

RECOVERY
FROM
ADDICTION

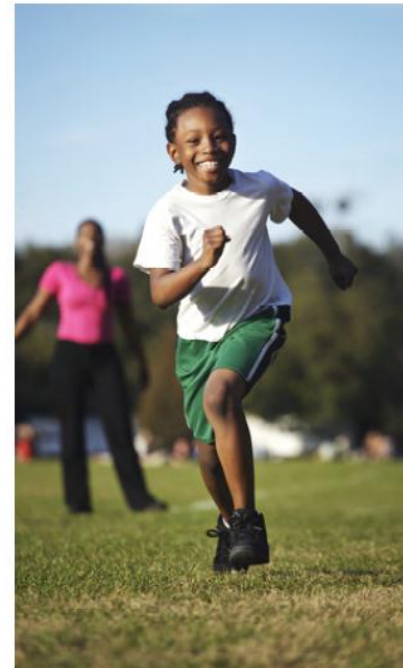
THE EFFECT OF TOXIC STRESS ON CHILDREN'S BRAIN AND BEHAVIOR

Judy L. Cameron, PhD

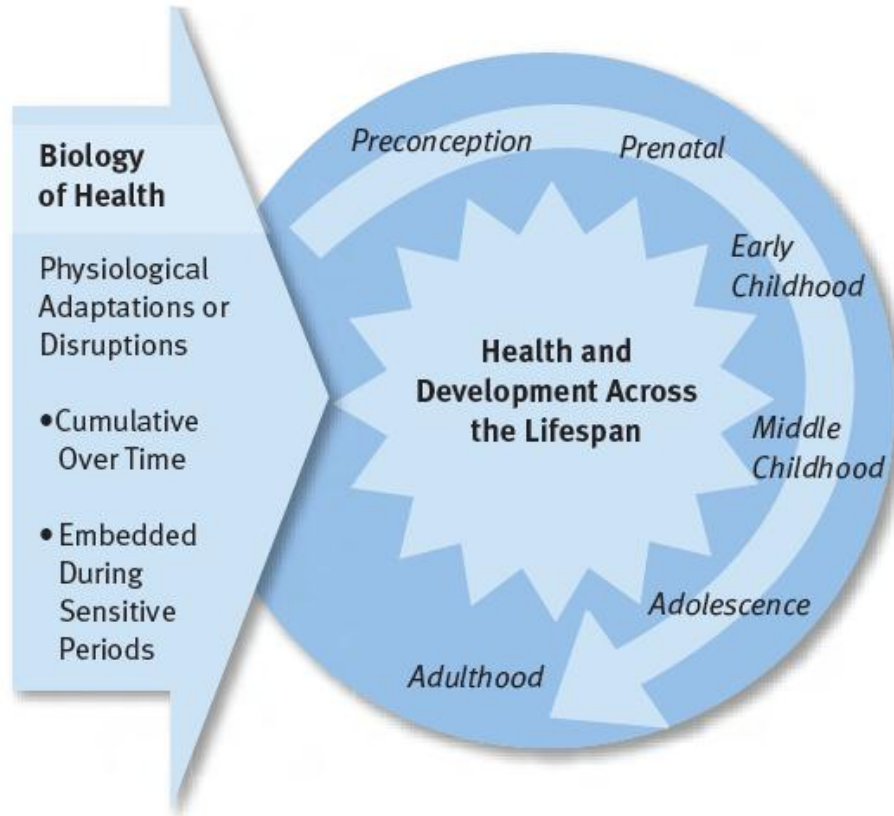
University of Pittsburgh

The National Scientific Council on the Developing Child

The Foundations of Lifelong Health are Built in Early Childhood



Early Life Stress Impacts Life-long Health



The Biology of Adversity: Three Levels of Stress

Positive

Brief increases in heart rate,
mild elevations in stress hormone levels.

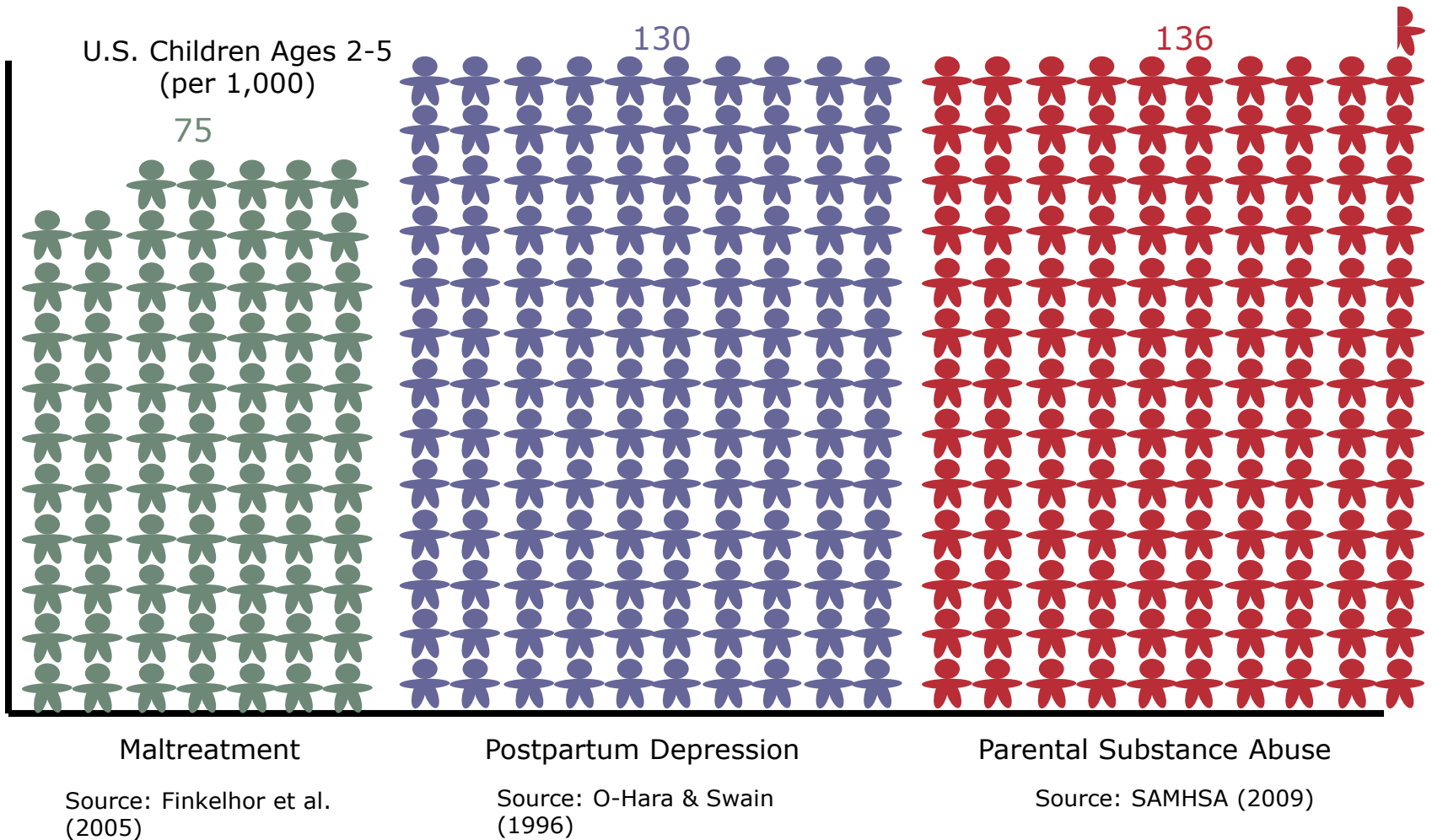
Tolerable

Serious, temporary stress responses,
buffered by supportive relationships.

