provides visual prompts for caregivers to have conversations revisiting the experience. Viewing documentation invites curiosity and confidence as infants and toddlers revisit their work and contemplate their accomplishments (Malaguzzi,1998). A documentation panel can display a variety of interactions visually: child/child, child/adult, and child/material (Klien, 2008). Artfully displaying the contents of a documentation panel serves as a visual archive of an infant or toddler's learning for directors, parents, and community members to view easily (Helm, Beneke, & Steinheimer, 1998). Documentation panels draw parents into the classrooms and serve as a springboard for conversations (Saltz, 1997). For centers and family childcare organizations utilizing project-based curriculum, documentation panels provide the space to convey the infant and toddler's experiences and learning throughout the project (Kline, 2008). Caregivers may put a set of photographs side by side to

show a sequence of actions or learning experiences. This technique sheds light on a wide range of learning (for example, an infant and toddler's understanding of routines or an infant and toddler's fine motor development). [2]

What to include on documentation panels:

- Photos of infants and toddlers demonstrating the skill you are explaining
- Narratives about the photos
- Sample of materials used
- Diagrams
- Procedures and processes for curriculum or project exploration
- Connections to assessment measures (i.e., DRDP measures)
- Children's quotes

When creating a board, think about the audience: the intended audience dictates the type of words and images used.

---

[1] Peterson, G., & Elam, E. (2021). Observation and Documentation - The Key to Intentional Teaching. In *Observation and Assessment in Early Childhood Education* is licensed under CC BY.

[2] The California Infant/Toddler Curriculum Framework by the California Department of Education is used with permission

---

30.5: Technology for Documentation

Tools of the Trade

Utilizing technology in established routines can make collecting evidence for observation much more efficient for busy caregivers. Photographs, video, and audio recordings can authentically capture infant and toddler explorations, investigations, play, and learning experiences in the actual moment.

With this type of documentation, caregivers can replay critical moments in an infant or toddler's day to look for specific interactions, play patterns, developmental milestones, struggles, accomplishments, and how infants and toddlers solve problems. Caregivers can also listen for language development by recording infant and toddler conversations with their peers. Technology provides opportunities for caregivers to share documentation with infants and toddlers in their classrooms.

There are numerous ways to incorporate technology into a classroom. Each center should develop its own protocol, policies, and procedures concerning the use of technology. What is permissible and not allowed should be clearly stated and known by all adults. Technology allows for easily sharing images and videos with the infant or toddler's family, but some infants and toddlers require special protection from public transmission or display of their images. Infant and toddlers in foster care, protected custody, or part of more private families might be prohibited from how and where images are shown and shared.

Here are a few suggestions for integrating technology into observation and documentation practices:

- Use a camera, laptop, tablet, or smartphone to record observations and take pictures.
- Ask a toddler to tell a story, then type it up on a computer or use an audio recorder.
- Scan or make copies of an infant or toddler's work, such as drawings or writing, to create a visual timeline showing an infant or toddler's skill development over time.
- Use email or a communication app to post work samples.
- Take pictures of 3-dimensional work: for example, woodworking projects, block towers, sandcastles, and culinary creations.

Use a video camera to document how infants and toddlers progress with their developmental milestones in each domain. For example, look at playful interactions to track social-emotional development.

Cameras and media recorders, including smartphones and tablets, offer quick, efficient ways to document what infants and toddlers say and do. Before jumping into a technology purchase, make sure to consider the following:

- Family access to technology
- The length of audio and video clips: the longer the clip, the larger the file (large files take up precious storage space). Long audio and video clips also take more time to review and analyze later.
- Costs for:
- Buying cameras and recorders
- Equipment
- Software to download, store, play, and print files
- Film development (if not using a digital camera)
- Upkeep (e.g., batteries, repair)
- Time for other caregivers in the program to learn and train on new technology [1]

Advantages and Disadvantages of Technology for Documentation

Advantages

- Provides tangible/visible evidence that caregivers can use to track an infant or toddler's learning, growth, and development over time
- Provides enjoyment for parents seeing the work on display
- Captures authentic documentation, which is ideal for assessment
- Shows families how infants and toddlers learn through play
- Allows infants and toddlers to share insight into *how* they created the work sample and offer their perspectives as to *what* they were thinking (authentic evidence)
- Provides enjoyment to infants and toddlers seeing their work on display
- Offers empowerment to infants and toddlers by confirming their work is valued

- Allows easier observation of infants and toddlers in their natural settings

Disadvantages

- Requires large amounts of time
- Requires ample storage space
- Requires a financial investment in technology (camera, video, or audio recorder)
- Brings up concerns over confidentiality and privacy when using photos, audio, or videos

Organizing data with technology

Observation data can be conveniently stored on a computer, and each infant and toddler can have their own digital portfolio or file folder. Some caregivers use an app to organize observation evidence formally, and some schools may purchase a program that links families to daily observations. Electronic observation evidence can also be managed and stored by:

- Scanning, printing, and posting photos in the classroom
- Creating photo slideshows for family nights or as screensavers[2]

When saving recordings, include information relevant for identification (e.g., date and time, setting, names of infants, toddlers and adults, the routine or play experience during which the recording was made). This information will be important when reflecting on observations about each infant and toddler and individualizing care and curriculum. Photographs, video clips, and audio clips are excellent concrete tools for conveying to families what infants and toddlers know and do. [1]

---

[1] Head Start | ECLKC under the U.S. Department of Health & Human Services, 2020. *Audio and Visual Recordings. Retrieved from Child Screening & Assessment:* is in the public domain.

[] Head Start | ECLKC under the U.S. Department of Health and Human Services. (2019, December 3). *Setting Up Systems for Ongoing Observations*. Retrieved from Child Observation: The Heart of Individualizing Responsive Care for Infants and Toddlers: is in the public domain

---

30.6: Key Concepts in Creating Documentation

Accuracy and Completeness

How important is accurate observation and documentation? If you were asked to write down one thing you did yesterday, how well would you remember the details of that moment? What if you were asked to write down a moment from one week ago today? Which of those memories would have more accurate details? Most would answer that recording a memory from yesterday would be more accurate and detailed than the record of an event from a week ago. Yet many caregivers try to document observations days or weeks after an event. Upcoming deadlines, such as a family conference or assignment due date, often prompt caregivers to sit down and create documentation from past observations. Unfortunately, waiting to record information diminishes accuracy and clarity.

Let's take this exercise further. What if you needed to write down a conversation from yesterday? From last week? From last month? Can you recall the details of what you said? Which memory would be most accurate: the one from yesterday, last week, or last month? How confident could you be of the accuracy of what was said?

Observation notes need to be accurate, objective and factual. Accurate observation notes include facts and details about the order in which they occur. Consider the following story about Gabriel (33 months), which occurs during a home visit. Here is the entire exchange:

"Gabriel and his mom are next to each other. Each one is building a tower using large plastic blocks. Gabriel builds his tower as tall as he is. He bumps into the tower with his arm. The tower falls over and knocks down the block tower that his mother built. Gabriel laughs and jumps up and down while clapping his hands. His mom laughs, claps her hands, and hugs Gabriel."

Here is what the caregiver documented:

"Gabriel builds a tower as tall as he is using large plastic blocks. He starts to laugh, jump up and down, clap his hands, and bumps into his tower, knocking it down and his mom's tower down, too."

This observation note created by the caregiver is not accurate. It contains facts out of order (laugh, jump up and down, clap his hands, and bump into his tower). It is also missing information (Gabriel and his mother are next to each other, each one is building a tower, Gabriel's mom laughs, claps her hands, and hugs Gabriel). Accuracy matters. Over time, inaccurate observation notes may lead to erroneous interpretations or misunderstandings of what an infant or toddler can do.

Here are additional tips to write accurate observation notes:

- Note the infant or toddler's name and the person making the observation.
- Note the date/time of the observation, setting (e.g., indoor/outdoor, routine, play experience), and other infants, toddlers, or adults involved.
- Use abbreviations, short phrases, symbols, drawn pictures, and other shorthand inventions to capture information quickly.
- Use phonetic spellings to capture vocalizations (e.g., buh-buh-buh-mmmm) and word attempts (e.g., "peez" for "please").
- Observe with a partner and then compare observations.[1]

Caregivers often document a behavior, but miss what happened before (antecedent) and what happened after (consequence). To capture an entire event, caregivers need to include the ABCs.

- **Antecedents** – Environmental events or stimuli that trigger a behavior
- **Behavior** – What people do, say, think or feel
- **Consequence** – Outcome of a behavior [2]

A Word About the Word Play

Educators love the word *play*, and it needs to be a more significant part of the vocabulary when teaching and planning the days with young infants and toddlers. However, play should rarely be part of documentation. What comes to mind if asked to describe an infant or toddler at play? It could include a few toddlers in the sociodramatic area pretending to cook dinner, an infant or toddler digging a hole in the sandbox, or a single infant stacking blocks or investigating a piece of fabric. If the word play were used to document each scene, information would be limited by saying “the infant played” because the details are missing. The word “play” might fit as a generalization, but it doesn't provide curriculum development or assessment details. If a caregiver writes, "Javier was playing house," many details for later analysis are missing. However, if the caregiver writes, “Javier grasped the pot with his left

hand. He clutched a wooden spoon firmly with his right hand and slowly mixed the pretend soup in a clockwise circle. Sarina walked over and handed Javier the spices and stated, ‘make the soup better,’” more visual details and information for assessment or curriculum development purposes are included. The second statement proves most effective because it describes the specific behaviors observed.

---

[1] U.S Department of Health and Human Services ECLKC Child observation: The heart of individualizing responsive care for infants and toddlers is in the public domain

[2] Daffin, L. W. (2022). Module 5: Determining the ABCs of Behavior via a Functional Assessment . In *Principles of Behavior Analysis and Modification* (4th ed.) licensed under a CC BY NC SA

30.7: Storing Documentation

To safely and securely store collected data, caregivers need an organized system in place: a system might be a filing cabinet, accordion file folder, or portfolio. There won't be a universal solution for containing documentation; each individual program requires its own unique system.

Portfolios

Caregivers often use individual portfolios to hold evidence of an infant or toddler's learning. A portfolio provides notes, photos, and work samples that demonstrate the infant or toddler's understanding of critical concepts and skills.[1] Portfolios can be created with a binder or notebook, a file or accordion-style folder, or a cardboard box. Unused pizza boxes with the infant or toddler's name printed on the end are an easy way to collect documentation for later organization. Including clear dates on documentation pieces allows for chronological organization at a later time.

A clear organization system helps track each infant and toddler's progress throughout the school year. Having dates on each piece removes concern over putting items in perfect order when pressed for time. Caregivers can go in later and organize chronologically. Portfolios allow caregivers to construct a well-rounded and authentic picture of each infant and toddler in their class. Knowing the whole infant and toddler better equips caregivers to build on each infant and toddler's interests and plan developmentally appropriate activities.

