Policy and Early Childhood Brain Development

Senate Early Childhood and Behavioral Health Committee

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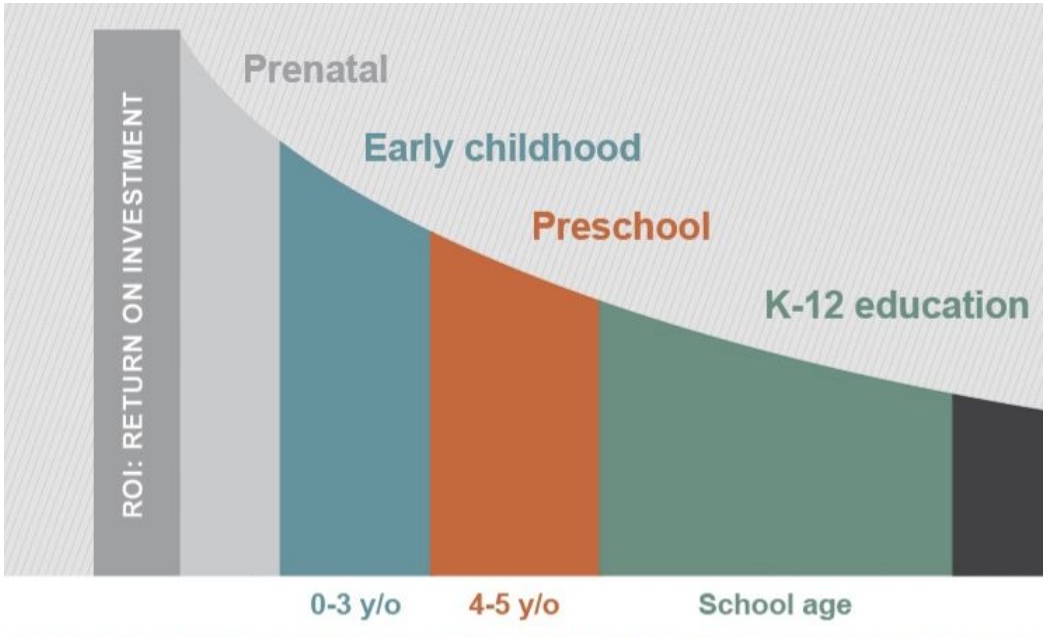
Why should we focus on early childhood?

Return on Investment
The Heckman Curve



"The highest rate of return in early childhood development comes from investing as early as possible, from birth through age five, in disadvantaged families. Starting at age three or four is too little too late, as it fails to recognize that skills beget skills in a complementary and dynamic way."

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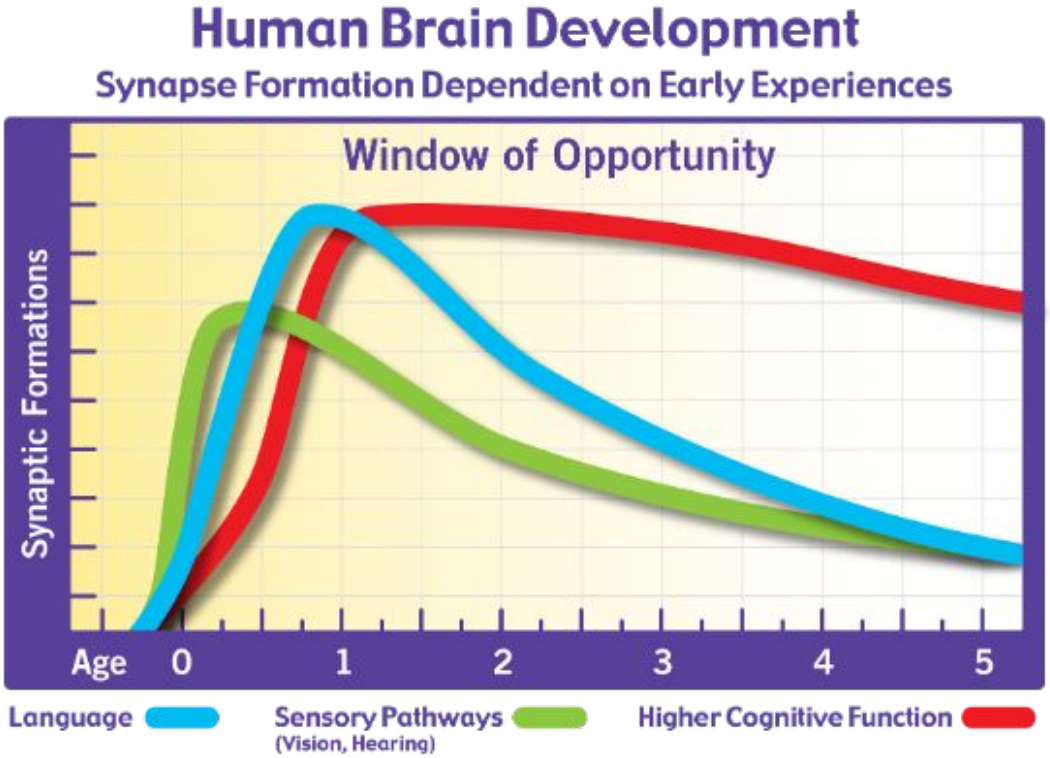
Brain Development in Early Life