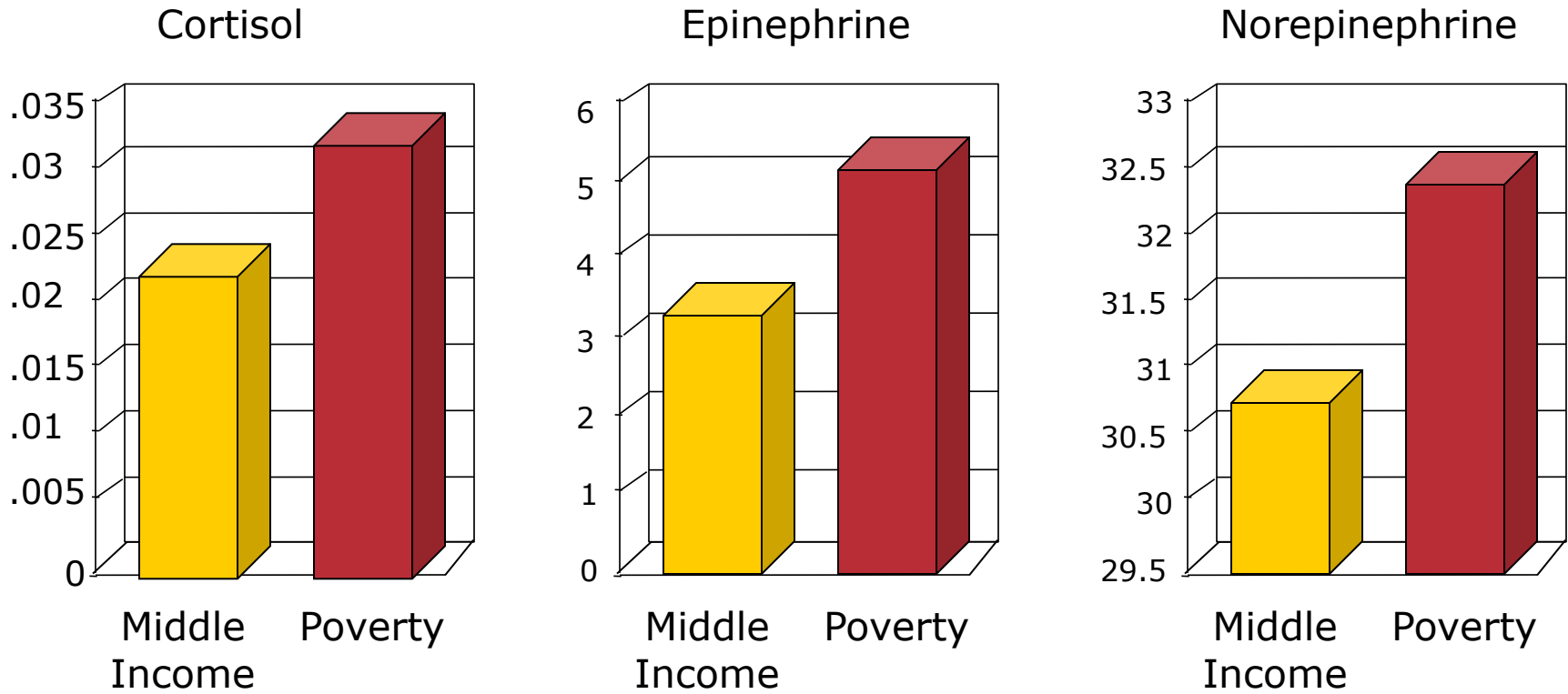
Toxic

Prolonged activation of stress response systems
in the absence of protective relationships.

Sources of Toxic Stress in Young Children



Poor Children Experience Elevated Stress

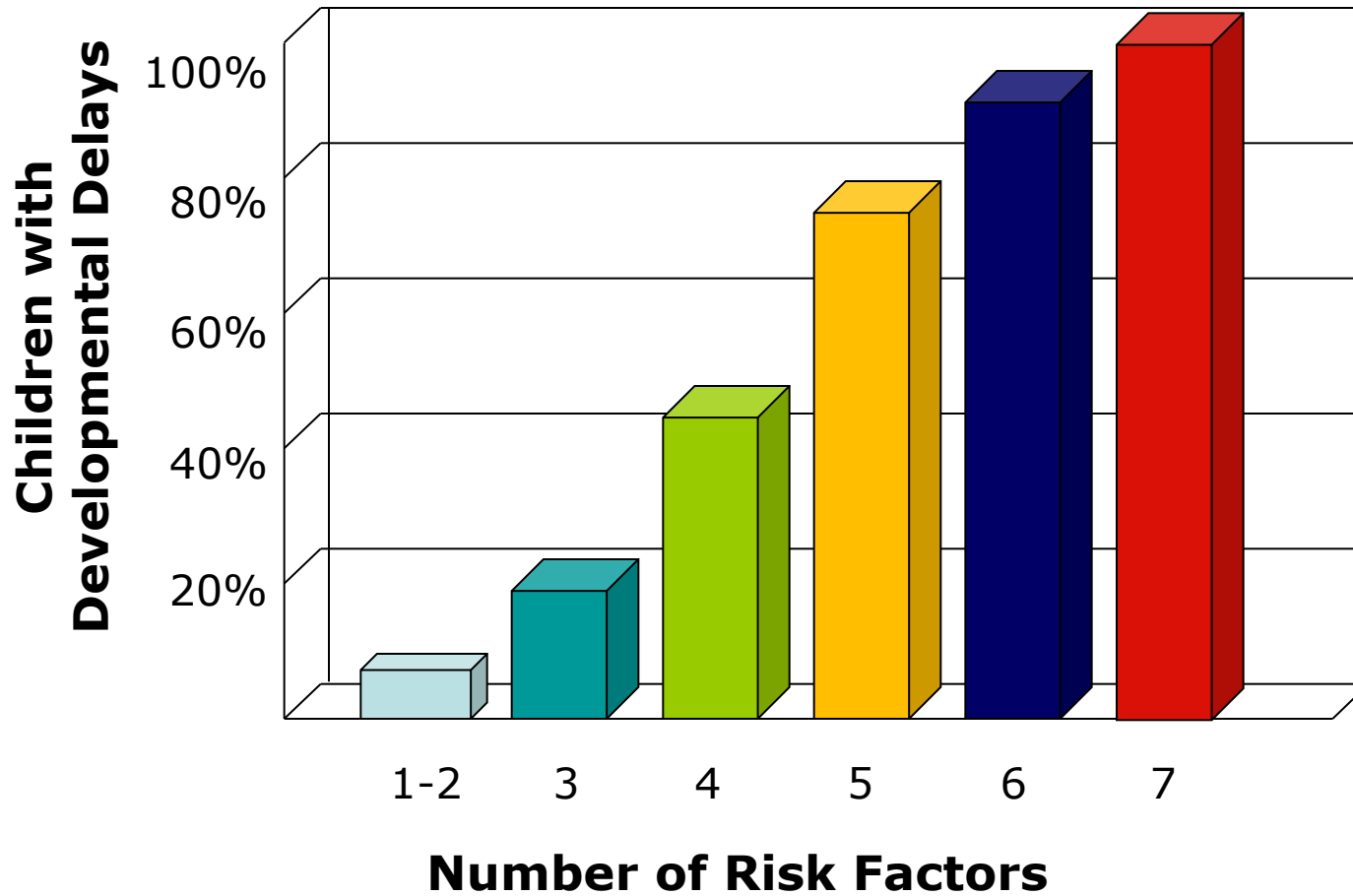


Overnight levels in rural 9-year-old white children

Source: Evans, GW and English, K. (2002)

What are the Long-term Impacts of
Toxic Stress in Early Life?