If utilizing portfolios, provide an individual file for each infant and toddler. A well-organized portfolio contains observations and artifacts of infant and toddlers' work collected at different periods throughout the year. Include documentation that highlights each developmental domain. For example:

- **Gross Motor:** Include photographs of the infant or toddler engaged in outside activities like running, jumping, climbing, riding a bike, or playing in the sandbox.
- **Fine Motor:** Use a checklist or other documentation of when the infant or toddler learns to button, zip, and tie his shoes. Include work samples of cutting, coloring, and painting.
- **Social-Emotional**: Utilize anecdotal or running records of infants and toddlers engaging in open-ended, infant and toddler-directed play.
  - Note sharing, taking turns, and cooperation with others.
  - Employ frequency count/event sampling to see in which centers infant and toddlers choose to spend their time, and tally play patterns to see if they prefer to play alone or with others.
- **Cognitive:** Chart a science experiment and take photos.
  - Use a video camera to record an infant or toddler as she stacks blocks. Record any explained process in the build.
- **Literacy and Oral language**: Save writing examples to track writing.
  - Write down quotes in an anecdotal and running record.
  - Make audiotapes of conversations during circle time.
- **Creative expression**: Videotape engagement in the dramatic play area.
  - Videotape dancing to music (this can also be excellent documentation for motor development).
  - Photograph a clay creation, painting, or block tower.

Portfolios tell the story of the whole infant or toddler. Each work sample, anecdotal note, checklist, frequency count, and photograph showcase how an infant or toddler processes information, develops relationships, and learns while playing.

---

[1] Early Education and Support. Best Practices for Planning Curriculum for Young Children: The integrated nature of learning is in the public domain

30.8: Documentation and Families

Partnerships

Documentation not only guides curriculum planning and provides evidence of an infant or toddler's learning, but it also offers an easy, effective way to engage families in participating in their child's learning plan. A note, photo, or work sample invites families to interpret the caregivers' observations and reflective planning.[1] Caregivers may combine photos with notes to create a book of an infant or toddler's learning experiences to share with the infant or toddler's family.

Families appreciate seeing their infant or toddler's progression, how they interact with others, and the types of activities their infant or toddler engages in. Families have the right to be part of the process taking place in the school (Cagliari, 2004). They are also an essential source of information during the reflection process. Families can answer questions and help interpret an infant or toddler's behaviors and interactions. They can continue to share what they have observed at home and the strategies that work for them. By including families in documentation reflection, the infant or toddler's family members will often add insights and a perspective that the caregivers may not have considered.[2] Regularly sharing observations and actively pursuing a family's input and perspectives on their infant or toddler gives caregivers fuller views of an infant or toddler as an individual. Discussing observations through documentation provides families the opportunity to work in partnership or take the lead in their infant or toddler's care and education. Sharing reflections on infant and toddler observations helps create a mutually respectful environment that promotes the infant's, toddler's and family's needs.[3]

The following example from volume 3 of the California Preschool Curriculum Framework (CDE 2013, 35) illustrates how caregivers use documentation to invite families to join them in work:

During the small-group face-drawing activity, Clayton was picking out pencils for his skin color when his mother arrived to pick him up. She knelt near the table as Connie read the name printed on the colored pencil that Clayton had selected. "This one says, sienna brown.' What do you think, Clayton?" Connie asked as she moved the tip of the pencil near his arm. "Is that your color?" Clayton smiled at his mother: "I'm sienna brown, mommy. Which one do you want to be?" A few minutes later, when Clayton was retrieving his things from his cubby, his mother confided in Connie how much she had enjoyed picking out her skin color with Clayton. She had been uncertain about how to talk with Clayton about skin color because she was of European-American background and Clayton's father was African American. Most of the family members living nearby were Caucasian. They discussed the possibility of doing an activity at the next parent meeting. All parents could explore the variety of flesh-toned colored pencils and even blend different tints of homemade play dough that they could take home to enjoy with their infant and toddlers.

---

[1] Early Education and Support. Best Practices for Planning Curriculum for Young Children: The integrated nature of learning is in the public domain

[2] Early Education and Support. Best Practices for Planning Curriculum for Young Children: The integrated nature of learning is in the public domain

[3] U.S Department of Health and Human Services ECLKC *Look at Me! Using Focused Child Observation with Infants and Toddlers* is in the public domain.

30.9: Reviewing and Reflecting on Documentation

Looking Back

"Reflection is a time to slow down, to see what can be learned if we take the time to carefully look at and listen to ourselves, and those with whom we work." (Parlakian, 2001, p. 16)

Once caregivers have observed and documented facts about each infant and toddler, they must do something with those facts. As part of ongoing infant and toddler assessment, caregivers review the facts and reflect on what they mean. When caregivers review anecdotal notes, photos, videos, or other samples, they piece together stories that portray the development of the infants and toddlers in their care. Caregivers may review multiple pieces of documentation (video recordings, notes, photographs, and so forth) to deepen their understanding of an individual infant or toddler. Observation notes might clarify why an infant or toddler is making rapid progress in one developmental domain while continuing to practice at about the same level of competency in another domain. [1] Caregivers consider what the information says about an infant or toddler's development, interests, and needs. The answers to these questions lead to individualized care and a supportive curriculum. [2]

Questions caregivers ask while reflecting on documentation might include:

- What developmental skill or activity does the infant or toddler appear to be working on?
- What strategies does the infant or toddler use to play with different toys?
- Does the infant or toddler engage with objects or people differently than he did a month ago? What has changed? What has not changed?
- Do my actions and the actions of other adults who interact with the infant or toddler affect the outcomes of the infant or toddler's experience? If so, how so?
- How does the information relate to goals for the infant or toddler? How does it relate to the family's goals?
- What other information do I need?
- What questions do I have for the infant or toddler's family? [3]

Caregivers who take time to reflect on the documentation created by their observations uncover infant or toddler's likes and dislikes, discover what makes the infant or toddler comfortable or uncomfortable, and notice how the infant or toddler approaches familiar and unfamiliar tasks and situations. This information enables caregivers to see and track trends in an infant or toddler's growth and development.

During the reflective process, interpreting the meaning of infant and toddler behaviors and interactions becomes essential. Ongoing observation and reflection on documentation offer insights into each infant and toddler, which deepen caregivers' understanding of each infant and toddler's development.

Reflecting Together

Caregivers share documentation with others to deepen understanding of infant/toddler thinking and learning. Interpreting an infant or toddler's thoughts, feelings, or ideas is vital for reflection and often most effective in partnership with co-teachers.[2] When caregivers interpret documentation, learning becomes explicit. Since documentation makes learning visible, caregivers need to work together to interpret that learning (Cagliari, 2004).

---

[1] The California Infant/Toddler Curriculum Framework by the California Department of Education is used with permission

[2] Early Education and Support. Best Practices for Planning Curriculum for Young Children: The integrated nature of learning is in the public domain

[3] The California Infant/Toddler Curriculum Framework by the California Department of Education is used with permission

---

30.10: Documentation as a Tool for Planning

Looking Forward

When caregivers observe, document, and interpret what they document, they generate ideas for supporting infants and toddlers to dive more deeply into an investigation. In doing so, the infant or toddler builds more complex, coherent concepts and master more difficult skills. Thoughtful planning begins with observing; documentation guides curriculum and provides evidence of the critical concepts and skills the young infant or toddler is building.[1]

[1] Early Education and Support. Best Practices for Planning Curriculum for Young Children: The integrated nature of learning is in the public domain

30.11: Documentation for Assessment

Assessment

Documentation provides evidence to support caregivers' observational assessments of infants and toddlers. Caregivers use their ongoing documentation of an infant or toddler's learning to complete assessment tools such as the DRDP. An observation, photo, or work sample, accompanied by the caregiver's interpretation, has the potential to reveal an infant or toddler's progress. By considering the integrated nature of an infant or toddler's learning, caregivers can interpret a single piece of documentation through several lenses when completing an assessment such as the DRDP.[1]

[1] Early Education and Support. Best Practices for Planning Curriculum for Young Children: The integrated nature of learning is in the public domai

30.12: Conclusion

Conclusion to Documentation

As caregivers gather and organize their observational data, they begin to see each infant and toddler for who they are as individuals and as members of the classroom community. With that information, intentional caregivers can set realistic expectations of what an infant or toddler can do.[1]

[1] Peterson, G., & Elam, E. (2021). Observation and Documentation - The Key to Intentional Teaching. In *Observation and Assessment in Early Childhood Education* is licensed under CC BY.

30.13: Reference

References for Documentation

- Bentzen (2009), Seeing Young Children: A Guide to Observing and Recording Behavior. Thomson Delmar Learning, Clifton Park, NY
- California Department of Education. (2012). *Infant/Toddler Curriculum Framework.* Sacramento: California Department of Education. Retrieved from https://www.cde.ca.gov/sp/cd/re/docu...elines2019.pdf
- Daffin, L. W. (2022). Module 5: Determining the ABCs of Behavior via a Functional Assessment . In *Principles of Behavior Analysis and Modification* (4th ed.). essay, Washington State University . Retrieved January 30, 2022, from https://opentext.wsu.edu/ldaffin/fro...er/title-page/. licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License, except where otherwise noted.
- Early Education and Support Division , The integrated nature of learning (2016). California Department of Education . Retrieved January 30, 2022, from https://www.cde.ca.gov/sp/cd/re/documents/intnatureoflearning2016.pdf.
- Early Education and Support. (F. Org, Ed.), Best Practices for Planning Curriculum for Young Children: The integrated nature of learning (2016). California Department of Education. Retrieved January 30, 2022, from https://www.cde.ca.gov/sp/cd/re/docu...arning2016.pdf.
- Helm, J., & Beneke, S. (Eds.). (2003). The power of projects: Meeting contemporary challenges in early childhood classrooms. New York: Teacher's College Press.
- Helm, J., Beneke, S., & Steinheimer, K. (1998). Windows on learning: Documenting young children's work. New York: Teacher's College Press.
- Head Start | ECLKC under the U.S. Department of Health & Human Services, 2020. (2019, December 3). *Audio and Visual Recordings*. Retrieved from Child Screening & Assessment: https://eclkc.ohs.acf.hhs.gov/child-...ual-recordings
- Head Start | ECLKC under the U.S. Department of Health and Human Services. (2019, December 3). *Setting Up Systems for Ongoing Observations*. Retrieved from Child Observation: The Heart of Individualizing Responsive Care for Infants and Toddlers: https://eclkc.ohs.acf.hhs.gov/child-...g-observations
- Kline, L. S. (2008). Documentation panel: The "Making learning visible" project. *Journal of Early Childhood Teacher Education*, *29*(1), 70–80. https://doi.org/10.1080/10901020701878685
- McAfee, O., Leong, D. J., & Bodrova, E. (2016). Documenting: Recording Information. In Assessing and guiding young children's development and learning. essay, Pearson Education.
- Malaguzzi, L. (1998). History, ideas and basic philosophy: An interview with Lella Gandini. In C. Edwards, L. Gandini, & G. Forman (Eds.), *The hundred languages of children: The Reggio Emilia approach advanced reflections* (2nd ed., pp. 49–97). Greenwich, CT: Ablex.
- National Infant & Toddler Infant Care Initiative, *Infant/Toddler Curriculum*, 2)
- Office of Child Care: Child Care Technical Assistance Network, Infant/Toddler Resource Guide: Planning for Infants and Toddlers. Observation, Documentation, and Reflection (2018). U.S. Department of Health & Human Services. Retrieved January 30, 2022, from https://childcareta.acf.hhs.gov/infa...and-reflection.
- Peterson & Elam, Chapter 9: Using Observation Methods, Tools and Techniques to Gather Evidence
- Parlakian, R. (2001). *Look, listen, and learn: Reflective supervision and relationship-based work*. Washington, DC: Zero To Three.
- Rinaldi, C. 1994. "Staff Development in Reggio Emilia." In Reflections on the Reggio Emilia Approach, edited by L. Katz and B. Cesarone. Perspectives from ERIC/ EECE: A Monograph Series, No. 6. Urbana, IL: ERIC Clearinghouse on Elementary and Early Childhood Education.
- Saltz, R. (1997). The Reggio Emilia influence at the University of Michigan-Dearborn Child Development Center: Challenges and change. In J. Hendrick (Ed.), *First steps toward teaching the Reggio way* (pp. 167–180). Columbus, OH: Merrill.
- Scheib, C. (2021). ANTHROPOLOGIES DISTINCTIVE RESEARCH STRATEGY. essay. "Cultures of the World - Perspectives on Culture (Scheib)" by LibreTexts is licensed under CC BY-NC-SA.
- Scheib, Crystal., Making the Strange Familiar and the Familiar Strange. (2021, July 22). https://socialsci.libretexts.org/@go/page/56388", licensed under CC BY-NC.
- Tarini, E. (1997). Reflections on a year in Reggio Emilia: Key concepts in rethinking and learning the Reggio way. In J. Hendrick (Ed.), *First steps toward teaching the Reggio* (pp. 56–69).Columbus: OH.

