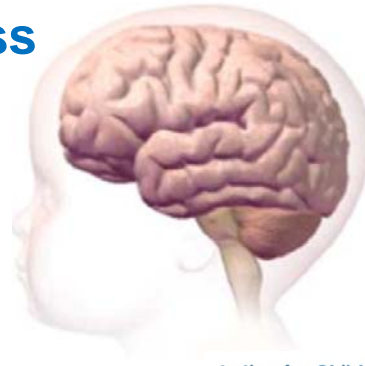


A PRIMER ON
**Brain Development
& School Readiness**

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



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BRAIN DEVELOPMENT & SCHOOL READINESS

What Science Tells Us . . .

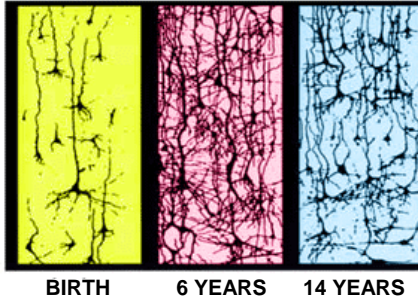
- The first three years of life are a period of incredible growth in all areas of a baby's development.
- A newborn's brain is about 25% of its approximate adult weight.
- But by age 3, it has grown dramatically by producing billions of cells and hundreds of trillions of connections – or ***synapses***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



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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.



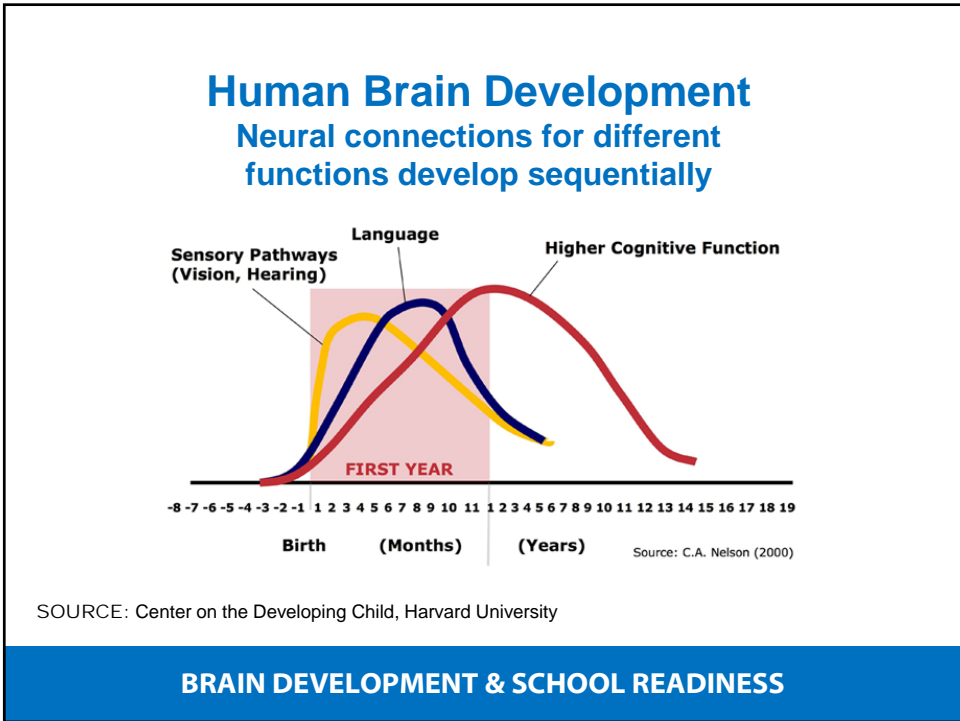
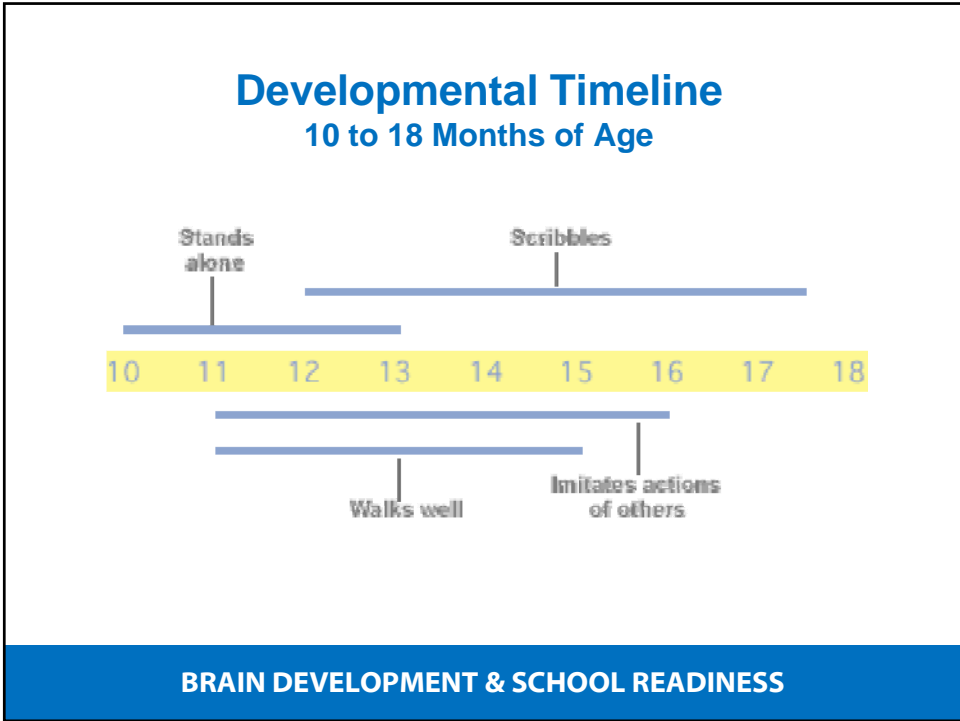
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This means . . .