Significant Adversity Impairs Development in the First Three Years

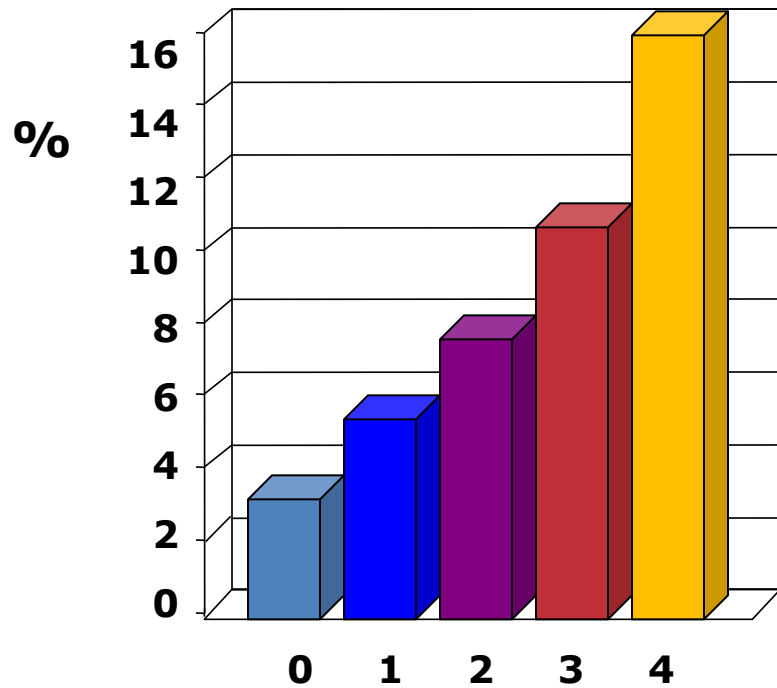


Source: Barth, et al. (2008)

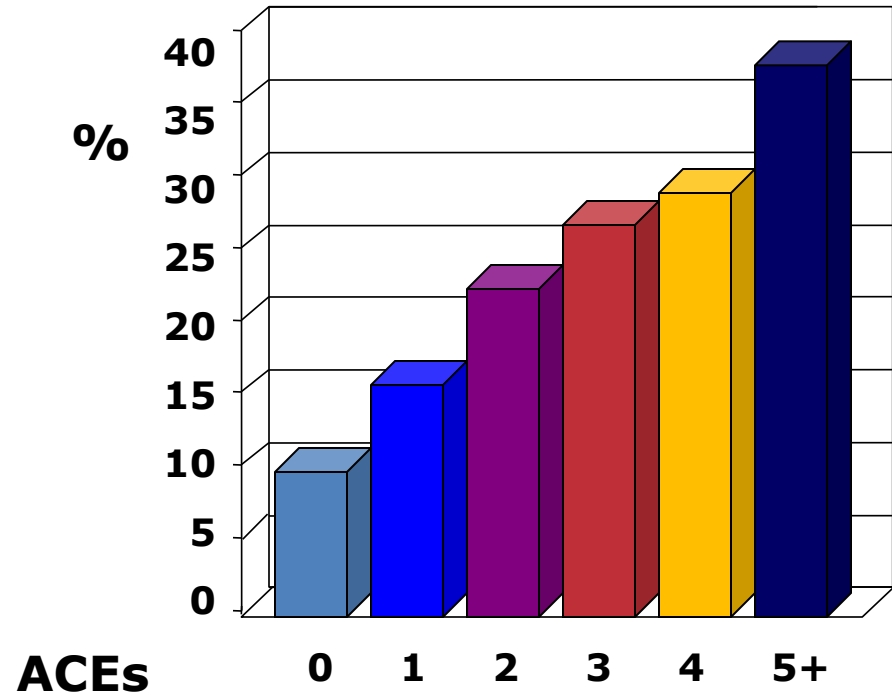
Risk Factors for Adult Substance Abuse Are Embedded in Adverse Childhood Experiences

Self-Report: Alcoholism

Self-Report: Illicit Drugs

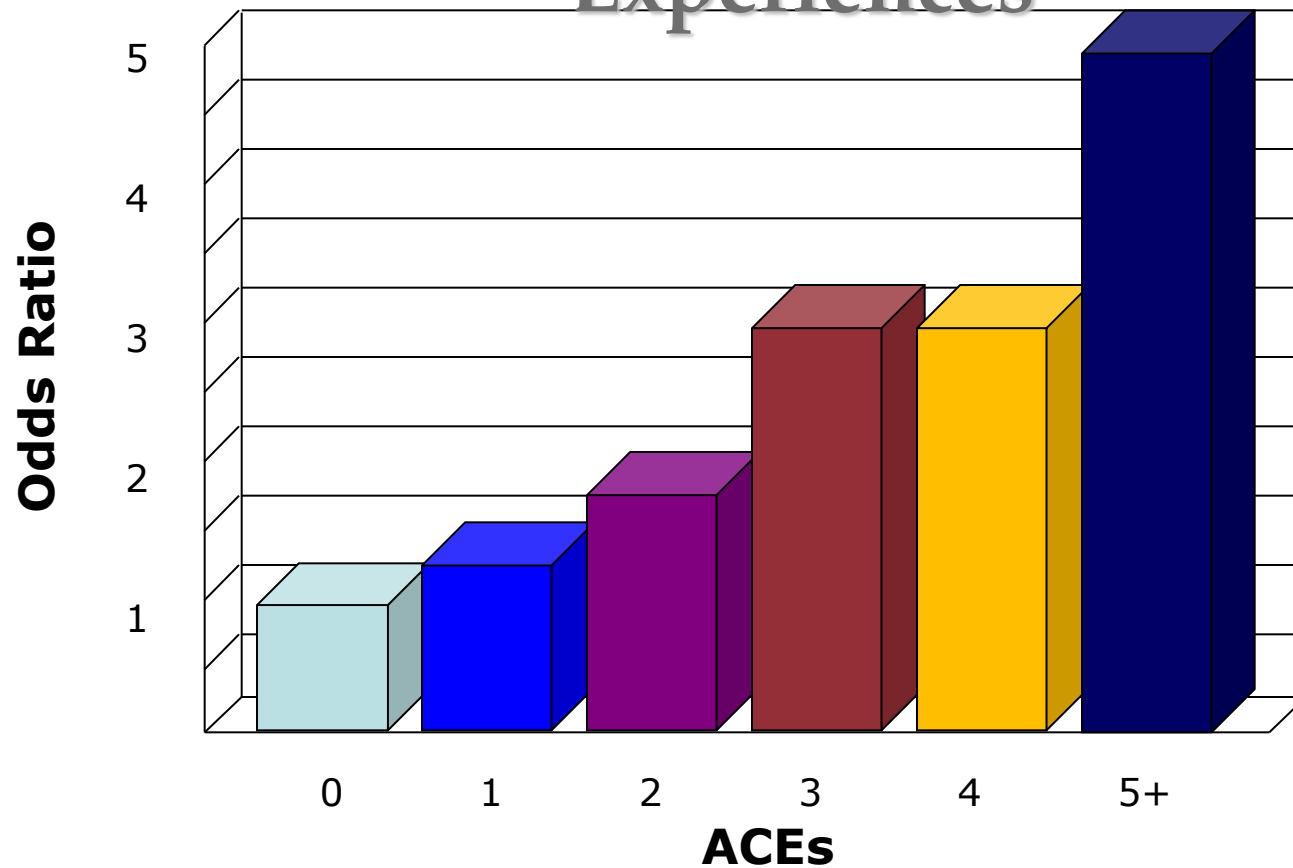


Source: Dube et al. (2002)