- University of Washington, EarlyEdU Alliance. (2020). Media, Modules, and More. *https://www.earlyedualliance.org/media-modules-and-more/*

CHAPTER OVERVIEW

31: Assessment

31.1: Introduction

Introduction to Assessment

Intentional caregivers engage in an ongoing process of observation, documentation, assessment, reflection, planning, and implementation of strategies to provide individualized, developmentally appropriate learning experiences. Increasing numbers of children with diverse backgrounds, including children with disabilities, participate in infant and toddler programs. Collaboration, time for reflection, planning, and communication are essential to extending the benefits of high-quality infant and toddler care to all children.[1]

[1] California Department of Education, 2015 Infant/Toddler Curriculum Framework by the California Department of Education is used with Permission

31.2: Purpose of Assessment

Why?

In early childhood settings, assessment is the process of obtaining information about various areas of children's development, learning, and progress. Ongoing assessment helps families and caregivers know how a child is progressing and helps teachers set goals and plan experiences for the program. As part of engaging in continuous quality improvement, programs assess infants' and toddlers' developmental progress and learning. [1]Caregivers must understand diverse assessment approaches, purposes, uses, benefits, and limitations.[2]

Caregivers use assessments for various purposes (Snow and Van Hemel 2008). In the Principles and Recommendations for Early Childhood Assessments (National Education Goals Panel 1998), 4 broad goals for early childhood assessment were established: [1]

· To promote learning and development of individual children

· To identify children who may have delays, disabilities, or health conditions

· To monitor trends in programs and evaluate program effectiveness

· To obtain benchmark data for accountability purposes at local, state, and national levels

Although a one-time, easily administered assessment may offer some information about children's development, it is better to use a variety of instruments and methods over time to gain a more comprehensive picture of development.[1]

Developmental Monitoring

Caregivers usually have primary responsibility for collecting information on children's learning and development. Continuous assessment provides feedback about children's progress and guides learning experiences.[1]

Caregivers should regularly add anecdotes, photos, and samples to a child's portfolio or file: this provides a basis for assessing each infant or toddler's developmental progress. These items provide evidence and information to complete formal assessments later, which produce profiles of each child's developmental progress. Assessments for developmental monitoring should occur on a regular schedule, such as every 4 or 6 months. Designing a schedule for each child or facility helps ensure this type of assessment occurs regularly. [3]

Assessment profiles give caregivers a general orientation for supporting each infant or toddler over weeks and months; they help the caregiver be sensitive to the next steps in each child's development and plan accordingly.[3]

Screening

Assessing children's development helps caregivers and family members identify children who need a referral for further assessment. The importance of gathering information from multiple sources applies to all children, but it is essential when assessing children with disabilities or other delays. Periodic assessment of children's development provides a firm basis for referral if a delay or disability is suspected.[1]

For children receiving services from other sources (such as therapy through insurance or special education through an Individual Family Services Plan or IFSP), work with family members to gather input from specialized service professionals. The specialized service professional may send reports to or talk directly with caregivers with the families' permission. Comprehensive development tests, such as the Bayley Scales of Infant and Toddler Development and the Mullen Scales of Early Learning, are often considered the gold standard in the developmental assessment of infants and young children [Walder, 2009]. These tests offer comprehensive information on a child's current developmental status, are administered directly with the child, and offer scores for the assessed areas (Albers,2006).

Briefer approaches to developmental assessments often function as screening instruments designed to identify children with developmental delays who require further assessment (Rydez,2005). Screening instruments will differ in whether they are based on direct assessment with the child or secondary reports [Fernald,et. al,2009; Macy,2012; Kvestad *et al*, *2013)*

Curriculum

Curriculum planning requires caregivers to reflect on children's learning and plan strategies that foster children's progress in building knowledge and mastering skills.[3] Assessments offer insights for teachers planning appropriate learning environments

and when or how to offer engaging materials to children. Assessment for curriculum planning, environment planning, and other early learning experiences is essential to ensuring high quality early learning and care programs. [1]

[1] California Department of Education, 2019 Infant/Toddler Learning and Development Program Guidelines, Second Edition by the California Department of Education is used with permission

[2] Head Start| Early Childhood Learning & Knowledge Center (Ed.)Child observation: The heart of individualizing responsive care for infants and toddlers. is in the public domain

[3] California Department of Education, 2015 Infant/Toddler Curriculum Framework by the California Department of Education is used with Permission

31.3: Sources of Information

Where we get our Information

To fully understand a child's development, caregivers need information from many sources: teacher observations, parent reports, samples of work (or pictures of samples), and direct assessment (Snow and Van Hemel 2008). Gathering information from multiple sources informs a balanced view, reduces the chances of underestimating children's abilities, and provides the caregiver a basis for building upon a child's strengths.

Programs should clearly articulate how assessment methods are used to inform decision-making, planning, and program evaluation. Assessment policies and practices should ensure confidentiality and protect the privacy of children and families. Well-understood policies and procedures should also be in place for collaborating with specialized service providers, such as early interventionists. When considering information sources for assessment purposes, employing various methods and tools allows caregivers to regularly and consistently understand and document what children do, both individually and in groups.

Assessment Based on Observation and Documentation

Screening, observations, and frequent documentation are essential methods teachers use for understanding individual children and groups of children. Observations teachers make while interacting with infants inform the assessment process.[1] Documentation provides evidence to support caregivers' assessments of infants and toddlers, and tools such as the DRDP allow caregivers to use ongoing documentation of an infant or toddler's learning on assessments. An observation, photo, or work sample, accompanied by the caregiver's interpretation, can reveal evidence of an infant or toddler's progress. Considering the integrated nature of infant/toddler learning, caregivers can interpret a single piece of documentation through several lenses when completing an assessment instrument such as the DRDP (CDE 2016). For instance, a teacher may note that when she brings out a clean diaper during a diaper change, a child stops moving and points at the diaper until the teacher says the word "diaper," and then the child smiles and makes the sound "di." This observation could be used as the teacher determines whether the child is at the "Acting with Purpose" developmental level of the DRDP's "Communication and Language" measures.[1]

Authentic Assessment

Engaging in authentic assessment means choosing assessment tools that that reflect the everyday, real-life experiences of the young children involved (McAfee, Leong, and Bedrova 2004). Authentic assessment reveals the knowledge and skills of young children as they engage naturally with learning in the program and home settings. For dual language learners who typically use their home language to communicate, authentic assessment must include assessment in their home language and English (State Advisory Council on Early Learning and Care 2013, Paper 5 [Assessment]). When assessment is an ongoing practice, teachers and program administrators can make effective instructional adaptations that build on children's prior knowledge and support new learning for each child.[2]

When using observation as an assessment method, teachers should:

- Observe the behavior of the infants and toddlers throughout the entire day.
- Observe children when they are alone, with peers, family members, and teachers.
- Incorporate observation and assessment processes into daily routines and activities.
- Review assessments tool regularly and keep developmental themes in mind while observing the behavior.
- Hold conversations with toddlers about their experiences and their work. Listen to their thoughts and ideas and ask questions that encourage older toddlers to describe their thinking and problem-solving.
- Study the older toddler's work (projects, drawings, building, etc.) as part of gathering information about their development.
- Find a quiet place and set aside time to reflect on documentation and assessment information.
- Complete periodic assessments of each child using an identified assessment tool/process, and continue the process of observing, documenting, and reflecting.
- Track each child's developmental progress over time.
- Summarize assessment information on individual children in a form that can be easily used for curriculum planning.
- Include family members in the ongoing assessment process.

Collaborating with Families on the Assessment Process

Family members should participate in documenting their children's learning and development; they can review the assessment records with teachers and program leaders and plan learning experiences based on the assessment information. Family members need to be fully informed and aware of the different assessments done in the infant and toddler care setting. Seek information from family members about the child's behavior at home and other places outside the infant and toddler program. Collaborate with family members to clarify differences in observation or interpretation. If caregivers do not speak the child's home language, enlist the support of interpreters or translators who speak the family's language. When meeting with the family, provide concrete examples of the behavior or activity assessed to support understanding and clarity.[1]

---

[1] California Department of Education, 2015 Infant/Toddler Curriculum Framework by the California Department of Education is used with Permission

[2] Head Start| Early Childhood Learning & Knowledge Center (Ed.)Child observation: The heart of individualizing responsive care for infants and toddlers. is in the public domain

---

31.4: Types of Commonly Used Assessments

Caregivers should evaluate and select reliable, valid, and universally designed child observational assessments. Assessments must be developmentally appropriate, culturally and linguistically sensitive, and fully cover the diverse learning needs of children with disabilities or other delays. At the infant/toddler level, assessments should be broad in scope, including children's knowledge, skills, behaviors, temperaments, and health.[1]

Ages and Stages

The Ages and Stages Questionnaire 3 ed. (ASQ-3) is a widely used screening tool for infants and young children's development that assesses development in 5 domains: Communication, Gross Motor, Fine Motor, Problem Solving, and Personal Social [Squire et al., 2009]. Developmental areas covered by this screening tool include self-regulation, compliance, communication, adaptive functioning, autonomy, affect, and interaction with people.[2] The ASQ system is initially a parent-completed questionnaire, but it may also be completed by a professional interacting with the child (Kvestad *et al, 2013)*. The ASQ-3 provides an opportunity to address parental concerns, educate parents on child development, and empower parents to advocate for their children. It identifies children at risk of having possible developmental delays, detects a child's strengths and needs, and can be used to predict future school-related challenges.[2]

Parental reports provide a risk of inaccuracy or overstatements regarding the child's development (Fernald et al., 2009). However, the ASQ system is developed and based on the conviction that families can provide information for proper assessments of their children. For instance, a study comparing the ASQ completion of low and middle-income parents in the US, followed by subsequent assessment by the Bayley Scales of Infant and Toddler Development, shows no differences in the accuracy of scoring in the 2 groups of parents. These results support the idea that parental completion of child development questionnaires gives reliable data in high-risk groups. [Squires et al., 1998; Kvestad *et al, 2013)*].

