

The success of community and economic development depends greatly on how a society invests in healthy child development. Proper child development, in turn, relies heavily on support provided by parents and other caregivers. Scientists, researchers, educators, and policy makers uphold different, but interconnected theories about which types of support are most important for proper child development. Some research focuses on “nature,” such as the relationship between brain development, prenatal care, and early childhood experiences, while other studies examine “nurture,” focusing upon the emotional and intellectual factors necessary for well-developed individuals.

### **Brain Development**

Initial brain development occurs prior to birth and continues, at varying rates, throughout life. The neural tube first develops 16 days after conception, fuses shut approximately 6 days later, and ultimately transforms into the brain and spinal cord of the embryo beginning 27 days after conception (Zero to Three, 2014a). Neurons contain information which allow for sensing, feeling, thinking, learning, and remembering. At birth, a baby possesses approximately 100 billion neurons, with limited nerve cell formation taking place after birth (You N Me, 2016). In order for this accomplishment to take place the unborn baby must produce 250,000 neurons every minute of fetal life (Orville, 2016).

Neurons create the basic wiring plan of the brain but how they communicate, or connect, is dependent upon use. Synaptic connections are

made between neurons to carry information. Connections that are used frequently become fixed while those that are infrequent, or are never made, eventually disappear. This process is often referred to as “pruning” and is influenced by every experience the child has (Zero to Three, 2014a).

Synaptic connections are formed throughout various regions of the brain after birth during prescribed times. “The cerebral cortex produces most of its synaptic connections after birth, in a massive burst of synapse formation known as the exuberant period. At its peak, the cerebral cortex creates an astonishing two million new synapses every second. With these new connections come a baby's many mental milestones, such as color vision, a pincer grasp, or a strong attachment to his parents. By two years of age, a toddler's cerebral cortex contains well over a hundred trillion synapses. This period of synaptic exuberance varies in different parts of the cerebral cortex: it begins earlier in primary sensory regions, like the visual cortex or primary touch area of the cortex, while it takes off somewhat later in the temporal and frontal lobes, brain areas involved in higher cognitive and emotional functions. Nonetheless, the number of synapses remains at this peak, over-abundant level in all areas of the cerebral cortex throughout middle childhood (4-8 years of age). Beginning in the middle elementary school years and continuing until the end of adolescence, the number of synapses then gradually declines down to adult levels” (Zero to Three, 2014a).

The brain becomes more efficient during the childhood years by keeping the synaptic connections that are used and “pruning” the unused connections. Because brain development is activity-dependent, every experience, or lack thereof, influences which neural connections remain active. Although pruning is generally a good thing, a lack of experiences can result in over-pruning, which can lead to developmental delays throughout childhood (Zero to Three, 2014a).

### Parenting and Brain Development

Supporting healthy brain development begins in the prenatal period by keeping the mother healthy. A child’s developing brain is more sensitive to environmental toxins than the brain of an adult. Exposure to environmental hazards, smoking, taking drugs and certain medications, drinking alcohol, lack of or improper nutrition and certain illnesses all have a negative effect upon the developing brain of a fetus. Changes in a child’s brain during prenatal and early development can last a lifetime (National Scientific Council on the Developing Child, 2006). In addition, when mothers do not receive prenatal care, the babies are three times more likely to be considered low birth weight and five times more likely to die (U.S. Department of Health and Human Services; Office on Women’s Health, 2009).

### Emotional Development

Emotional development encompasses the ability to recognize and understand one’s own feelings and the feelings of others, to handle and express strong emotions appropriately, to regulate behavior, and to create and sustain relationships. In addition, positive emotional development during a child’s first few years helps to establish healthy physical and intellectual development.

- Infants cannot control how they express positive and negative emotions. They cry when hungry, cold, wet, or uncomfortable and relax when fed, soothed, and held. They begin to create an association between the availability and sensitivity of the caregiver and their negative and positive emotions.

- Toddlers and preschoolers acquire a larger range of emotions, making their emotional states more complex and dramatic. As they begin to understand the intricacies of what their caregivers do they also learn how to manage and interpret their feelings.
- By the end of preschool, children can anticipate, talk about, and use emotions in everyday situations. They begin to experience pride, shame, guilt, and embarrassment, all of which are important to healthy development in a social society. (Odle, 2013)

The appendix provides more milestones in the average child’s emotional development from birth to age five.

