A PRIMER ON
Brain Development & School Readiness

What science tells us . . . and how early experiences affect long-term development and success

What Science Tells Us . . .

- The first three years of life are a period of incredible growth in all areas of a baby's development.
- A newborn's brain is about 25% of its approximate adult weight.
- But by age 3, it has grown dramatically by producing billions of cells and hundreds of trillions of connections – or synapses – between these cells.
Science Also Tells Us . . .

- 85% of a child’s brain development takes place by age five.
- Synapses are created with astonishing speed in the first three years of life.
- For the rest of the first decade, a child’s brain has twice as many synapses as an adults’ brain.

This means . . .

A child’s experiences during the first five years of life can greatly impact the brain’s ability to develop.
Developmental Timeline
10 to 18 Months of Age

Human Brain Development
Neural connections for different functions develop sequentially

SOURCE: Center on the Developing Child, Harvard University
Pruning

- Neural connections that are used and reinforced – the pathways involved in language, for example – will be strengthened, while the ones that aren’t used will die out.

Nerve Proliferation

- By age 11 for girls and 12 for boys, the neurons in the front of the brain have formed thousands of new connections.
- Over the next few years most of these links will be pruned.
**Time-Lapse Brain**

- Gray matter wanes as the brain matures.

Here 15 years of brain development are compressed into five images, showing a shift from least mature (red) to most mature (blue).

**What Difference Does It Make?**

- Early prenatal or postnatal experiences and exposures influence long-term outcomes by chemically altering the structure of genes.

- The brain is particularly responsive to experiences and environments during early development, which influences how well or poorly its architecture matures and functions.

_SOURCE: Center on the Developing Child, Harvard University_
What Difference Does It Make?

- Adverse fetal and early childhood experiences can – and do – lead to physical and chemical changes in the brain that can last a lifetime.

SOURCE: Center on the Developing Child, Harvard University
Question . . .

More specifically, what do we know about the connection between brain development and school readiness?

SOURCE: Center on the Developing Child, Harvard University

Substantial achievement gaps exist as children begin kindergarten, but it’s not just children from low-income families who have an uneven start in school.

Many middle-income children are not ready to succeed when they start school.
Similar gaps in social skills exist as children begin kindergarten.

Poverty, abuse and neglect, parental substance abuse, mental illness, exposure to violence and other toxic stress experiences can have a cumulative toll on an child’s physical and mental health.

As the number of adverse early childhood experiences mounts, so does the risk of developmental delays.

SOURCE: Center on the Developing Child, Harvard University
Fear and anxiety affect the brain architecture of learning and memory.


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Looking at the facts, **James J. Heckman**, 2000 Nobel laureate in Economics, says the best way to meet the school readiness challenge is …

“Catch ‘em Young!”