Developmental Profile (DRDP)

The DRDP for infants and toddlers consists of 29 items divided into 5 domains, covering approaches to learning/self-regulation, socio-emotional development, language and literacy, cognition, and physical development. The DRDP helps early educators observe, document, and reflect on the developmental progress of individual children. The Desired Results assessment system documents the progress made by children and families in reaching desired results and provides information to help practitioners improve childcare and development services.[1] As teachers gain familiarity with the DRDP, they find that they can use their daily observations to complete it without taking time out of their day for special attention to the forms.[3]

Environment Rating Scale (ERS)

The ERS assesses the quality of the learning environment. Teachers use the ERS to assess the quality of the interactions, space, schedule, and materials they provide to their group of children. The ERS is completed, summarized, analyzed, and considered in program improvement plans once a year. Teachers combine information gained from the ERS with other sources for long-term planning and continuous program improvement.[3]The ERS has a long history of use worldwide: the first use of the original ERS in the USA dates back more than 30 years ago (Harms and Clifford 1983). The Environment Rating Scales (ERS) were developed to evaluate process quality in early childcare settings. Process quality refers to children's experiences within the childcare environment, including their interactions with others, materials, and activities (Phillipsen et al., 1997). It is assessed primarily through observation and is more predictive of child outcomes than structural indicators of quality (such as staff-to-child ratio, group size, cost of care, and type of care) (Whitebook et al. 1989).[4]

---

[1] California Department of Education, 2019 Infant/Toddler Learning and Development Program Guidelines, Second Edition by the California Department of Education is used with permission

[2] Ministry of Children and Family Development: British Columbia. *Ages & stages questionnaire. Early Years Professional Development* licensed CC BY

[3] California Department of Education, 2015 Infant/Toddler Curriculum Framework by the California Department of Education is used with Permission

[4] Vermeer, H.J., van IJzendoorn, M.H., Cárcamo, R.A. *et al.* Quality of Child Care Using the Environment Rating Scales: A Meta-Analysis of International Studies is licensed CC BY

31.5: Assessment of Dual Language Learners

Language and Assessment

Because dual language learners develop their knowledge about the world in 2 languages, their skills and abilities are distributed across both languages. As such, assessments conducted in only 1 language will yield incomplete information and prohibit caregivers from addressing areas where growth should be supported or built upon. The recent NASEM report confirms this in its conclusion: "During the first 5 years of life, infants, toddlers, and preschoolers require developmental screening, observation, and ongoing assessment in both languages to support planning for individualized interactions and activities that will support their optimal development." (NASEM 2017, 423). Identifying the child's language status is crucial because it forms the basis for developing appropriate early learning and care.[1]

[1] California Department of Education, 2019 Infant/Toddler Learning and Development Program Guidelines, Second Edition by the California Department of Education is used with permission

31.6: Supporting Assessment

Assessment in the Classroom

Infant and toddler programs that support intentional teaching and care allocate time in teachers' schedules for individual and team reflection and planning.[1] Programs supporting assessment provide adequate time and space for family members and caregivers to reflect individually, as well as consult with co-teachers regarding observation and assessment information. This time and space to reflect needs to be separated physically and emotionally from caring for the children.[2]

[1] California Department of Education, 2015 Infant/Toddler Curriculum Framework by the California Department of Education is used with Permission

[2] California Department of Education, 2019 Infant/Toddler Learning and Development Program Guidelines, Second Edition by the California Department of Education is used with permission

31.7: Concerns with Assessment

Look out for....

Informed assessment systems contribute to the overall quality of an infant and toddler program by providing teachers and families with valuable information about what children know and can do. However, when assessment systems do not consider developmental appropriateness or are not sensitive to the diverse learning needs of individuals or groups of children, there is a risk of making children uncomfortable or generating insufficient, inaccurate information. One of the most critical assumptions underlying the effective assessment of young children is that their development is continuing and complex.[1]

[1] California Department of Education, 2019 Infant/Toddler Learning and Development Program Guidelines, Second Edition by the California Department of Education is used with permission

31.8: Conclusion

Conclusion to Assessment

Screening, observation, and documentation are all assessment processes for gathering, interpreting, applying, and sharing information built upon children's previous experiences. They are essential tools for understanding children individually and in groups and for planning environments, curriculum, and other learning experiences. [1]With appropriate support, teachers can grow professionally through a continuous learning process and explore ways to respond to young children's learning interests and needs. [2]

---

[1] California Department of Education, 2019 Infant/Toddler Learning and Development Program Guidelines, Second Edition by the California Department of Education is used with permission

[2] California Department of Education, 2015 Infant/Toddler Curriculum Framework by the California Department of Education is used with Permission

---

31.9: References

References for Assessment

- Albers CA, Grieve AJ: Test review: Bayley, N. (2006). Bayley scales of infant and toddler development–third edition. San Antonio, TX: Harcourt assessment. J Psychoedu Assess. 2007, 25 (2): 180-10.1177/0734282906297199.
- California Department of Education, 2015 Infant/Toddler Curriculum Framework by the California Department of Education is used with Permission
- California Department of Education, 2019 Infant/Toddler Learning and Development Program Guidelines, Second Edition by the California Department of Education is used with permission
- California Department of Education: Early Education and Support. (F. Org, Ed.), Best Practices for Planning Curriculum for Young Children: The integrated nature of learning (2016). California Department of Education. Retrieved January 30, 2022, from https://www.cde.ca.gov/sp/cd/re/docu...arning2016.pdf.
- Fernald LCH, Kariger P, Engle P, Raikes A: Examining early child development in low-income countries. 2009, Washington DC: The World Bank
- Head Start| Early Childhood Learning & Knowledge Center (Ed.). (2020, April 10). Child observation: The heart of individualizing responsive care for infants and toddlers. Child Observation: The Heart of Individualizing Responsive Care for Infants and Toddlers. Retrieved January 29, 2022, from https://eclkc.ohs.acf.hhs.gov/child-...ndividualizing is in the public domain
- Kvestad, I., Taneja, S., Kumar, T. *et al.* The assessment of developmental status using the Ages and Stages questionnaire-3 in nutritional research in north Indian young children. *Nutr J* **12,** 50 (2013). https://doi.org/10.1186/1475-2891-12-50
- McAfee, O., Leong, D. J., & Bodrova, E. (2016). Documenting: Recording Information. In Assessing and guiding young children's development and learning. essay, Pearson Education.
- Ministry of Children and Family Development: British Columbia. (2017, January 24). *Ages & stages questionnaire*. Early Years Professional Development. Retrieved February 12, 2022, from https://earlyyearsbc.ca/events/ages-...questionnaire/ Except where otherwise noted, content on this site is licensed under a Creative Commons Attribution 4.0 International License
- National Education Goals Panel. 1998. Principles and Recommendations for Early Childhood Assessments. Washington, DC: The National Education Goals Panel. https://govinfo. library.unt.edu/negp/reports/prinrec.pdf
- Rydz D, Shevell MI, Majnemer A, Oskoui M: Topical review: developmental screening. J Child Neurol. 2005, 20 (1): 4-21. 10.1177/08830738050200010201.
- Snow, C. E., and S. B. Van Hemel. 2008. Early Childhood Assessment: Why, What, and How? Washington, DC: National Research Council of the National Academies.
- Walder DJ, Sherman JC, Pulsifer MB: Neurodevelopmental assessment. Evidence –Based Practice in Inant and Early Childhood Psychology. Edited by: Mowder BA, Rubinson F, Yasik AE. 2009, Hoboken: John Wiley & Sons, Inc, 167-205.
- Vermeer, H.J., van IJzendoorn, M.H., Cárcamo, R.A. *et al.* Quality of Child Care Using the Environment Rating Scales: A Meta-Analysis of International Studies. *IJEC* **48,** 33–60 (2016). https://doi.org/10.1007/s13158-015-0154-9 This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (http://creativecommons.org/licenses/by/4.0/),

CHAPTER OVERVIEW

32: Introduction to Curriculum

32.1: Introduction

Introduction to Curriculum

At the heart of early childhood curriculum is the child who depends on adults to support and nurture exploration and learning. An appropriate curriculum for infants and toddlers provides guidance and strategies for supporting development and learning, engaging in responsive interactions to build relationships, and partnering with families. It is essential to consider what learning looks like in the minds of infants and toddlers. Children from birth to 5 do not build or acquire their knowledge and skills in domain-specific categories one domain at a time. They relate to each learning experience as a whole experience. They naturally cross the boundaries of domains and simultaneously build concepts related to social-emotional development, science, mathematics, language, social sciences, the arts, physical development, and health.[1]

A good curriculum leaves decisions about what this looks like to the caregiver implementing the curriculum. When it comes to curriculum, caregivers must:

- Have room to discover an infant or toddler's "individual curriculum" (e.g., the child's interests, motivations, and needs).
- Choose and offer experiences that match a child's (or small group of children's) interests and developmental level
- Use everything that happens as a learning opportunity, both planned/intentional and spontaneous.
- Create environments that reflect children and families served in the program.

A responsive, relationship-based curriculum supports child-initiated, child-pursued opportunities to individualize within the chosen or created curriculum

---

[1] Early Education and Support Division, California Department of Education. (2016). *BEST PRACTICES FOR PLANNING CURRICULUM FOR YOUNG CHILDREN. The Integrated Nature of Learning*

32.2: Foundational Concepts of Infant and Toddler Curriculum

What's most important?

Before exploring curriculum development, it is essential to understand the thinking around infants and toddlers. Most caregivers don't argue the fundamental rights of children, and the United Nations Convention on the rights of children created 54 articles around these rights. 3 articles below from the children's version of the document should be taken especially to heart by caregivers who work with children (UNICEF, 2009).

Article 3. Best interests of the child

When adults make decisions, they should think about how their decisions will affect children. All adults should do what is best for children. Governments should make sure children are protected and looked after by their parents or other people when this is needed. Governments should make sure that people and places responsible for looking after children are doing a good job.

Article 29. Aims of education

Children's education should help them fully develop their personalities, talents and abilities. It should teach them to understand their own rights, and to respect other people's rights, cultures and differences. It should help them to live peacefully and protect the environment.

Article 31. Rest, play, culture, arts

Every child has the right to rest, relax, play and to take part in cultural and creative activities.

As caregivers of young children, our beliefs about children affect we treat them, the care we provide, and the curriculum we chose or create. Does your belief about the capacity of infants and toddlers agree with Jerome Bruner when he says, "the child is not merely ignorant or an empty vessel, but somebody able to reason, to make sense, both on her own and through discourse with others" (Bruner, 1996)? Or do you have another structural belief which will guide you as you create curriculum?

32.2.1: Relationships and Curriculum

Start with Relationships

The everyday interactions with infants and toddlers form the foundation for quality care. It is only within the context of secure, nurturing relationships with parents, family members, and other caring adults that healthy infant and toddler development and learning happen. Infants are biologically programmed to expect those in their world to care for them, protect them, and do so in a loving way. (Shonkoff & Phillips, 2000) Individualizing care and curriculum involves tailoring to each child's needs. No 2 infants or toddlers are the same; each child is unique, making a "one size" curriculum, experience, or interaction a poor fit for all infants and toddlers. Creating a custom fit curriculum requires observation, engagement with families, and knowledge of child development. This knowledge guides how caregivers interact and respond. Caregivers read each child's cues and react in nurturing ways. They also consider individual characteristics, such as the child's age, abilities, needs, and interests, as well as temperament, home language, and family culture.