### Parenting and Emotional Development

Parents, family members, caregivers, and a few peers represent babies and young children’s sole relationships. These relationships establish emotional health by providing the necessary comfort, protection, encouragement and buffer against stressful times for the baby (Zero to Three, 2014b). Children who receive sensitive and attentive care are more likely to develop secure relationships as young adults that encourage emotional development and protect from stressful life situations. These children are also more likely to experience success at school, in the community, and at the workplace as adults (Centre for Community Child Health, 2009).

On the other hand, young children who grow up in homes that are troubled by parental mental-health problems, substance abuse, or family violence face significant threats to their own emotional development. According to the Child Welfare Information Gateway (2011, p1), “evidence indicates maltreatment can alter brain functioning and consequently affect mental, emotional, and behavioral development (often called socio-emotional development). In Texas during 2015, 290,471 reports of child abuse were made with 108,167 child victims confirmed. Of those children, 17,151 were removed from their homes as a result of a child abuse/neglect investigation (Texas Department of Family and Protective Services

[DFPS], 2015, p27). Children who are abused or neglected in their early years often suffer damage that stays with them their entire lives. The implications of the maltreatment of infants are far reaching and surpass the implications of the same treatment later in life, because the brain is still growing and producing connections. Abuse and neglect during this time will change the way the brain develops and the way it reacts to various situations. In 2015, 23.5% of children placed in foster care were under the age of 2 (DFPS, 2015, p50).

### **Intellectual Development**

The young mind has an amazing capacity for language. At birth, infants have the ability to learn any language. However, as they age, children begin to focus on sounds in the language they are exposed to and, due to pruning, lose their ability to distinguish between slight differences of sound in languages they are not frequently exposed to (Multilingual Children's Association, 2004). In addition, the level of parental support and skill in developing reading proficiency, mathematical proficiency, expressive language ability, and fine and gross motor ability appears to influence children's overall intellectual development.

#### *Reading proficiency*

Research demonstrates a relationship between maternal education, poverty, and lower levels of child literacy. For example in 2013 only 16% of children with parents who had not graduated from high school were reading proficiently in Eight Grade, compared to 49% for children with parents who had a bachelor degree. Children who developed strong literacy skills early are more likely to succeed during the course of their academic career and throughout their lives (Foundation for Child Development, 2014).

#### *Mathematical proficiency*

Early mathematical skills, including counting, patterns, and spatial relationships, provide the basis for formal mathematics education provided in schools. The Commonwealth Fund

(2004) reported that in 1998 kindergarten children of mothers without high school degrees were mathematically proficient 32% of the time, while mothers with at least a bachelor's degree had kindergarteners proficient 79% of the time.

#### *Expressive Language*

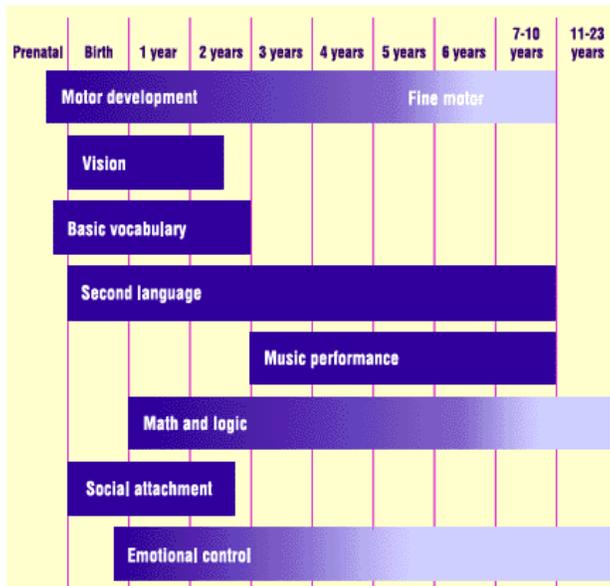
Expressive language ranges from an infant's cooing to complex vocabulary and sentences spoken by children. One study found that communication interaction between parents and children, even before the child could talk, resulted in improved language scores for the child (Cary-Stanford, 2013). This area of development varies widely from child to child; abnormal development in this area could require medical intervention.

#### *Motor Skills*

Motor skills can be classified as visual, fine, or gross. Visual motor skills are essential for developing reading ability. Fine motor skills are used for detailed tasks, such as drawing. Gross motor skills occur with balancing, hopping, and walking. Ohio State University (2010) reported that a lack of normal motor skills results in potential academic challenges, lack of concentration, behavioral issues, lowered self-esteem, and improper social development. This research also showed that 86% of disadvantaged preschool children scored below the 30<sup>th</sup> percentile of children nationwide, which is considered developmentally delayed. In general, girls of every socioeconomic category perform poorer than boys in the object control test (throwing, catching, kicking, and striking, dribbling and rolling).