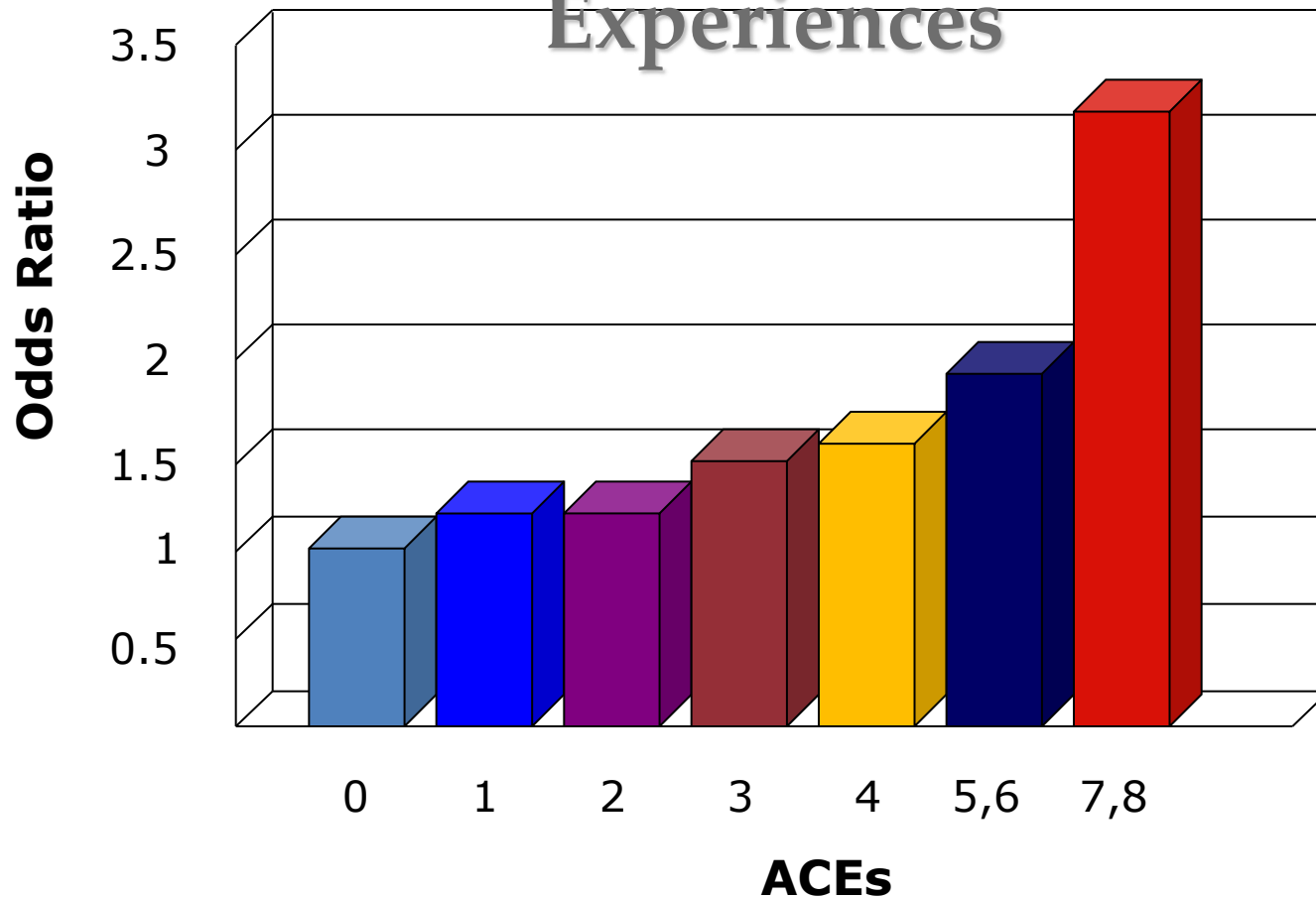
Source: Dube et al. (2003)

Risk Factors for Adult Depression are Embedded in Adverse Childhood Experiences



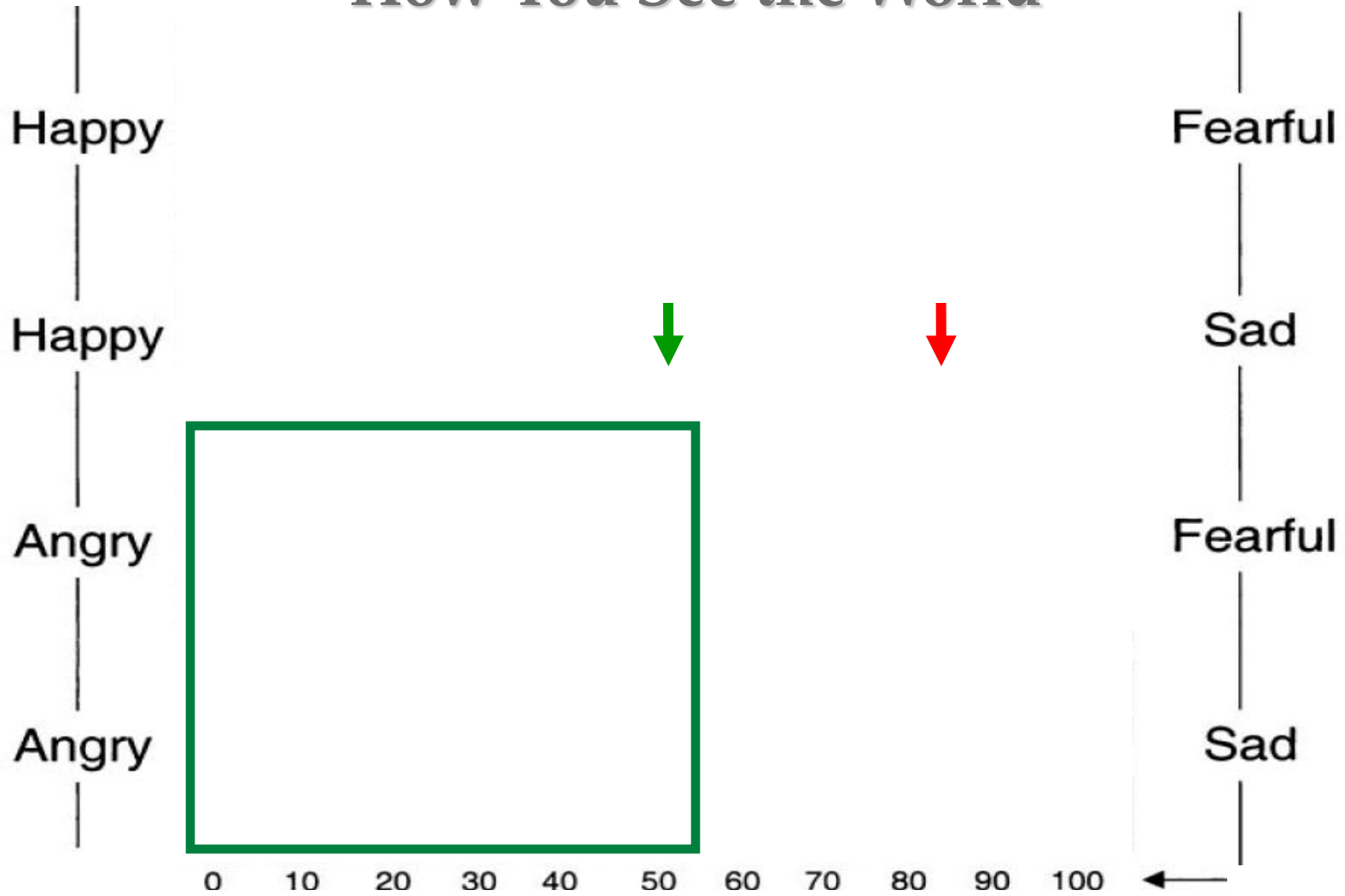
Source: Chapman et al. (2004)