A child's experiences **during the first five years of life** can greatly impact the brain's ability to develop.



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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.

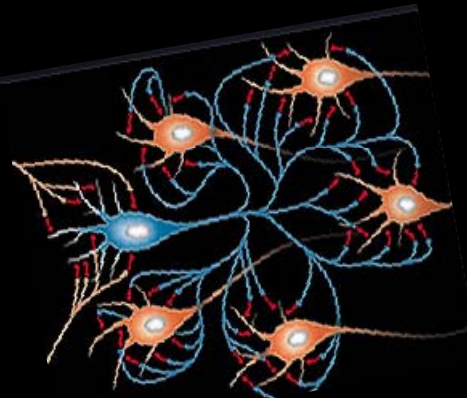


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Nerve Proliferation

❑ 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.

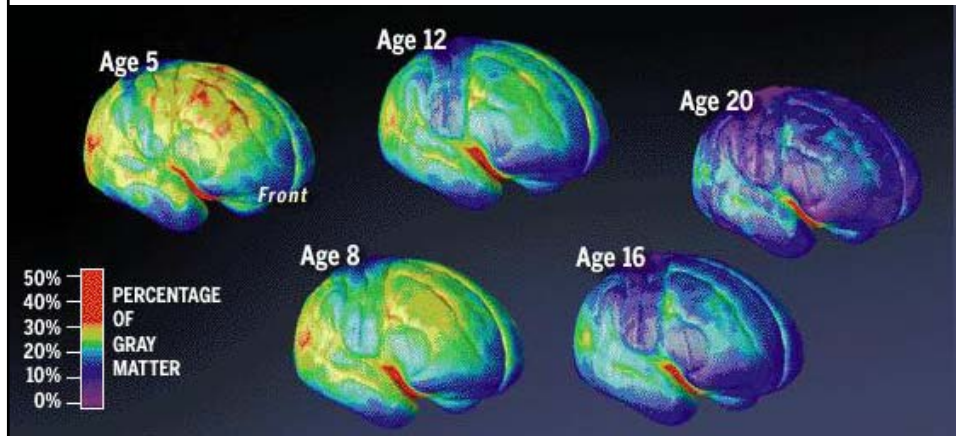


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Time-Lapse Brain

- ❑ 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

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What Difference Does It Make?

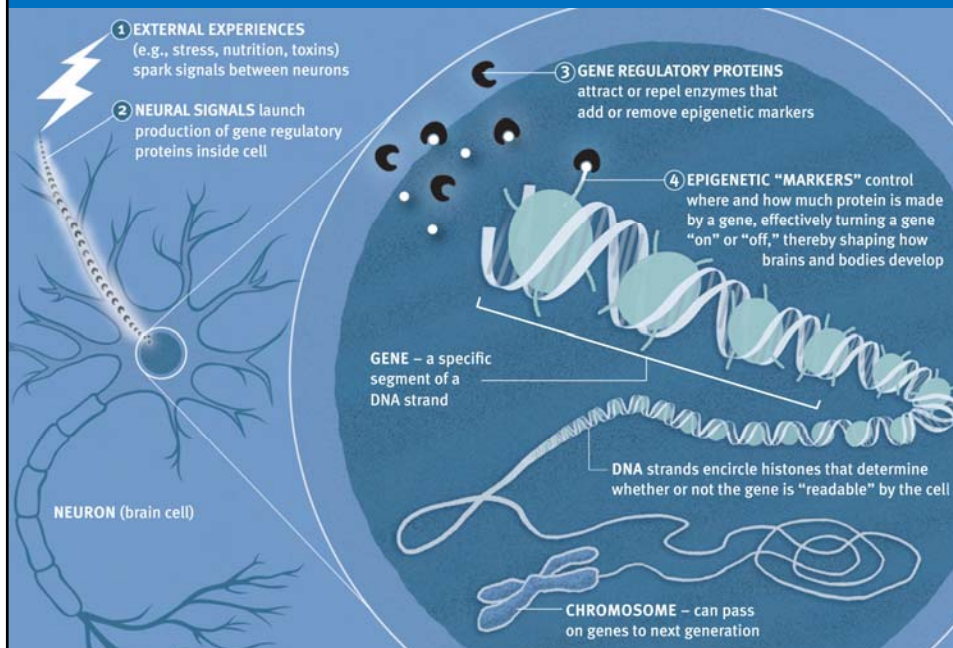
❑ Adverse fetal and early childhood experiences can – and do – lead to physical and chemical changes in the brain that can last a lifetime.