32.2.2: Temperament and Curriculum

Individual Differences

Understanding the unique differences of each infant and toddler helps caregivers build relationships with infants and toddlers and interact in ways that meet each child's needs. One of these individual differences is temperament. Temperament refers to behavioral "styles" that children are born with and describes how they approach and react to the world.[1] Temperament is crucial because it affects how infants and toddlers interpret and respond to the world around them. When planning and implementing curriculum for individual or groups of children, caregivers must consider the temperament of the infants and toddlers. When planning something messy or loud where a slow-to-warm child is present, how will the caregiver provide caring and respectful support structures that allow him to engage in the curriculum without feeling overwhelmed?

Figure 32.2.2.1: Primary caregiving can help support sensory exploration for children with more reluctant temperaments. ([2])

In Figure 32.2.2.1 above, the relationship between the child and primary caregiver provides comfort so the infant with a more reluctant temperament can still engage with the experience.

[1] Culture and Psychology by L D Worthy; T Lavigne; and F Romero is licensed CC BY-NC-SA

[2] Image by Amanda Taintor is licesned CC BY-NC

32.2.3: Play and Curriculum

The Importance of Play

Scientists who study how infants think and feel often describe them as small scientists: like their adult counterparts, infants constantly experiment and investigate to figure things out. ((Gopnik, Kuhl, & Meltzoff, The scientist in the crib: Minds, brains, and how children learn, 1999)) Infants spend their days actively gathering and organizing information about what objects and people are like, and they do much of this discovery through play. According to Gopnik, Meltzoff, and Kuhl (2000), infants actively build knowledge as they interact with the world around them. They try a variety of ways to act on objects and materials and, in doing so, experiment with and build concepts and ideas.

In the early twentieth century, scientists and theorists—such as Jean Piaget and Lev Vygotsky—developed widely studied theories to explain how infants acquire knowledge. Their theories are commonly encountered in many other early childhood areas of study. [1]

In most of these theories, infants actively construct concepts and build skills by interacting with objects and people, often occurring in the context of play. The body of research on the young infant's developing mind adds to our understanding of teaching and planning an infant's curriculum. Studies show infants are highly motivated to explore new materials and take on new challenges (Bowman, Donovan, and Burns 2000.) Moments often discounted as "just play" or as "fiddling around" are moments in which infants are actively learning (Hirsh-Pasek et al. 2009; Jones and Reynolds 2011; Zigler, Singer, and Bishop-Josef 2004; Elkind 2007.) While engaged in play, infants explore the physical properties of materials and the possibilities for action, transformation, or representation.[2] Capturing these moments of play through documentation and linking them to areas of development help other stakeholders understand the importance of play in development and as an integral part of curriculum.[3]

---

[1] How Young Children Learn - What Science Reveals is shared under a CC BY license and was authored, remixed, and/or curated by Jennifer Paris, Kristin Beeve, & Clint Springer.

[2] Early Education and Support Division, California Department of Education. (2016). *BEST PRACTICES FOR PLANNING CURRICULUM FOR YOUNG CHILDREN. The Integrated Nature of Learning* is used with permission.

[3] How Young Children Learn - What Science Reveals is shared under a CC BY license and was authored, remixed, and/or curated by Jennifer Paris, Kristin Beeve, & Clint Springer.

32.2.4: Routines and Curriculum

The Importance of Routines

Caregiving routines (arrival and departure, feeding, meals and snacks, diapering and toileting, dressing, and napping) provide a framework for the infant and toddler day. A significant amount of individualization for curriculum occurs during routine care. Routines offer caregivers many opportunities to observe and understand each child's ways and preferences and support development. During routine care, infants and toddlers enjoy adults' undivided attention as the focus is on meeting children's needs and getting to know them. By taking advantage of these opportunities to build relationships with each infant and toddler, caregivers promote attachment and trust with the infants or toddlers in their care. These developmental milestones for trust and relationships are critical for children's sense of security and willingness to explore people and objects in their environment: a high level of trust is necessary for infants and toddlers to fully engage in the offered curriculum.[1]

---

[1] Department of Health and Human Services, Administration for Children and Families , ECLKC Early Head *TECHNICAL ASSISTANCE PAPER NO. 16 INDIVIDUALIZING CARE FOR INFANTS AND TODDLERS – PART 1*. Is in the public domain

---

32.2.5: Curriculum and the Environment

Environmental Impact

The environment holds high priority when it comes to curriculum for infants and toddlers. In fact, the environment is such an important part of curriculum that Loris Malaguzzi, founder of the municipal preschools in Reggio Emilia, Italy, defined the environment as the third teacher. (BIERMEIER, 2015) Think about how materials are arranged within each area of a space: displaying materials at infants' and toddlers' levels makes them easily accessible, supports independent exploration, and allows the caregiver to follow the children's lead as they create their own curriculum. It is helpful to provide a few types of the same materials so that several children can play without taking turns, minimizing conflict. However, it is essential to avoid offering too many materials since a cluttered room can overwhelm children and create classroom management concerns as well. Regularly rotating materials creates a balance of familiar and new materials, which helps infants and toddlers maintain interest and enjoy age appropriate challenges. (Infant/Toddler Care Providers | Early Childhood Training and Technical Assistance System (hhs.gov))

32.2.6: Curriculum as Experiences

Experiences or Activities?

Research shows that "much of how infants and toddlers learn best comes not from specific adult-directed lessons but from [adults] knowing how to maximize opportunities for each child to use natural learning inclinations." (Lally, 2000) These opportunities or experiences can be set up in a planned, purposeful way or occur in the moment as adults follow a child's lead and take advantage of teachable moments. These teachable moments will often happen during routine care, which is why routines form the core of many curricula in infant and toddler programs.

Experiences for infants and toddlers share some common elements regardless of the type of care:

- They focus on the way children relate to materials, adults, and each other.
- They are based on each child's developmental level and interests.
- They support children's development and learning in all domains.

Caregivers will typically organize experiences around:

- Stories and books
- Toys and gross motor equipment
- Creative arts such as music, movement, and art materials
- Imitation and pretending
- Sensory exploration (e.g., sand, water, tasting and preparing food)
- Outdoor play and exploration

Caregivers may offer one-on-one experiences for individual children; they may also provide experiences for a small group of children, offering individualized attention and support during the group experience.

The key to successful experiences, whether planned or spontaneous, one-on-one or with a small group, is having a deep understanding and knowledge of each child and family. This knowledge makes experiences meaningful and relevant to the child's development and learning, and results from ongoing observations, assessment, and engaging with families.[1]

Planning and carrying out appropriate experiences for infants and toddlers can sometimes be challenging. Even when experiences are based on a child's interests, abilities, and needs, the child may not respond as expected. Caregivers may be unsure of what to do when this happens. Planning experiences means "planning for possibilities." This idea is central to balancing planning with the flexibility necessary for successful infant and toddler care. Plans are helpful because they enable caregivers to stay organized and focused. However, infants and toddlers are unpredictable; caregivers often must modify an experience or abandon it and try it at a different time or on another day. It is more important to follow a child's lead than to stick to the planned experience. Additionally, a child's family may not be comfortable with an offered experience because of their beliefs, values, or life situations. Messy experiences, such as painting and playing with water or sand, and going outside (especially if it is windy or cold) are examples of experiences to which families may object.[1] Including families in the planning process and making them aware of the center's philosophy can be helpful in avoiding potential conflict.

---

[1] U.S Department of Health and Human Services ECLKC *Individualizing Care for Infants and Toddlers – Part 2 is in the public domain*

32.3: Curriculum for One- Individualizing the Curriculum

Individualizing the Curriculum

Planned interactions, routines, daily schedules, experiences, and environments that take into consideration families' culture, language, and goals for their children "appropriately support the unfolding development of each child at their unique pace."[1]

This unfolding development is a necessary part of a child's journey toward school readiness. Caregivers observe, document, reflect, interpret, plan, implement, and evaluate to individualize care that is responsive to each infant, toddler, and family. The process is illustrated as a cycle in the figure below.

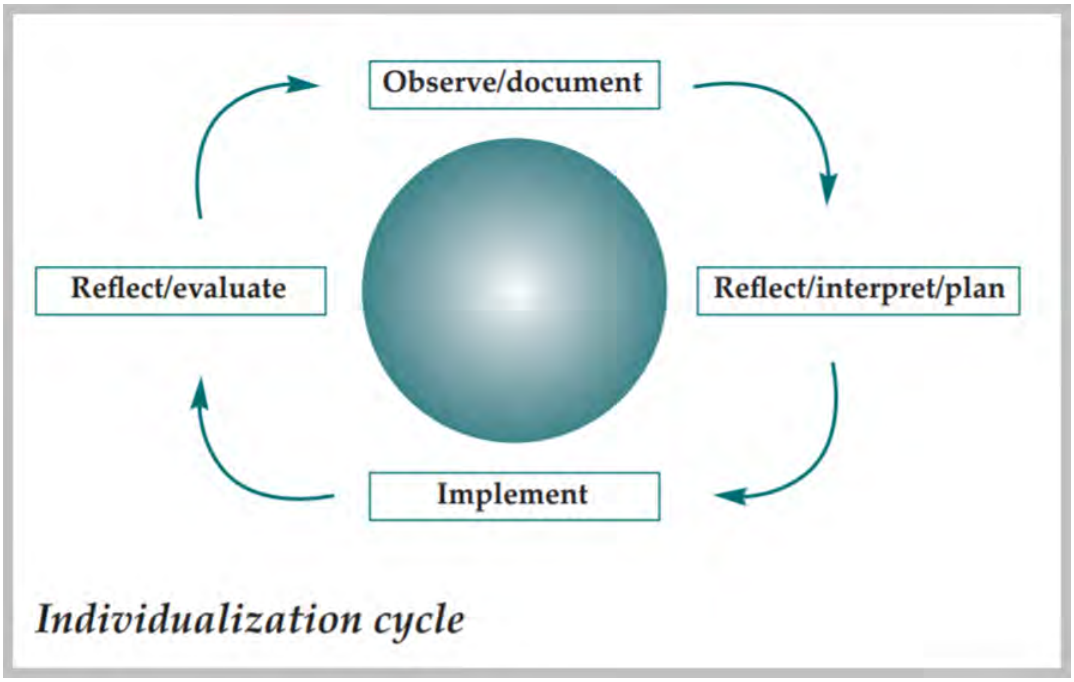


Figure 32.3.1: The Curriciculum Individulaization Cycle. ([1])

[1] Department of Health and Human Services, Administration for Children and Families , ECLKC Early Head *TECHNICAL ASSISTANCE PAPER NO. 16 INDIVIDUALIZING CARE FOR INFANTS AND TODDLERS – PART 1*. Is in the public domain