Risk Factors for Adult Heart Disease are Embedded in Adverse Childhood Experiences



Source: Dong et al. (2004)

Adverse Early Life Experiences Change How You See the World



Source: Pollak & Kistler (2002)

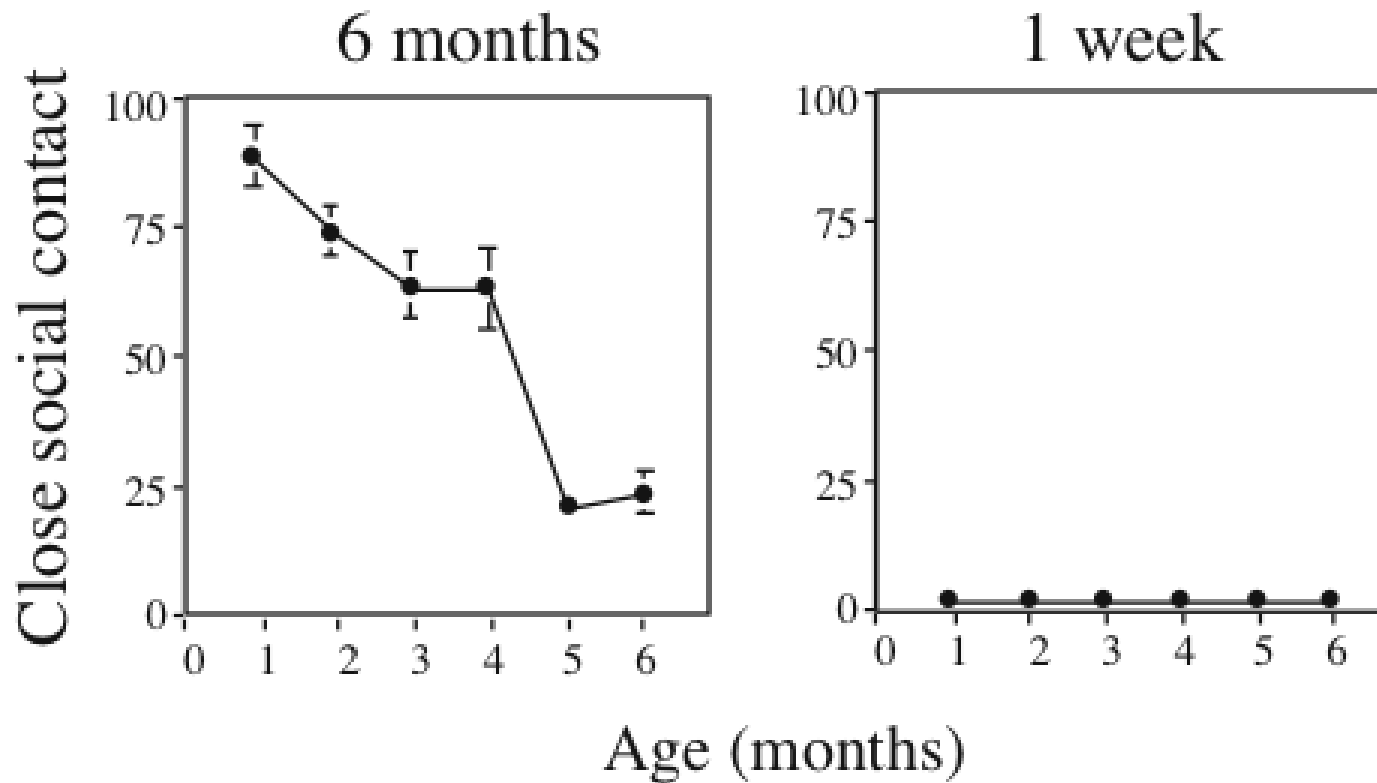
How Does Stress Impact the Brain?

Studies in monkeys show that early life experiences have lasting effects on brain development

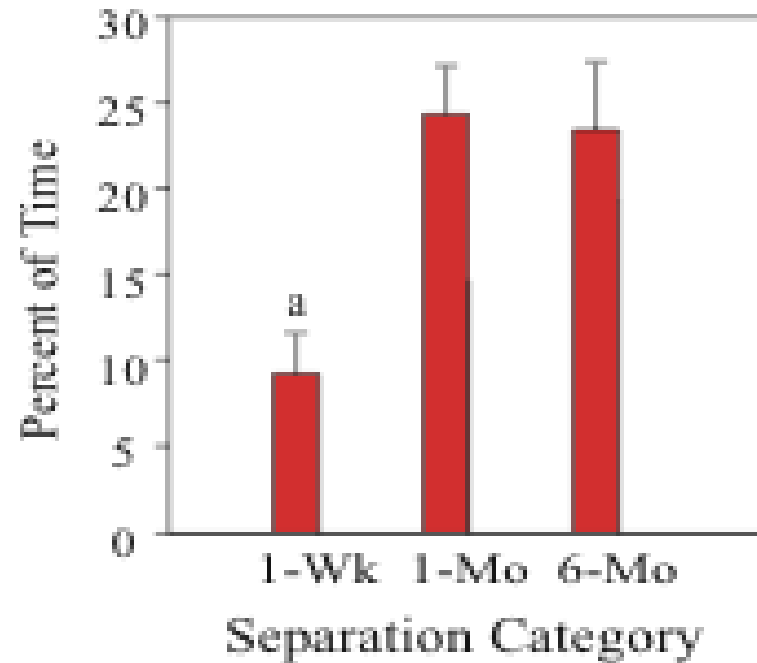




Mother removed from social group when young monkey was:



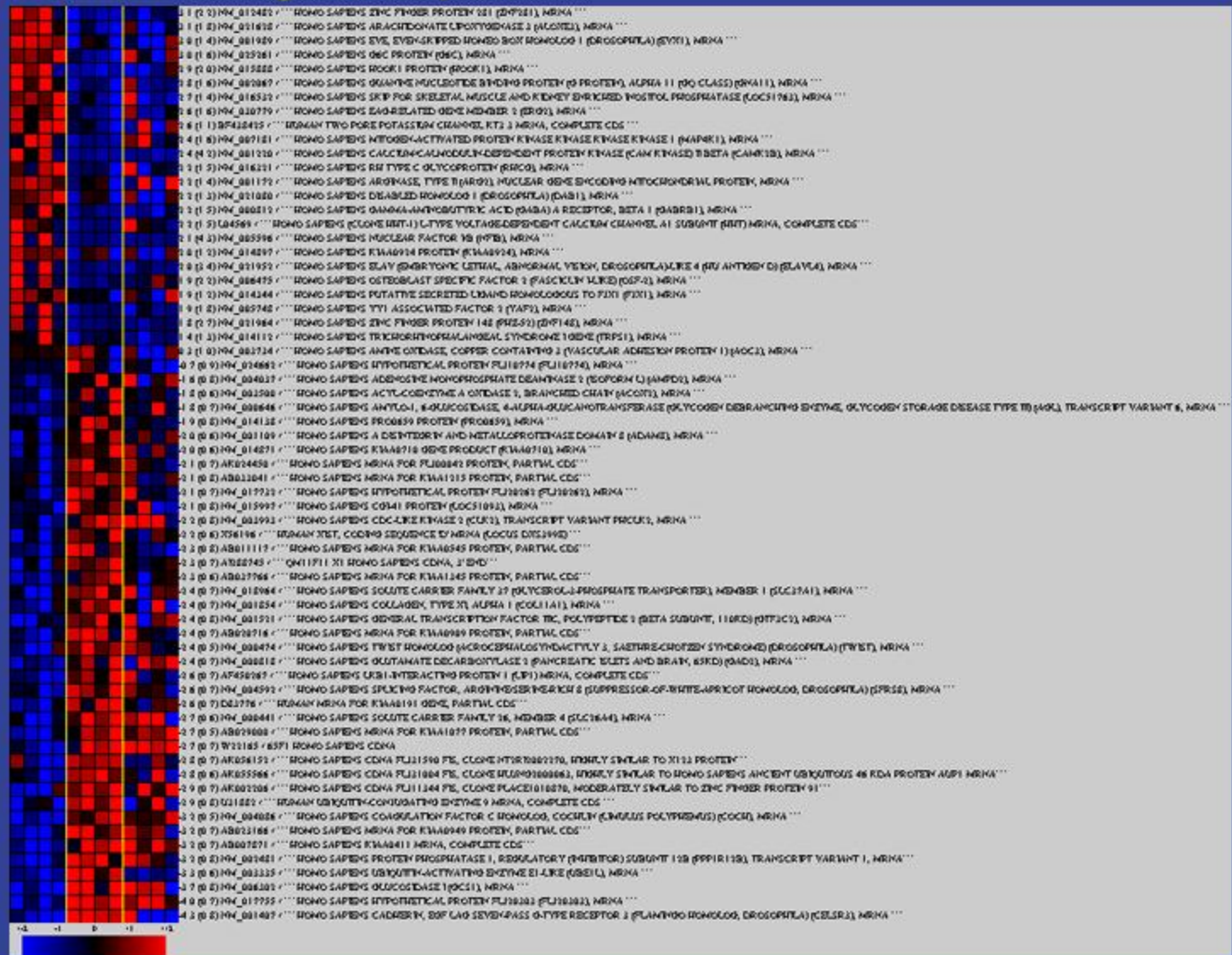
Social Behavior Remains Decreased In Adulthood