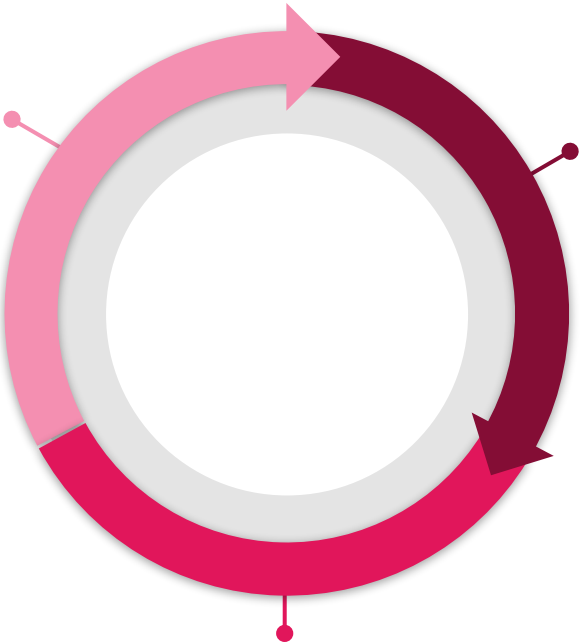


The prenatal time period through age 5 has the highest rate of neurodevelopment of any other time period in life. Child development is both robust and highly vulnerable. (NASM, 2000)

Brain Development in Early Life

1.
Rapid proliferation of neural connections in the first years of life

Over 1 million connections per second!



2.
Pruning to make brain processes more efficient

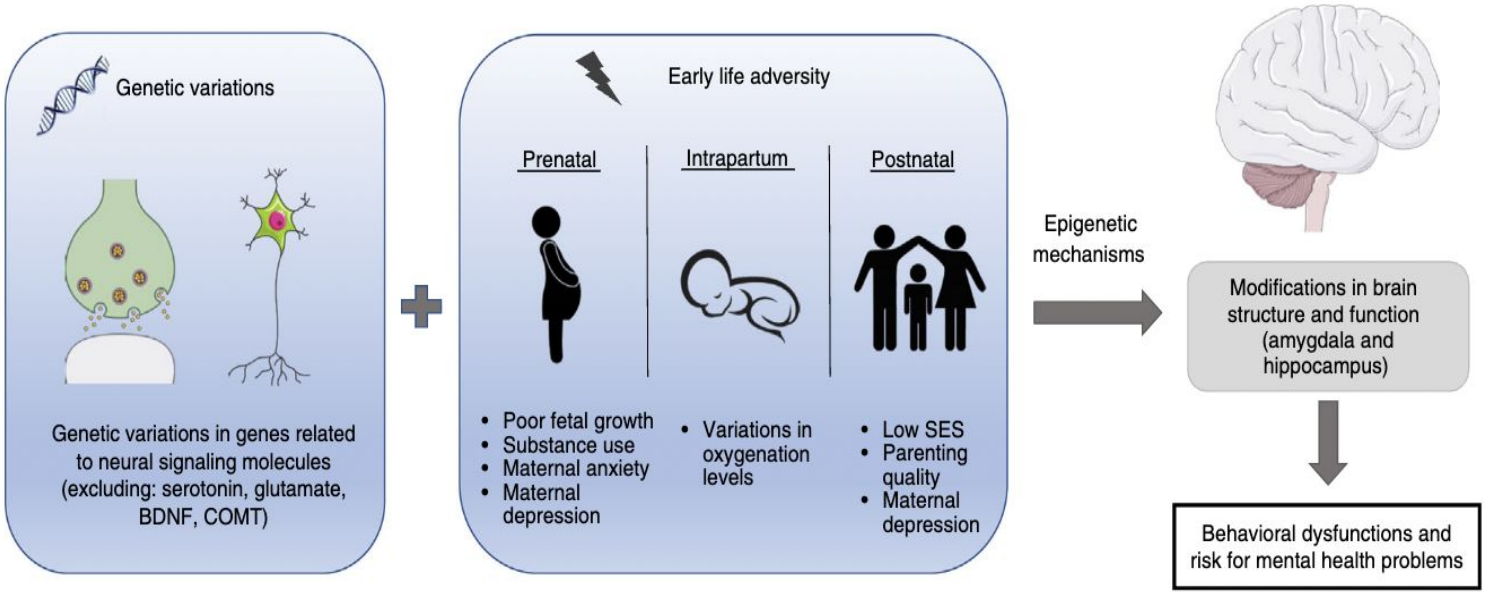
Some brain circuits are strengthened, some weaken based on experiences