### **Parenting and Intellectual Development**

Parents should receive education that explains the critical periods for their child's intellectual development after birth and throughout childhood. They can then be taught to provide experiences that facilitate specific types of learning. The following chart illustrates some of the most sensitive periods in which parents can influence their child's brain.



(You N Me, 2016)

## REFERENCES

- Cary-Stanford, Bjorn. (2013). *Little kids need conversation to pick up language*. Retrieved from <http://www.futurity.org/talking-toddlers/>
- Centre for Community Child Health. (2009). *Caring for young children: What children need. Policy Brief no. 15 2009*. Retrieved from [http://www.rch.org.au/emplibrary/ccch/PB15-caring\\_for\\_children.pdf](http://www.rch.org.au/emplibrary/ccch/PB15-caring_for_children.pdf)
- Child Development Institute. (2015). *Normal stages of human development: Birth to 5 years*. Retrieved from <http://www.childdevelopmentinfo.com/development/normaldevelopment.shtml>
- Child Welfare Information Gateway. (2011). *Supporting brain development in traumatized children and youth*. Retrieved from <http://www.childwelfare.gov/pubs/braindevtrauma.pdf>
- Commonwealth Fund. (2004). *Early child development in social context: A chartbook*. Retrieved from <http://www.commonwealthfund.org/Publications/Chartbooks/2004/Sep/Early-Child-Development-in-Social-Context--A-Chartbook.aspx>
- Edublox. (n.d.). *Language acquisition in children: Talk your child clever*. Retrieved February 10, 2016 from <http://www.audiblox2000.com/language-acquisition.htm>
- Foundation for Child Development. (2014). *Mother's education and children's outcomes: How dual-generation programs offer increased opportunities for America's families*. Retrieved from <http://fcd-us.org/sites/default/files/Mothers%20Education%20and%20Childrens%20Outcomes%20FINAL.pdf>
- Gisler, P., and Eberts, M. (2016). *Top 10 ways to improve reading skills*. Retrieved from <http://school.familyeducation.com/top-10-ways/improve-reading-skills/38329.html?page=1>
- Multilingual Children's Association. (2004). *0-12 months: All about sounds*. Retrieved from [http://www.multilingualchildren.org/milestones/first\\_year.html](http://www.multilingualchildren.org/milestones/first_year.html)
- National Scientific Council on the Developing Child (2006). *Early exposure to toxic substances damages brain architecture: Working paper no. 4*. Retrieved from <http://developingchild.harvard.edu/resources/early-exposure-to-toxic-substances-damages-brain-architecture/>
- National Scientific Council on the Developing Child. (2010). *Early experiences can alter gene expression and affect long-term development: Working paper no. 10*. Retrieved from <http://developingchild.harvard.edu/index.php?CID=362>
- Odle, T. (2013). *Emotional development*. Retrieved from <http://www.education.com/reference/article/emotional-development/>
- Ohio State University. (2010). 86 percent of disadvantaged preschoolers lack basic motor skills. *ScienceDaily*. Retrieved from <http://www.sciencedaily.com/releases/2010/04/100426131608.htm>
- Orville, E. (2016). *Fetus to newborn: The perinatal period*. Retrieved from <http://www.yale.edu/ynhti/curriculum/units/1982/7/82.07.08.x.html>
- Snuggs, C. (2008). *Enhancing motor skills through play*. Retrieved February 10, 2016, from <https://suite.io/carla-snuggs/xfd258>
- Texas Department of Family and Protective Services (TDFPS). (2015). *2015 Combined annual report and data book*. Retrieved from <http://www.dfps.state.tx.us/About DFPS/Data Books and Annual Reports/2015/default.asp>
- U.S. Department of Health and Human Services, Office on Women's Health. (2012). *Prenatal care fact sheet*. Retrieved from <http://www.womenshealth.gov/publications/our-publications/fact-sheet/prenatal-care.html>
- Uscher, J. (2016). *Reading, writing, and math skills for preschoolers*. Retrieved from <http://www.webmd.com/parenting/features/preschoolers-reading-writing-and-math-skills>
- You N Me. (2016). *Brain development*. Retrieved from <http://www.younme.com.my/index.php?webpage=72> Brain Development
- Zero to Three. (2014a). *FAQ's on the brain*. Retrieved from <http://www.zerotothree.org/child-development/brain-development/faqs-on-the-brain.html>
- Zero to Three. (2014b). *Tips for promoting social-emotional development*. Retrieved from <http://www.zerotothree.org/child-development/social-emotional-development/tips-for-promoting-social-emotional-development.html>

