Synapses & Skills: The Science of Lifelong Success

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Healthy neural architecture formed in children's earliest years is an essential platform for ongoing learning and achievement

The quality of children's interactions, environments and relationships in the first five years of life has a direct effect on emerging brain architecture and early skill formation. Ensuring these early experiences are cognitively stimulating and emotionally supportive helps set the trajectory that points children toward academic success, marketable skills and productive adulthood.

Principles of Early Neural Development

The early years are a period of rapid brain development

The human brain builds neural circuitry at an astonishing rate—as many as **one million new synapses per second**—throughout the earliest years of life. This begins with simple neural circuits governing sensory functions, but soon moves on to more complex structures that govern language development and higher cognitive functions.

Early experiences affect neural architecture and health

During this period of rapid growth, children's brain circuitry is highly sensitive to the nature of their earliest relationships, interactions and environments. **The more a very young child is held, comforted, spoken to and played with, the more these experiences stimulate emerging neural pathways**, enabling them to become increasingly efficient and resilient over time.

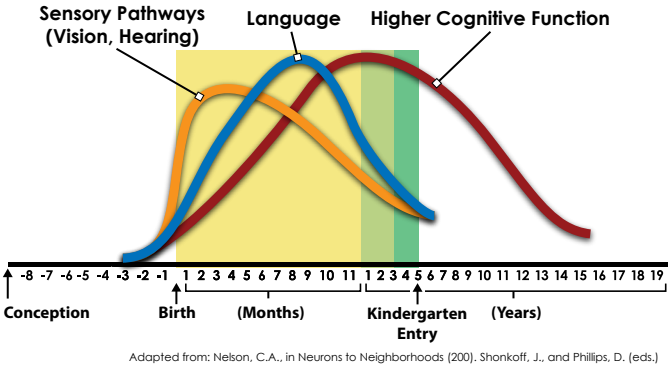
In contrast, low-quality early experiences can weaken early neural circuity in young children, undermining ongoing skill formation at a critical time in their lives. Consistently negative experiences can even damage developing brain architecture, resulting in profoundly serious and costly physical and mental health outcomes extending far into adulthood.

Why the timing of high-quality early experiences matters

Even before children arrive at kindergarten, the rapid growth of synapses slows. Excess and under-utilized synapses are naturally "pruned" away to enable the brain to operate more efficiently. The remaining network of neural circuitry provides a base for all future learning and achievement. Even though the brain continues to form synapses as it learns new information and skills, this process requires increasing effort as children grow. **The best opportunity to lay a solid foundation of neural circuitry for success in school and life is before children even reach school age.**

Human Brain Development

Synapse Formation Dependent on Early Experiences



Adapted from: Nelson, C.A., in Neurons to Neighborhoods (200). Shonkoff, J., and Phillips, D. (eds.)

Early Brain Development Supports Skill Formation

The importance of executive function

Getting along with others, prioritizing tasks, remembering rules and goals and controlling impulses are among the core skills we all need to manage our lives successfully. These self-regulation skills, also known as *executive function*, are cultivated in early childhood and are critically important to making good life choices, growing positive work habits and building healthy relationships.

All children are born with the ability to form these skills, but early experiences either foster their growth, or not. Acquiring the building blocks of these skills is one of the most important functions of the earliest years, and enabling children to build upon them is crucial to their healthy development as they grow toward adulthood. Protective relationships with nurturing adults set children on a path to becoming highly competent, productive citizens who will be better prepared to successfully raise future generations of Nebraskans.

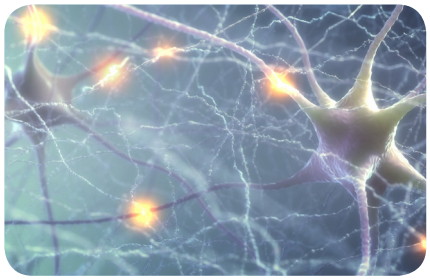
Serve-and-return interactions build healthy brains

Responsive relationships early in life are critical to building strong brain architecture. Key to those relationships are specific types of early interactions, called *serve-and-return*, which significantly influence children's neurological development during their earliest years.

A "serve" occurs when a baby communicates through babbling, pointing or other gestures. When parents "return" the serve through meaningful sounds, words, facial expressions or touch in ways that encourage further volleys of interaction, these reponses literally build and strengthen synaptic connections in the child's brain that will support all future learning.

Using Science to Frame Public Policy

Nebraska's lawmakers have an established and well-deserved reputation for using credible, grounded data to inform the decisions they make for our state. There are few areas of public policy supported by a stronger base of scientific evidence than that pertaining to the early care and education of our youngest citizens.



Increase parents' and caregivers' knowledge about brain development during the earliest years

Educating parents about the critical importance of their children's earliest years and growing the caliber of early childhood professionals who work with young children and their families through training and other professional development opportunities can help put more Nebraska children on a path for success.

Hold early care and learning services accountable for promoting the healthy development of young children

In Nebraska, multiple grants, programs, services and public-private partnerships are available to help parents and caregivers cultivate the kinds of engaging relationships that drive young children's healthy development. Objective and rigorous evaluation of these programs are essential to ensure accountability for the dollars we use to purchase high-quality services known to help close the achievement gap for children at risk.

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