



*Family and Consumer Sciences, 1787 Neil Avenue, Columbus, OH 43210*

# Your Child's Brain: The Crucial Early Years

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In the 1970s and 1980s, science told us the genes we were born with determined how our brains developed. However, advances in brain science understanding are rewriting the “nature versus nurture” debate. Today, the focus is on the different roles “nature *and* nurture” play in brain development. Nature (genetics) is responsible for the basic wiring plan—for forming all of the cells (neurons) and general connections between different brain regions. Nurture (experience) is responsibility for fine-tuning those connections, helping each child adapt to the particular environment (culture, family, peer group) to which he or she belongs.

“There is no cognitive, perceptual, emotional, or motor skill that is not influenced by both of these factors,” said Dr. Lise Eliot of the Chicago School of Medicine. “We can’t do much about the genes we are born with—or the genes we transfer to our children, but we do influence environment. We know from 50 years of research in neuroscience that an infant’s experience can have permanent effects on the wiring of the brain,” said Eliot, author of the book *What’s Going on in There? How the Brain and Mind Develop in the First Five Years of Life*. Neurosurgeons know there are truly critical periods—stages of development—in which the brain needs certain types of experience, or the circuits don’t get put together properly.

How does the environment shape a child’s brain development? Each brain cell, a neuron, is shaped like a tree with two branching ends, a root system known as the “dendrites,” which receive information from thousands of other neurons, and an output side called the “axon,” which branches out to send information to hundreds or thousands more neurons. There are some 100 billion brain cells

in a human, a number that is reached by just five months gestation in the womb. So there are literally some quadrillion synapses or connections in a child’s brain, each of which can be altered by a child’s experiences.

Synapses can be gained or lost, strengthened or weakened, as a result of their own electrical activity. There are a couple of useful phrases to describe this process: “Cells that fire together, wire together,” which means that synapses that are highly active will be preserved and strengthened. On the other hand, synapses that are underactive will be pruned away, according to a “use it or lose it” rule, forever threatening the child’s ability to do a task. Between the ages of two and ten years, a child’s brain contains 50 percent more synapses than in the adult. These excess synapses provide the raw material on which experience acts to shape a child’s mental abilities.

What suggestions do experts have for building a baby’s brain? Babies’ brains need stimulation to develop their full potential. Their best learning is from being highly attuned to human stimuli—interacting with your face, voice, and touch. Singing, talking, and reading to babies are all ideal ways of stimulating their senses. Babies are also highly responsive to motion—gentle bouncing, swinging, and being carried—because of their highly developed vestibular system (sensory network that controls our sense of balance). Even the fanciest toy is not as effective as a loving caregiver in nurturing a child’s developing brain.

Early childhood is the best time to acquire language skills. At birth, infants begin tuning into the sounds of their surroundings. While the human brain is uniquely prepared for language, language stimulation must be given through loving, two-way interactions. Toddlers don’t

learn language by listening to television or hearing adults converse among themselves. They learn it when caregivers, peers, or siblings engage them in conversations about feelings, objects, and events in their environments. They also learn it through our feedback—when parents mimic their baby's babbling. Loving verbal dialogues is the single proven way to enrich children's later mental ability.

Other factors in early childhood that are associated with greater cognitive achievement include: a healthy environment (free of secondhand smoke, lead, and other heavy metals); exposure to a variety of sensory and social stimuli (but avoiding overstimulation); high quality child care or nursery school; firm but fair discipline; and high expectations of mature behavior. "If children have stressful or impoverished early environments, there will be long-term implications for the building of the brain. However, though early experience is very important, later experience is also important," states neuroscientist Eric Knudsen, member of the National Scientific Council on the Developing Child at Harvard University. "You need to have appropriate experiences throughout life to take advantage of the architecture built in childhood, even when that architecture is sturdy and strong, reports Knudsen.

So in conclusion, the key to raising a smarter, happier child is loving interaction with parents for a lifetime. Spend time together in positive ways, engaging in a variety of activities with the child. Most importantly, model the kind of responsible, intelligent, and moral behavior you want your child to emulate, since children learn most through the example we set, rather than the specific teaching we attempt.

## References

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August 2007—3478