32.4: References

References for Introduction to Curriculum

- BIERMEIER, M. A. (2015). Inspired by Reggio Emilia: Emergent Curriculum in Relationship-Driven Learning Environments. *Young Children*, *70*(5).
- Bruner, J. (1996). *The culture of education.* Cambridge, MA: Harvard University Press .
- California Department of Education. (n.d.). *Infant/Toddler Curriculum Framework.* Sacramento: California Department of Education. Retrieved from https://www.cde.ca.gov/sp/cd/re/docu...elines2019.pdf
- Early Education and Support Division, California Department of Education. (2016). *BEST PRACTICES FOR PLANNING CURRICULUM FOR YOUNG CHILDREN. The Integrated Nature of Learning* . Sacramento: Department of Education.
- Early Head Start National Resource Center and revised by the National Center on Early Childhood Development, Teaching, and Learning in collaboration with the Office of Head Start. (2018). *TECHNICAL ASSISTANCE PAPER NO. 16 INDIVIDUALIZING CARE FOR INFANTS AND TODDLERS – PART 1.* Washington, DC: U.S. Department of Health and Human Services, Administration for Children and Families, Office of Head Star. Retrieved from https://eclkc.ohs.acf.hhs.gov/sites/...rs-part-01.pdf
- Early Head Start National Resource Center in collaboration with the Office of Head Start. (2014). *Individualizing Care for Infants and Toddlers – Part 2 • TA Paper 17.* Washington, DC: Early Head Start National Resource Center at ZERO TO THREE. Retrieved from https://eclkc.ohs.acf.hhs.gov/sites/...rs-part-02.pdf
- Early Learning and Care Division, California Department of Education. (2019). *Infant/Toddler Learning and Development Program Guidelines, Second Edition.* Sacramento: California Department of Education.
- Edwards, C., & Gandini, L. (Eds.). (2001). *Bambini: The Italian approach to infant/toddler care.* New York: Teachers College Press .
- Gopnik, A. (2009). *The Philosophical Baby: What Children's Minds Tell Us About Truth, Love, and the Meaning of Life.* New York: Farrar, Straus, and Giroux.
- Gopnik, A., Kuhl, P. K., & Meltzoff, A. N. (1999). *The scientist in the crib: Minds, brains, and how children learn.* William Morrow & Co.
- Hirsh-Pasek, , K., Golinkoff, M. R., Berk, L. E., & Singer, D. G. (2009). *A Mandate for Playful Learning in Preschool: Presenting the Evidence.* . New York: Oxford University Press.
- Honig, A. (1996). Methal health for babies: what do theory and research tell us? *Young Children*, *48*(3), 69-76.
- Lally, J. R. (2000). *"Infants Have Their Own Curriculum: A Responsive Approach to Curriculum Planning for Infants and Toddlers," in Curriculum in Head Start.* U.S. Department of Health and Human Services/Administration on Children and Families/Administration for Children, Youth and Families. Washington, DC: Head Start Bureau.
- Shonkoff, J. P., & Phillips, D. A. (Eds.). (2000). *From nuerons to neighborhoods: The science of early development.* Washington, DC: National Academy Press.
- UNICEF. (2009). Convention on teh Rights of the Child: Children's Version. Retrieved December 15, 2021, from https://www.unicef.org/child-rights-...ldrens-version

CHAPTER OVERVIEW

33: Creating Curriculum

33.1: Observe and Document

How to Begin

Creating a responsive, individualized curriculum starts with observing each child: watching and listening to discover how infants actively make sense of their everyday encounters with people and objects, documenting observations, and connecting with each child's family to share information.[1] When caregivers intentionally observe and listen, infants and toddlers reveal clues about their thinking, feelings, or intentions. Infants' actions, gestures, and words illuminate what they are trying to figure out or how they make sense of people and objects' attributes, actions, and responses.[2] Through documentation, caregivers make visible the ways infants and toddlers learn. Planning infant/toddler curriculum begins with caregivers discovering, through careful listening and daily observation, each infant's interests, abilities, and needs.[3] Written observations of infant and toddler play and interactions reveal emerging skills and ideas. As caregivers observe, they discover ways to extend learning experiences to support the infant in building more complex, coherent ideas. Caregivers' reflections of an individual infant lead to further review on the emerging interests, concepts, and skills of another infant in the small group.[3]

Anecdotal notes or photos make it possible to reflect on infant and toddlers' learning experiences. Documentation supports caregivers in planning how to extend, expand, and add complexity to infants' learning through the curriculum offered.

By taking time to review and reflect on each infant's behavior, temperament, learning interests, developmental profile, and needs, caregivers deepen their understanding and appreciation of each infant. This reflection also gives caregivers ideas on supporting learning and development, responding to infants' interests, expanding on their ideas, and engaging them in planning learning experiences. (California Department of Education)

Gathering artifacts for documentation, including samples of an infant's work and other materials involving the infant, informs curriculum plans. For example, a caregiver notes an infant beginning to stand up with support and documents the behavior with a photo.

The caregiver, drawing on her knowledge of infant development, knows the next step in infant motor development will be cruising —moving from place to place while standing and holding on to something for support. As a result of the caregiver's documentation, she knows to modify the environment to include supports on which the infant might pull up to a standing position to cruise around. When reflecting on documentation, the caregiver will note other children who could benefit from environmental modifications. The curriculum for the infant becomes intentionally designed time and space for the infant to engage with the environmental changes as their physical development unfolds. As caregivers observe, reflect, and document, they become more attentive and responsive to each infant's ongoing development. Caregivers must plan experiences that support infant/toddler learning and development in all domains and content areas.[3]

---

[1] Department of Health and Human Services, Administration for Children and Families , ECLKC Early Head *TECHNICAL ASSISTANCE PAPER NO. 16 INDIVIDUALIZING CARE FOR INFANTS AND TODDLERS – PART 1*. Is in the public domain

[2] Early Education and Support Division, California Department of Education. *BEST PRACTICES FOR PLANNING CURRICULUM FOR YOUNG CHILDREN. The Integrated Nature of Learning* . is used with permission.

[3] The California Infant/Toddler Curriculum Framework by the California Department of Education is used with permission

---

33.2: Reflect, Interpret, and Plan

The Process

Effective infant and toddler teaching require caregivers to recognize how infants actively search for meaning. When caregivers view teaching in this light, infants become active participants in negotiating the course of their curriculum.[1] Once caregivers gather objective documentation, they can reflect on information individually, with coworkers, and with the child's family. Through taking time to reflect on and interpret what the data means, caregivers develop a deeper understanding of individual developmental processes, behavior, temperament, interests, and challenges. This process of reflection and interpretation leads caregivers to conclusions that help them individualize planning.[2]

Reflect and Interpret: A Closer Look

Reflecting involves reviewing documentation and asking questions about what the data says about the infant.

Petersen and Wittmer have suggested some questions that caregivers can use to reflect on what children's behaviors might mean:

- What is the child experiencing?
- What is the child thinking?
- What is the behavior, and when, where, and with whom does it occur?
- What wants or needs is the child communicating?
- What is the purpose of the child's behavior?
- What is the meaning of the child's behavior?
- What do the child's family and I want the child to do/learn/feel?

Interpreting observed behavior involves making educated guesses about what the collected information reveals about the child. When caregivers reflect and interpret, they review the documentation they have gathered, include their knowledge about development, and make informed decisions about next steps that support development and learning.

---

[1][1] Early Education and Support Division, California Department of Education. *BEST PRACTICES FOR PLANNING CURRICULUM FOR YOUNG CHILDREN. The Integrated Nature of Learning* . is used with permission.

[2] Department of Health and Human Services, Administration for Children and Families , ECLKC Early Head *TECHNICAL ASSISTANCE PAPER NO. 16 INDIVIDUALIZING CARE FOR INFANTS AND TODDLERS – PART 1*. Is in the public domain

---

33.3: Responsive Curriculum

In the Moment Curriculum

Caregivers unknowingly give responsive interpretation through the care they provide. Responding to infant and toddlers' behavior in the moment helps support development and learning. These immediate, informal interpretations are based on each child's knowledge as well as the professional knowledge and expertise of the caregiver. This type of curriculum does not require planning but relies on the knowledge base of the caregiver. When a caregiver has spent time reflecting on documentation and studying child development, responsive interpretation to support development is the developmentally appropriate curriculum.

33.4: Involve Infants and Toddlers in Planning

It's a group effort

An additional part of curriculum planning and implementation occurs when caregivers share their documentation with toddlers, creating opportunities for the toddler to participate in thinking about ideas and problems they are exploring or have previously explored. Reflection on documentation by caregivers, families, and children serves as a springboard to explore more deeply topics that engage the infant's interest. Although it might sound odd, documenting reflection on documentation provides information for further curriculum offerings. When discussing documentation with the toddlers, note when they become interested and record any questions or comments they make. As toddlers discuss photo documentation, they also reveal information about their cognitive, social-emotional and language development. Documentation provides essential information for later assessment, but it also gives insight into a child’s interests and guides caregivers toward subsequent curriculum offerings.[1]

[1] The California Infant/Toddler Curriculum Framework by the California Department of Education is used with permission

33.5: Holistic Planning

Remembering the Whole Child

Infants continually use all their senses and competencies to relate new experiences to prior experiences and to understand and create meaning. Infants learn all the time in different and integrated ways. For example, during book reading, infants use their knowledge and cognitive abilities, understanding of language, physical skills, and experiences at home and in the community to make new connections and expand their knowledge of themselves and the world. Infants and toddlers are constantly moving, thinking, communicating, and feeling: their learning is integrated across domains and occurs almost every moment of the day.[1]

Involving Families in Curriculum

Families who entrust their infants to the care and guidance of caregivers also become active participants in the curriculum process. Everyone's shared participation in creating learning experiences allows a dynamic exchange of information and ideas—from infant to adult, from adult to infant, from adult to adult, and from infant to infant. The perspective of each (infant, family, caregiver) informs the other, and each learns from the other. Each relationship (infant with family, infant with caregiver, infant with infant, and family with the caregiver) is reciprocal. Each participant gives, receives and adds to the other's learning and understanding.[2]

Caregivers must explain to families their principles of curriculum planning based on observation, documentation, interpretation, reflection, planning, and implementation; they must also clarify the goals and features of the curriculum used in the learning environment. This step should not be overlooked or skipped in the curriculum process. Enlist the support of interpreters or translators as needed. Additional ways to include families in the curriculum process:

- Engage families in discussions about the role of observation, documentation, interpretation, and reflection in planning.
- Synthesize information gathered through the observation process (including input from families) in planning for individual infants and the group, considering diverse cultural and linguistic experiences.
- Solicit ideas from families to meet infant learning and developmental goals. These ideas should inform the planning of activities, experiences, interactions and selection of materials for indoor and outdoor spaces.
- Share learning materials with families and explain how their infants learn as they engage with those materials and experiences. Include families in curriculum planning and implementation.
- Share observations with families about their infants in an objective, timely, private, and confidential manner in the most comfortable language for them. Enlist the assistance of an interpreter or translator as needed. [3]

Plans also present opportunities to strengthen relationships between programs and families and foster families. Through the planning phase, caregivers can communicate and collaborate with parents. Plans are shared to provide information about changes and to strengthen relationships with families. Communication about planned curriculum experiences enhances parents' feelings of inclusion in the program and provides them with opportunities to communicate about their child. Parents may also be interested in watching for changes in their infant's behavior due to the program's adaptations. Sharing plans can be a way for caregivers and families to come together, enhancing their sense of partnership in the experience of watching an infant grow and develop.[3]

Using Technology in Curriculum Planning

Programs enhance curriculum when they support caregivers in selecting, using, and integrating appropriate technology into everyday experiences. Technology in the infant/toddler environment can support learning in different ways. A program’s use of technology should be consistent with the overarching principles of the curriculum set by the program. Technology functions as an important tool for introducing or designing adaptations that address the infant’s individual needs, interests, and abilities, especially infants with disabilities or other delays. Additionally, it can be used by caregivers for documenting infants' and toddlers' learning and development. Use technology to document learning and support curriculum goals. Collaborate with early intervention specialists to become familiar with any assistive technology device used by an infant due to a disability or other delay. Utilize technology with older toddlers for joint engagement and interaction around photos and other documentation of their learning.[3]

Special Needs and curriculum planning

For infants with disabilities or other delays that need additional support, various accommodations can be made.