3.
Increasing complexity of circuits and continued brain development

90% of brain development occurs in the first 5 years but continues to develop through early adulthood

The brain develops from back to front with frontal lobe developing last in young adulthood

The interplay between genetics and experience



Miguel, P.M., Pereira, L.O., Silveira, P.P. and Meaney, M.J. (2019), Early environmental influences on the development of children's brain structure and function. Dev Med Child Neurol, 61: 1127-1133. https://doi-org.libproxy.lib.unc.edu/10.1111/dmcn.14182

The interplay between genetics and experience

- Childhood development is shaped by a consistent and changing dynamic between **genetics** and **experience**.
- Early environments and nurturing early relationships matter for normal development.
- Experiences in the **prenatal period and early life** have powerful effect on brain function including **alterations in DNA and gene expression** that affects brain development
- Both **adverse** and **positive** childhood experiences affect brain development

Early Childhood experiences affect health across the lifecourse

- 15-20% of children account for over 50% of medical and psychiatric morbidity and healthcare utilization

- Poverty is the single largest contributor to morbidity:
  - Low birthweight
  - Developmental disabilities
  - Dental caries
  - Infectious diseases
  - Poor academic achievement
  - Employment
  - Interpersonal relationships
  - Lifelong well being

Infant Mental Health

A young child's capacity to:

- Experience, regulate, and express emotions
- Form close and secure relationships
- Explore their environment and learn

These are accomplished within the context of a caregiving environment that includes **family, community, and culture**.

Healthy social and emotional development depends on **secure attachment** and **positive early relationships** during the critical period of rapid brain development.

Early Relational Health

- Creation of emotional well being for parents and children through building **strong, secure, positive relationships** throughout early life.
- Integral for a child's growth, development, promoting family resilience, and protecting from stress.
- **Safe, stable, nurturing relationships** prevent the extreme or prolonged activation of the stress response system leading to toxic stress.

What is Toxic Stress?

Toxic Stress

- Strong, frequent, or prolonged activation of stress management system → stressful events are chronic, uncontrollable, and without support from caring adults
- Over time, stress response system activates at lower thresholds

Tolerable Stress

- Stressful events that have the potential to cause lasting negative effects
- Short duration allows brain to recover - safe stable adult relationships mitigate negative effects of the stress

Positive Stress

- Moderate, short-lived stressful events
- Normal part of life → Builds resilience in the setting of positive, safe, stable adult relationships

Toxic Stress and Child Brain Development

- Dealing with stress involves both hormonal and brain circuits
- Toxic stress in the prenatal period and early years of life changes the way the brain and hormonal circuits that deal with stress develop
  - Changes can impair **learning**, **memory**, and **stress responses**
- Frequent and persistent activation of the brain stress response leads to **poor physical and behavioral health outcomes** throughout life
  - Anxiety, depression, substance use disorders, cardiovascular disease, diabetes, stroke
  - Persistent elevation in cortisol changes brain circuitry, impairs immune function, changes brain architecture responsible for learning and memory

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