

Brain Development: Pathways to Learning

Most of human brain development occurs after birth, meaning that the first three years of life are critical for the development of the human brain. How well a child's brain develops during these early years affects how individuals think and behave for the rest of their lives.

How the brain develops in the early years

Brain development occurs as a result of interactions between genetic factors and the child's environment. The 100 billion nerve cells in a child's brain at birth will grow and connect with other neurons in the systems that control vision, hearing, movement, and emotions, as well as thinking and learning. Repeated positive experiences activate these systems and provide the foundation for the brain's organization and functioning throughout life.

Neurons in the brain are specialized cells that transmit information throughout the body. The neurons present in the brain need to establish and reinforce connections with other neurons and at birth, most of these connections have not yet happened. The brain does not function to its fullest capacity until the cells are connected.

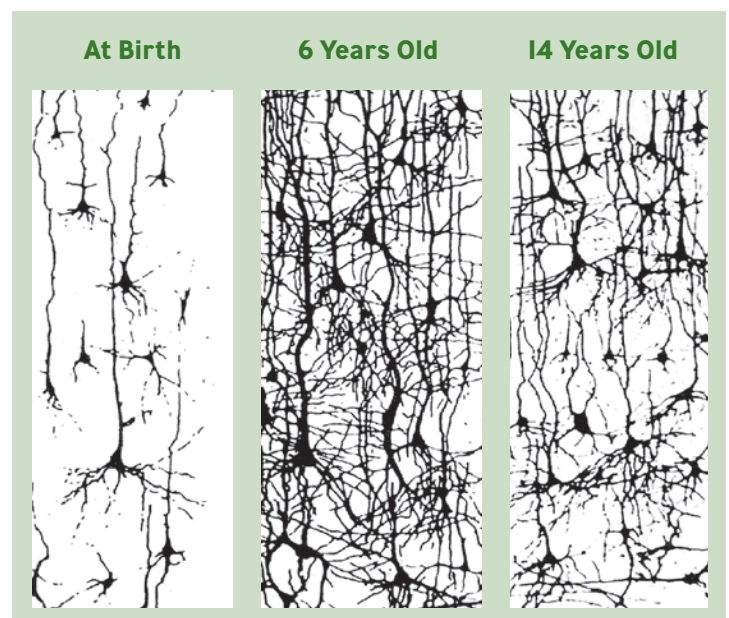
"Learning starts in infancy, long before formal education begins and continues throughout life..."

Early learning begets later learning and early success breeds later success."

James Heckman, Nobel Prize-winner; Economics

These connections between brain cells, called synapses, form complex pathways in the brain to control how children see, hear, move, talk, think, remember, and express emotion. During the first year of a baby's life, these brain pathways build very quickly. Between birth and age 6, the brain creates more synapses than it needs. The synapses that are used frequently become a permanent part of the brain. That explains why repetition of experiences is so important in the early years of a child's life. The synapses that are not used frequently are eliminated or pruned. The brain actively produces and eliminates synapses throughout life. This "use it or lose it" process is known as "wiring" the brain.

Brain Connections - Synapse Development



From **Rethinking the Brain: New Insights into Early Development** by Rima Shore (NY: Families and Work Institute, 1997). Illustration by Dr. Harry T. Chugani, Wayne State University

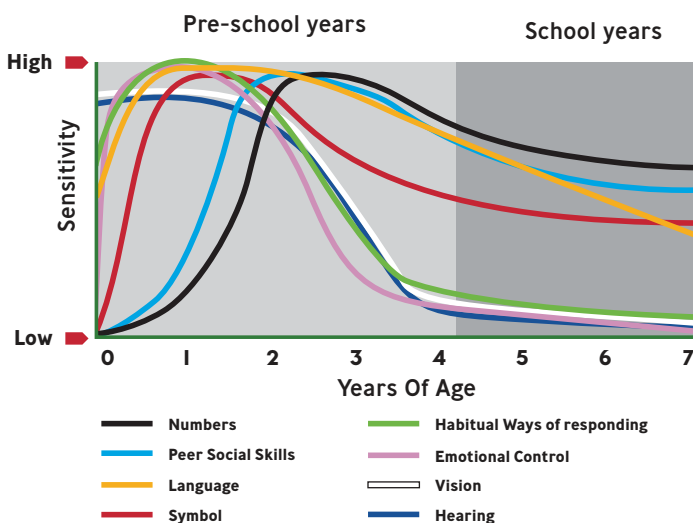
Positive relationships and learning opportunities spark brain activity so that the synapses associated with these experiences become permanent. The brain is far more impressionable (neuroscientists use the term "plastic") in early life than in maturity. This plasticity has both a positive and a negative side. On the positive side, it means that young children's brains are more open to learning and enriching influences. On the negative side, it also means that young children's brains are more vulnerable to developmental problems if they are in an environment that is chronically stressful or are neglected or abused. Young children who are involved in stressful situations produce hormones that inhibit brain development.

Windows of Opportunity

There are sensitive periods in the development of the brain. The brain has more potential for growth or plasticity and these periods are broad windows of opportunity for certain types of learning. For example, children can learn a second language with ease during the preschool years, a task that is much more difficult as an adult. Brain research highlights birth through age 3, and up until 6 years of age, as sensitive periods for development and learning in all areas. In fact, throughout the early years and up until about 24 years of age, there are a series of time periods, or “windows,” in which a person can best learn a particular skill. However, if the opportunity for learning does not arise, these potential new skills are not lost forever. Individuals still learn new things during their lives, but the learning will take more time and effort if it doesn't occur during these sensitive periods.

Researchers have identified the time frames for the development of certain skills.

Sensitive Periods in Early Brain Development



Graph Developed by Council for Early Child Development (ref: Nash, 1997; Early Years Study, 1999; Shonkoff, 2000.)

How Parents can Support Brain Development

What love can do . . .

Parents and other caregivers play a crucial role in the brain development of young children. It is critical for the infant to have positive interactions for the brain to grow. Infants learn through their senses and are keenly aware of familiar smells, tastes, sights, sounds and touches. Touch actually sends signals to the brain telling it to make connections and grow. Children in the early years flourish when adults are warm, loving and consistently responsive to their cues and clues.

A healthy body supports a healthy brain...

Children must have regular medical check-ups, as well as routine developmental, vision and hearing screening during the early years. There are also strong correlations between the amount of sleep a child gets and normal brain development. A nutritious, balanced diet feeds the brain and allows it to make the connections that result in healthy growth and development.

Provide opportunities for play...

Play is critical to all areas of the child's development – physical, social, emotional, and intellectual. Brain growth is not fostered through passive attention to television or through direct instruction by adults; instead it is best stimulated as the child is actively engaged in sensory play experiences. Children thrive in environments that include a balance between indoor and outdoor experiences, with a great emphasis on movement and physical activity. Adults can enhance brain development as they provide all types of play to facilitate pathways to learning.

Talk, share books, stories and music . . .

Talk to your baby and respond to his or her attempts to communicate. Listen to music and sing together. Read daily to your baby. Research has shown that reading to a child is one of the most predictable activities in supporting the child's readiness for school.



The Understanding the Early Years Initiative is funded by Human Resources and Social Development Canada. For further information, visit www.hrsdc.gc.ca

Contact Laurie Lafortune, Project Coordinator, at Family Services of Central Alberta (403-343-6400) for more information about the Understanding the Early Years (UEY) project in Red Deer, or visit www.fsca.ca

Further Reading

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