Amygdala Microarray Studies

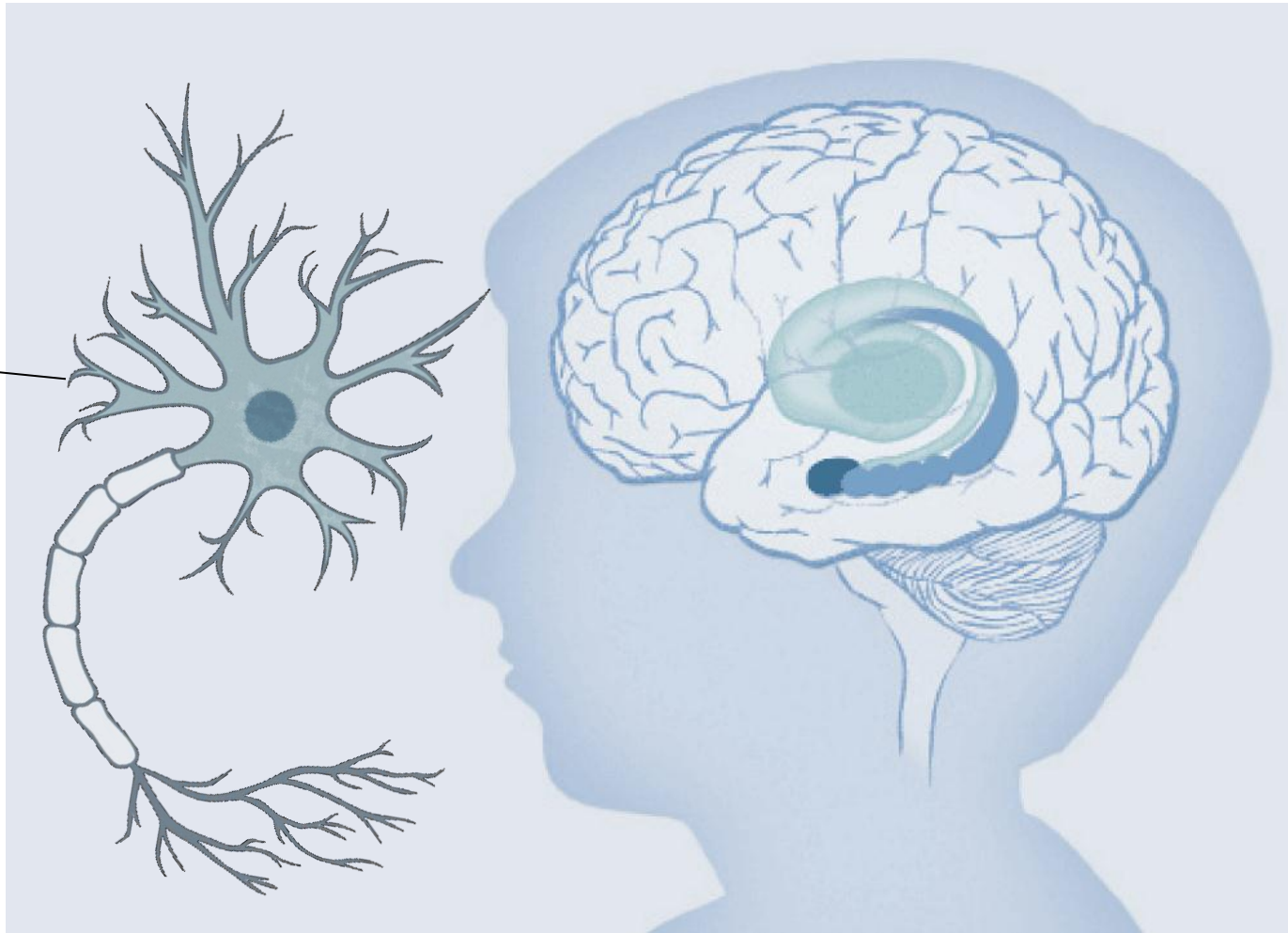
ctrl wk mo

gene description

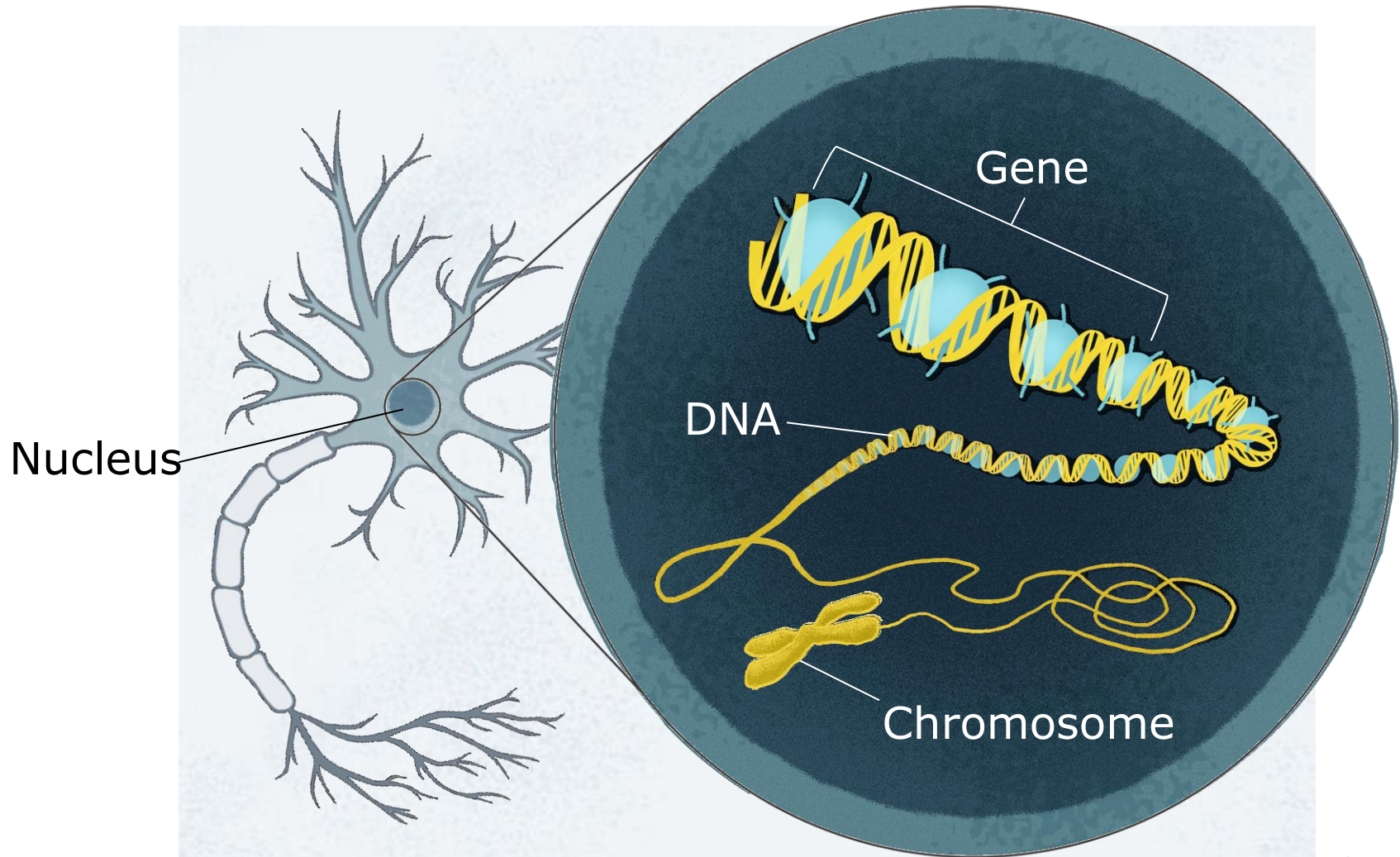


How Early Experiences Alter Gene Expression and Shape Development

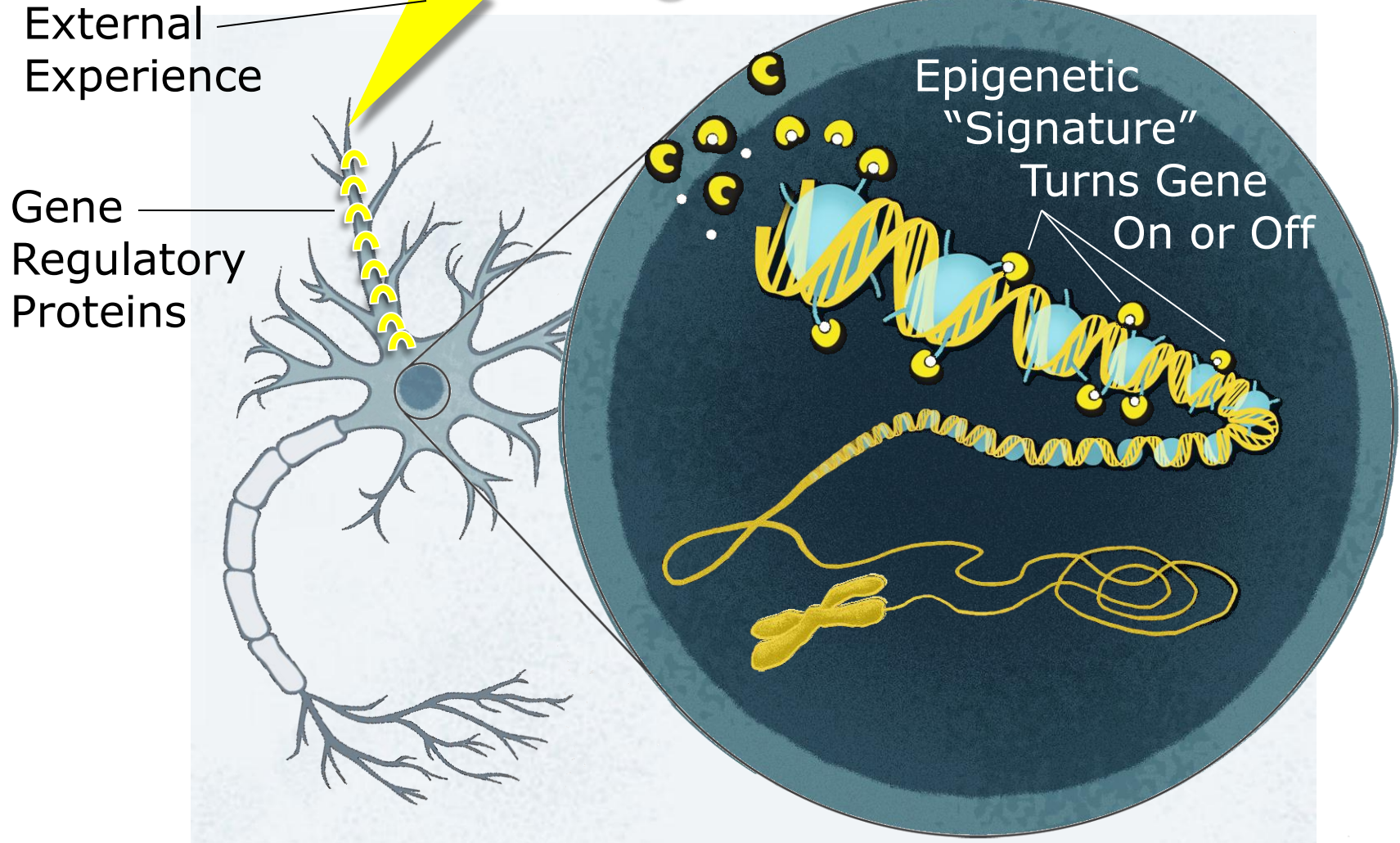