Reading proficiency improves when parents read regularly to their children, provide books, and model reading (Gisler & Eberts, 2016). Concrete methods for improving mathematical proficiency include engaging toddlers and preschoolers in counting, sorting, identifying shapes and numbers, and measuring (Uscher, 2016). Expressive language is improved when mothers spend more time speaking to their children; research shows particular benefits when speaking to children as they dressed and ate (Edublox, n.d.). Motor skills are improved through active practice, with minimal television viewing recommended. Fine motor skills are enhanced using crayons, play dough, and puzzles, while gross motor skills progress through plenty of running, dancing, and jumping (Snuggs, 2008).

APPENDIX

Average Child Development	
Emotional/Social	Physical/Intellectual
<p><b><u>Birth to 1 month:</u></b> Generalized Tension</p>	<p><b><u>Birth to 1 month:</u></b> Sensory Capacities: makes basic distinctions in vision, hearing, smelling, tasting, touch, temperature, and perception of pain</p>
<p><b><u>2 to 3 months</u></b> Delight Distress Smiles at a Face Can be soothed by rocking</p>	<p><b><u>2 to 3 months</u></b> Sensory Capacities: color perception, visual exploration, and oral exploration Motor Ability: control of eye muscles, lifts head when on stomach.</p>
<p><b><u>4 to 6 months</u></b> Enjoys being cuddled Recognizes mother</p>	<p><b><u>4 to 6 months</u></b> Sensory Capacities: localizes sounds Motor Ability: control of head and arm movements, purposive grasping, rolls over</p>
<p><b><u>7 to 9 months</u></b> Specific emotional attachment to mother Protests separation from mother Enjoys playing “peek-a-boo”</p>	<p><b><u>7 to 9 months</u></b> Motor Ability: control of trunk and hands, sits without support, crawls about</p>
<p><b><u>10 to 12 months</u></b> Anger Affection Fear of strangers Curiosity, exploration</p>	<p><b><u>10 to 12 months</u></b> Motor Ability: control of legs and feet, stands, creeps, apposition of thumb and fore-finger Language: says one or two words, imitates sounds, and responds to simple commands</p>
<p><b><u>1 to 1 ½ years</u></b> Dependent Behavior Very upset when separated from mother Fear of Bath</p>	<p><b><u>1 to 1 ½ years</u></b> Motor Ability: feeds self, creeps up stairs, walks (10-20 min), and makes lines on paper with crayon Language: Repeats a few words</p>
<p><b><u>1 ½ to 2 years</u></b> Temper tantrums (1-3yrs) Resentment of new baby Does opposite of what told (18 months)</p>	<p><b><u>1 ½ to 2 years</u></b> Motor Ability: runs, kicks a ball, and builds 6 cube tower (2yrs), capable of bowel and bladder control Language: vocabulary of more than 200 words</p>
<p><b><u>2 to 3 years</u></b> Fear of separation Negativistic (2 ½ yrs) Violent emotions, anger Facial expressions of anger, sorrow, and joy</p>	<p><b><u>2 to 3 years</u></b> Motor Ability: jumps off a step, rides a tricycle, uses crayons, builds a 9-10 cube tower Language: starts to use short sentences controls along with “I”, “me” and “you” and explores the world with language, stuttering may briefly appear</p>
<p><b><u>3 to 4 years</u></b> Affectionate toward parents Romantic attachment to parent of opposite sex (3 to 5 yrs) Jealousy of same-sex parent Imaginary fears of dark, injury, etc. (3 to 5 years) Cooperative play with other children</p>	<p><b><u>3 to 4 years</u></b> Motor Ability: Stands on one leg, jumps up and down, draws a circle and a cross (4 yrs), self-sufficient in many routines of home life Language: Uses “we”</p>
<p><b><u>4 to 5 years</u></b> Responsibility and guilt Feels pride in accomplishments Prefers to play with other children</p>	<p><b><u>4 to 5 years</u></b> Motor ability: mature motor control, skips, broad jumps, dresses him or herself, copies a square and a triangle Language: talks clearly, uses adult speech sounds, has mastered basic grammar, relates a story, knows over 2,000 words (5 yrs)</p>
<p>(Child Development Institute, 2015)</p>	