SOURCE: Center on the Developing Child, Harvard University

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Early experiences alter gene expression, shape development



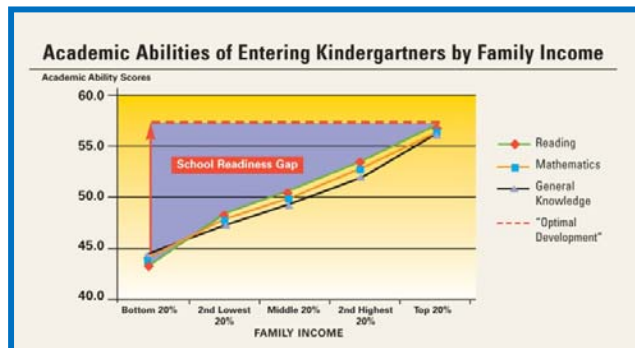
Question . . .

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



SOURCE: Center on the Developing Child, Harvard University

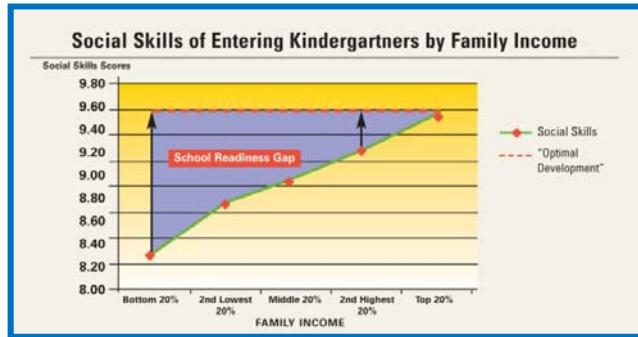
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Substantial achievement gaps exist as children begin kindergarten, but it's not just children from low-income families who have an uneven start in school.

Many middle-income children are **not ready** to succeed when they start school.

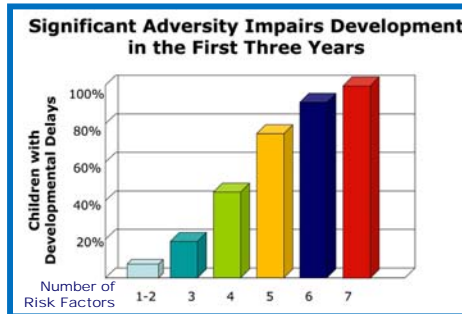
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Similar gaps in social skills exist as children begin kindergarten.

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Poverty, abuse and neglect, parental substance abuse, mental illness, exposure to violence



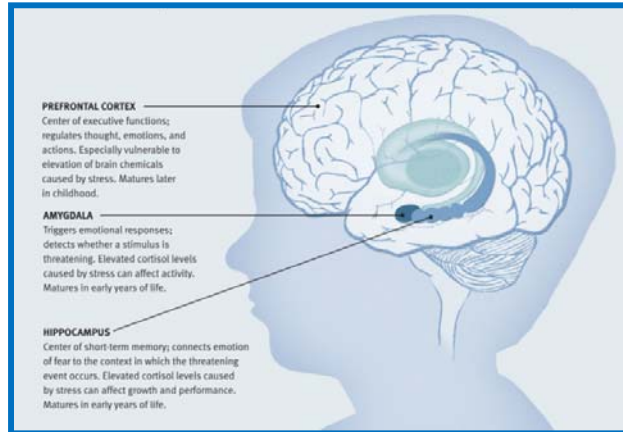
and other toxic stress experiences can have a cumulative toll on an child's physical and mental health.

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

SOURCE: Center on the Developing Child, Harvard University

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Fear and anxiety affect the brain architecture of learning and memory.



SOURCE: National Scientific Council on the Developing Child (2010). Persistent Fear and Anxiety Can Affect Young Children’s Learning and Development: Working Paper No. 9.

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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!”

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