Neuron



Genes Carry Instructions that Tell Our Bodies How to Work



Early Experiences Leave Lasting Chemical "Signatures" on Genes

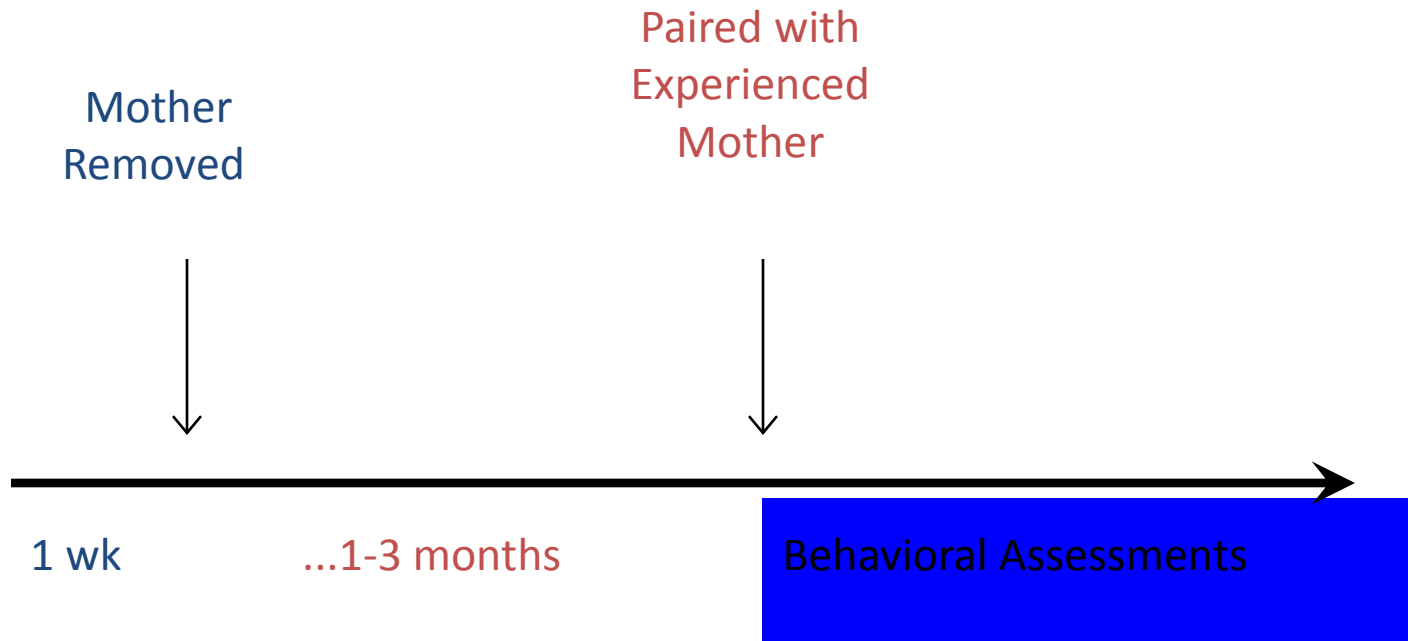


Can We Prevent Long-term Health Impacts of Early Life Stress?