Caregivers, in collaboration with family members and specialized service providers, can

- Provide social supports (for example, peer-mediated intervention strategies or cooperative learning)

- Use visual, auditory, and kinesthetic methods (for example, use pictures and models when explaining)
- Employ a range of acknowledgments (for example, smiles, hugs, verbal acknowledgment, provision of desired toy/object, or continuing play)
- Adapt toys/materials to allow an infant to use a variety of movements in different positions
- Alter the physical, social, or temporal environment
- Change the schedule of activities and routine, adjust the amount and type of support provided, and divide an activity into smaller steps (DEC 2007).

[1] The California Infant/Toddler Curriculum Framework by the California Department of Education is used with permission

[2] Early Education and Support Division, California Department of Education. *BEST PRACTICES FOR PLANNING CURRICULUM FOR YOUNG CHILDREN. The Integrated Nature of Learning* . is used with permission.

[3] The California Infant/Toddler Curriculum Framework by the California Department of Education is used with permission

---

33.6: Interpretation for Planning

Interpreting

Curriculum interpretation for planning is different from responding in the moment. To plan curriculum, caregivers regularly set aside time and space to review data on each infant.[1] Based on insights from reflection, the caregiver develops ideas for steps to support each infant's learning and development, including possible adaptations to interactions, environments, activities, and routines.

This critical part of the process can stimulate caregivers to discover new ideas and consider how they might adapt to the environment or routines, or introduce a new routine or material based on observations, notes, DRDP (2015) information, reflection, and discussion.

Reflecting on and interpreting data for planning also helps caregivers consider:

- Ways to engage families in their child's care
- Whether caregivers need more information about a child and when/where/from whom to gather it
- Whether to provide the same, similar, or different strategies and experiences related to specific goals

Evaluative Interpretation

Interpreting data for planning can provide information about children's development over time. However, caregivers also look at the data they have collected on each child after a more extended period (e.g., several weeks or months, depending on the child's age) to evaluate the child's progress toward reaching individual goals.

Interpretation is not always easy to do but it gives meaning to documented information. Without enough information, first impressions about what infants or toddlers can or cannot do sometimes lead to inaccurate assumptions and expectations. These may affect interactions with children and the quality of their relationships, impacting children's development and learning. Keep an open mind while observing children, talking with families, and gathering the information that challenges first impressions.[1]

A Plan to Plan

Observation, documentation, reflection, and interpretation lead to individualized curriculum planning, which supports each infant and toddler's unique abilities, interests, preferences, and needs.

Good planning

- Provides opportunities to strengthen the relationship between caregivers and families and the home/program connection, as well as foster family engagement in their child's care
- Deepens understanding of each child and family and includes family input and observations about their child
- Ensures that interactions and relationship-building, routines, daily schedule, experiences, and the physical environment address the child's current and emerging interests, abilities, needs, and understandings about people and objects in their environment
- Facilitates the child's development and learning across the 5 essential domains and supports children's progress toward individual child development goals

Multiple ideas are necessary when considering how to promote each child's development and learning. There are different ways to support an infant who is beginning to figure out that objects and people exist even when she can't see them (object permanence) or a toddler who has discovered the joys of dumping and filling. Caregivers likely think about the indoor/outdoor environment and what changes they might make. They also identify potential changes to interactions, the child's schedule, and strategies for engaging families. Families may have suggestions and preferences that reflect their daily home practices. Caregivers do not have to implement every idea at once!

Infants and toddlers benefit from repetition, practice, and familiarity. "Repeated exposure to familiar opportunities gives [infants and toddlers] the chance to make sense of their experiences and build [a] foundation that will support later learning." (Early Head Start National Resource Center and revised by the National Center on Early Childhood Development, Teaching, and Learning in collaboration with the Office of Head Start., 2018).

Flexibility is a priority while planning curriculum: caregivers must respond to children's moment-to-moment interests and needs. Planning for infants and toddlers equates to planning for possibilities. As Linda Lloyd Jones says in her article "Relationship as Curriculum," we should watch and observe our babies much more closely. What are they doing? How are they playing? What are

they trying to achieve? Ask them who they are, what they need, and how we can support them. Then listen and watch for the answer.

J. Ronald Lally suggested planning should:

- Include experiences that place the adult in the role of facilitating children's learning rather than directing learning.
- Assist the adult in reading each infant and toddler's cues.
- Prepare the caregiver, home visitor, and family childcare provider to communicate effectively with other adults in the child's life (Lally, 2000).

Writing it Down

What form should be used when writing down curriculum possibilities? A quality planning form supports caregivers in connecting the dots between reflections/interpretations of information and observations and promoting development and learning strategies.

Whether a caregiver creates plans for an individual child or a group, the process is similar. Caregivers review the information gathered for each child, note any common interests, abilities, and needs, then decide what changes to make, exceptional experiences to offer, and ways to engage families. Even within group plans, caregivers should consider how to individualize the plan for each child. For example, a fingerplay song can be planned to meet receptive language interests for one child, a fine motor exploration for another child, and an adult-child interaction (social/emotional) interest for a third child.

Reviewing individual child or group planning forms from the previous weeks and the documentation created during those activities is also helpful for planning purposes. Depending on how each child or group of children respond, caregivers may or may not change the current week's plans. If children enjoy exploring pom-poms and containers on a water table, caregivers may decide not to change the experience. If, upon reflection of the documentation, infants and toddlers appear interested in picking up the pom poms, caregivers may choose to add spoons and tongs to extend the experience.

Planning based on observations, input from families, ongoing assessment, and knowledge of infant/toddler development is key to creating developmentally age-appropriate experiences. It is easy to choose experiences that, while possibly appropriate for older children, are not suitable for younger ones. Experiences that require a child to be in a group without leaving if she loses interest or requires sitting still for long periods are also inappropriate. A high-quality, developmentally sensitive curriculum should provide suggestions for selecting appropriate experiences, materials, and equipment, facilitating the experiences, and creating safe and interesting environments for infants and toddlers to explore.[1]

---

[1] Department of Health and Human Services, Administration for Children and Families , ECLKC Early Head *TECHNICAL ASSISTANCE PAPER NO. 16 INDIVIDUALIZING CARE FOR INFANTS AND TODDLERS – PART 1*. Is in the public domain

---

33.7: References

References for Creating Curriculum

- BIERMEIER, M. A. (2015). Inspired by Reggio Emilia: Emergent Curriculum in Relationship-Driven Learning Environments. *Young Children*, *70*(5).
- Bruner, J. (1996). *The culture of education.* Cambridge, MA: Harvard University Press .
- California Department of Education. (n.d.). *Infant/Toddler Curriculum Framework.* Sacramento: California Department of Education. Retrieved from https://www.cde.ca.gov/sp/cd/re/docu...elines2019.pdf
- Early Education and Support Division, California Department of Education. (2016). *BEST PRACTICES FOR PLANNING CURRICULUM FOR YOUNG CHILDREN. The Integrated Nature of Learning* . Sacramento: Department of Education.
- Early Head Start National Resource Center and revised by the National Center on Early Childhood Development, Teaching, and Learning in collaboration with the Office of Head Start. (2018). *TECHNICAL ASSISTANCE PAPER NO. 16 INDIVIDUALIZING CARE FOR INFANTS AND TODDLERS – PART 1.* Washington, DC: U.S. Department of Health and Human Services, Administration for Children and Families, Office of Head Star. Retrieved from https://eclkc.ohs.acf.hhs.gov/sites/...rs-part-01.pdf
- Early Head Start National Resource Center in collaboration with the Office of Head Start. (2014). *Individualizing Care for Infants and Toddlers – Part 2 • TA Paper 17.* Washington, DC: Early Head Start National Resource Center at ZERO TO THREE. Retrieved from https://eclkc.ohs.acf.hhs.gov/sites/...rs-part-02.pdf
- Early Learning and Care Division, California Department of Education. (2019). *Infant/Toddler Learning and Development Program Guidelines, Second Edition.* Sacramento: California Department of Education.
- Edwards, C., & Gandini, L. (Eds.). (2001). *Bambini: The Italian approach to infant/toddler care.* New York: Teachers College Press .
- Gopnik, A. (2009). *The Philosophical Baby: What Children's Minds Tell Us About Truth, Love, and the Meaning of Life.* New York: Farrar, Straus, and Giroux.
- Gopnik, A., Kuhl, P. K., & Meltzoff, A. N. (1999). *The scientist in the crib: Minds, brains, and how children learn.* William Morrow & Co.
- Hirsh-Pasek, , K., Golinkoff, M. R., Berk, L. E., & Singer, D. G. (2009). *A Mandate for Playful Learning in Preschool: Presenting the Evidence.* . New York: Oxford University Press.
- Honig, A. (1996). Methal health for babies: what do theory and research tell us? *Young Children*, *48*(3), 69-76.
- Lally, J. R. (2000). *"Infants Have Their Own Curriculum: A Responsive Approach to Curriculum Planning for Infants and Toddlers," in Curriculum in Head Start.* U.S. Department of Health and Human Services/Administration on Children and Families/Administration for Children, Youth and Families. Washington, DC: Head Start Bureau.
- Shonkoff, J. P., & Phillips, D. A. (Eds.). (2000). *From nuerons to neighborhoods: The science of early development.* Washington, DC: National Academy Press.
- UNICEF. (2009). Convention on teh Rights of the Child: Children's Version. Retrieved December 15, 2021, from https://www.unicef.org/child-rights-...ldrens-version

CHAPTER OVERVIEW

34: Implementing Curriculum

34.1: Putting Plans into Action

Ready, Set, ...Go!

Once observation takes place and experiences are documented, caregivers implement plans by making changes in the environment and introducing materials (California Department of Education). Each infant's unique thoughts, feelings, needs, interests, and reactions influence curriculum implementation. "When experiences are planned and tailored to the developmental needs of infants and toddlers, they become engaged, active learners." Plans can be brief and flexible as responsiveness to the infant's moment-to-moment interests and needs applies to every part of the curriculum planning process. Caregivers should consistently demonstrate cultural sensitivity in formal and informal interactions when implementing curriculum. Including families in the curriculum planning process and engaging in open dialogue through the implementation process helps ensure greater cultural sensitivity.

Implementing curriculum plans may involve a new way to interact with a child (or family member to support the child), a change in the schedule or physical environment, a different approach to routine care, a new material, or a new experience. It may also involve doing the same things as before. Either way, allow the infant to make choices and interact freely with materials and equipment, the setup of the indoor and outdoor environment, the experience or routine, and with the caregivers (or family members) themselves.[1] The child's response (or lack of response) influences how implementation occurs; the implementation process is not an endpoint in the curriculum planning process. Once a possibility or experience is introduced, the caregiver observes and responds to the individual infant's ongoing engagement in the experience. Just as a caregiver must do when planning and creating a curriculum, implementation includes observation, reflection, documentation, and interpretation. A key piece of implementation is observing what the child does and following the child's lead. In this way, caregivers "create with the child a learning experience that is personally meaningful and responsive, moment by moment."[1] In group care settings with infants and toddlers, expecting all children to do the same things simultaneously is not the best practice for individualized care. Allow infants and toddlers to engage with the experience independently and freely come and go as needed. Infants or toddlers should never be prohibited from leaving the experience or from choosing not to engage in an experience. Once an experience with an infant or small group begins, caregivers adapt their plans and actions to the changing needs and interests of the infants.

Implementing curriculum plans may produce surprising or unexpected results, which offers caregivers new insights and opportunities to refine their understanding of each child and family. Implement plans "in the spirit of experimentation: Each time a plan works or does not work, [caregivers] can learn and grow from the experience."[1] Adaptation and change are critical parts of the learning processes for both infant and caregiver.

Creating and implementing infant experiences or curriculum allows a caregiver to experiment and learn more about the infant and oneself as a caregiver.

Let's look at a scenario of observation and implementation of curriculum.

Over several days, a caregiver might observe a small group of older toddlers fascinated with pretend play. Through reflection on observations and documentation of the toddlers' emerging interests, the caregiver may place additional puppets in the environment. The caregiver may wonder whether the puppets would motivate the toddlers to build interest in pretend play. Rather than drawing attention to the puppets, the caregiver may simply decide to place the puppets in the dramatic play area in the room. The caregiver can add some gardening-related props to the outside play area. Curious about what the toddlers will do with the new play materials, the caregiver waits to see what happens next. Anything could happen: the toddlers may not be interested in the latest materials, or they may begin to engage in lively pretend play that suggests new possibilities to the caregiver.

The above example of supporting older toddlers' pretend play is one of countless possible ideas caregivers may try as part of a reflective, responsive approach to curriculum. In addition to modifying the environment and introducing equipment and play materials, caregivers adapt their interactions with toddlers based on what they discover through observation, documentation, and reflection.

In another instance, a caregiver may realize that the infants are exploring the environment differently. With insights about the infant's ongoing development, the caregiver may step back when the infant moves out into the environment. When relating to the infants from a distance, the caregiver may discover that one infant enjoys making contact, while another infant may need to stay close and often seeks physical contact. The same caregiver may observe that some infants have an emerging interest in joint attention or looking at things together with the caregiver. As a result, the caregiver may look at books more frequently, with the infant looking at an adult. When sharing books with the infant, the caregiver may notice that 2 of the infants spend a long time looking at each picture, while another infant prefers to turn the pages quickly. Although implementing an interaction strategy to

support infants' learning may start the same way, each infant's path with the new possibility will require the caregiver to adapt. For a strategy or plan based on prior observation, documentation, and reflection to be effective, the caregiver must follow each infant's lead and create a learning experience that is personally meaningful and responsive moment by moment.[1]

To sum up planning and implementing as they relate to individualizing, consider the following (adapted from the California Infant/Toddler Curriculum Framework). Planning for individualized care practices should reflect:

- The abilities that infants and toddlers bring to each interaction
- Each child's need for relationship-based experiences
- Family input and preferences
- An understanding of and appreciation for each child within the context of the child's family and culture

Implementing individualized care practices should focus on facilitating learning and enable caregivers to:

- Enhance their connections and engagement with each child's family.
- Maximize each child's sense of security and attachment.
- Learn to read the cues of each infant and toddler and respond appropriately.
- Encourage and support each child's interests and explorations.
- Address the child's whole learning experience, including creating a safe and exciting place for learning.
- Support children's progress toward individual child goals and allow for unique variations in temperament, approach, and pace.

[1] Early Learning and Care Division, California Department of Education. (2019). *Infant/Toddler Learning and Development Program Guidelines, Second Edition.* Sacramento: California Department of Education is used with permission.

34.2: Reflect and Evaluate

Looking Back

As caregivers implement their plans with children and families, they continue to observe and document the experiences. They ask questions such as "How did it go?" "What worked well and why?" "What didn't work and why?" and "What changes could be made?" They may ask themselves these questions in the middle of trying a new experience or later as they reflect on and evaluate the day or week. The answers to questions like these must be fed back into the cycle of individualization as caregivers continue to observe, document, reflect, interpret, plan, and implement.

Becoming skilled in these activities means caregivers:

- Become better prepared to understand each infant and toddler's developmental stage.
- Show thoughtfulness about how to offer support to further each child's development and learning.
- Demonstrate through actions that they understand the critical role positive adult-child relationships play in how infants and toddlers develop.
- Support the family's role as their child's first and most important caregiver.
- Know the value of families' input and actively seek it out.
- Evaluate the effectiveness of what they implement by continually observing, reflecting, communicating with families, and refining their plan.

As caregivers become more purposeful in their individualization practices, they see more and more opportunities to plan for possibilities and learning opportunities that nurture each infant, toddler, and family. This intentional, individualized care is the path to positive learning and life outcomes for very young children and their families.[1]

---

[1] Department of Health and Human Services, Administration for Children and Families , ECLKC Early Head *TECHNICAL ASSISTANCE PAPER NO. 16 INDIVIDUALIZING CARE FOR INFANTS AND TODDLERS – PART 1*. Is in the public domain

---

34.3: References

References for Implementing Curriculum

- BIERMEIER, M. A. (2015). Inspired by Reggio Emilia: Emergent Curriculum in Relationship-Driven Learning Environments. *Young Children*, *70*(5).
- Bruner, J. (1996). *The culture of education.* Cambridge, MA: Harvard University Press.
- California Department of Education. (n.d.). *Infant/Toddler Curriculum Framework.* Sacramento: California Department of Education. Retrieved from https://www.cde.ca.gov/sp/cd/re/docu...elines2019.pdf
- Early Education and Support Division, California Department of Education. (2016). *BEST PRACTICES FOR PLANNING CURRICULUM FOR YOUNG CHILDREN. The Integrated Nature of Learning.* Sacramento: Department of Education.
- Early Head Start National Resource Center and revised by the National Center on Early Childhood Development, Teaching, and Learning in collaboration with the Office of Head Start. (2018). *TECHNICAL ASSISTANCE PAPER NO. 16 INDIVIDUALIZING CARE FOR INFANTS AND TODDLERS – PART 1.* Washington, DC: U.S. Department of Health and Human Services, Administration for Children and Families, Office of Head Star. Retrieved from https://eclkc.ohs.acf.hhs.gov/sites/...rs-part-01.pdf
- Early Head Start National Resource Center in collaboration with the Office of Head Start. (2014). *Individualizing Care for Infants and Toddlers – Part 2 • TA Paper 17.* Washington, DC: Early Head Start National Resource Center at ZERO TO THREE. Retrieved from https://eclkc.ohs.acf.hhs.gov/sites/...rs-part-02.pdf
- Early Learning and Care Division, California Department of Education. (2019). *Infant/Toddler Learning and Development Program Guidelines, Second Edition.* Sacramento: California Department of Education.
- Edwards, C., & Gandini, L. (Eds.). (2001). *Bambini: The Italian approach to infant/toddler care.* New York: Teachers College Press.
- Gopnik, A. (2009). *The Philosophical Baby: What Children's Minds Tell Us About Truth, Love, and the Meaning of Life.* New York: Farrar, Straus, and Giroux.
- Gopnik, A., Kuhl, P. K., & Meltzoff, A. N. (1999). *The scientist in the crib: Minds, brains, and how children learn.* William Morrow & Co.
- Hirsh-Pasek, , K., Golinkoff, M. R., Berk, L. E., & Singer, D. G. (2009). *A Mandate for Playful Learning in Preschool: Presenting the Evidence.* . New York: Oxford University Press.
- Honig, A. (1996). Methal health for babies: what do theory and research tell us? *Young Children*, *48*(3), 69-76.
- Lally, J. R. (2000). *"Infants Have Their Own Curriculum: A Responsive Approach to Curriculum Planning for Infants and Toddlers," in Curriculum in Head Start.* U.S. Department of Health and Human Services/Administration on Children and Families/Administration for Children, Youth and Families. Washington, DC: Head Start Bureau.
- Shonkoff, J. P., & Phillips, D. A. (Eds.). (2000). *From nuerons to neighborhoods: The science of early development.* Washington, DC: National Academy Press.
- UNICEF. (2009). Convention on teh Rights of the Child: Children's Version. Retrieved December 15, 2021, from https://www.unicef.org/child-rights-...ldrens-version

Index

Glossary

Sample Word 1 | Sample Definition 1

Detailed Licensing

Overview

Title: Infant and Toddler Care and Development (Taintor and LaMarr)

Webpages: 385

All licenses found:

- Unknown License: 98.2% (378 pages)
- Undeclared: 1.8% (7 pages)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)

- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)

- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)

- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)

- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)

- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)

- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)

- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)
- Unknown License: 0% (0 page)

By Page

- Infant and Toddler Care and Development (Taintor and LaMarr) - *Unknown License*
  - Front Matter - *Unknown License*
    - TitlePage - *Unknown License*
    - InfoPage - *Unknown License*
    - Table of Contents - *Undeclared*
    - How this Book is Organized - *Unknown License*
    - Licensing - *Undeclared*
    - Program Page - *Undeclared*
  - 1: Infants and Toddlers An Introduction - *Unknown License*
    - 1.1: Introduction - *Unknown License*
    - 1.2: Who are Infants and Toddlers? - *Unknown License*
    - 1.3: What does Care and Education of Infants and Toddlers mean? - *Unknown License*
    - 1.4: Guiding Principles of Infant and Toddler Care and Education - *Unknown License*
    - 1.5: Why is Care and Education with Infants and Toddlers Important? - *Unknown License*
    - 1.6: Conclusion - *Unknown License*
    - 1.7: References - *Unknown License*
  - 2: Overview of Physical Development - *Unknown License*
    - 2.1: Introduction - *Unknown License*
    - 2.2: Growth in Body Weight - *Unknown License*
    - 2.3: Growth in Body Length/Height - *Unknown License*
    - 2.4: Growth in Head Circumference - *Unknown License*
    - 2.5: Worldwide Variation in Human Growth - *Unknown License*
    - 2.6: Conclusion - *Unknown License*
    - 2.7: References - *Unknown License*
  - 3: Health and Nutrition - *Unknown License*
    - 3.1: Introduction - *Unknown License*
    - 3.2: Breast Milk- Composition, Benefits and Rates - *Unknown License*
    - 3.3: Complementary Foods - *Unknown License*
    - 3.4: Concerns for Underconsumption and Overconsumption - *Unknown License*
    - 3.5: Beverages - *Unknown License*
    - 3.6: Healthy Dietary Patterns During a Toddler’s Second Year of Life - *Unknown License*
    - 3.7: Supporting Healthy Eating - *Unknown License*
    - 3.8: Sleep - *Unknown License*
    - 3.9: Sudden Unexpected Infant Death (SUID) - *Unknown License*
    - 3.10: Physical Activity - *Unknown License*
    - 3.11: Conclusion - *Unknown License*
    - 3.12: References - *Unknown License*
  - 4: Overview of Brain Development - *Unknown License*

- Index - *Unknown License*
- Glossary - *Unknown License*
- Detailed Licensing - *Undeclared*