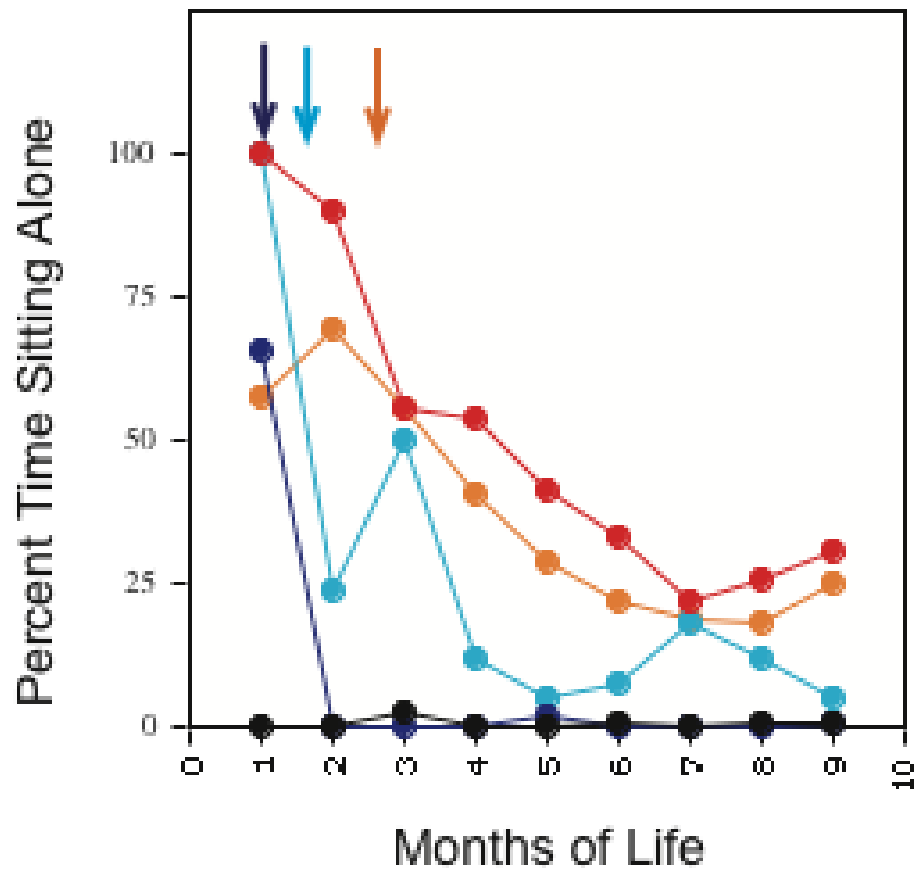
Intervention

- *Can pairing a separated infant with a very attentive mother reverse the effects of early social bond disruption?*
- *Does the **timing** of therapy matter?*

Intervention Design



(arrows show introduction of experienced mother)

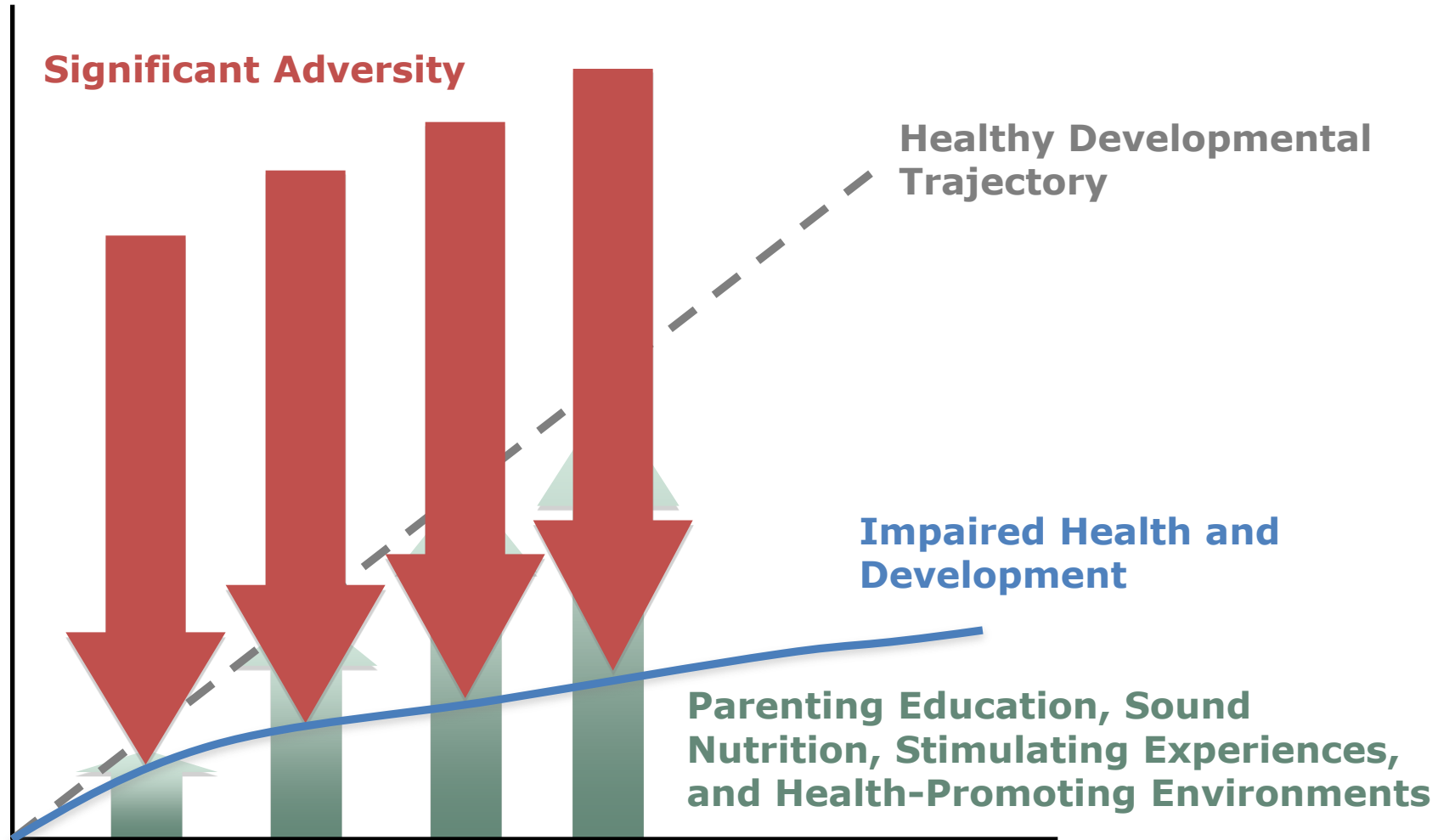


Pairing with an experienced mother is effective when initiated early.

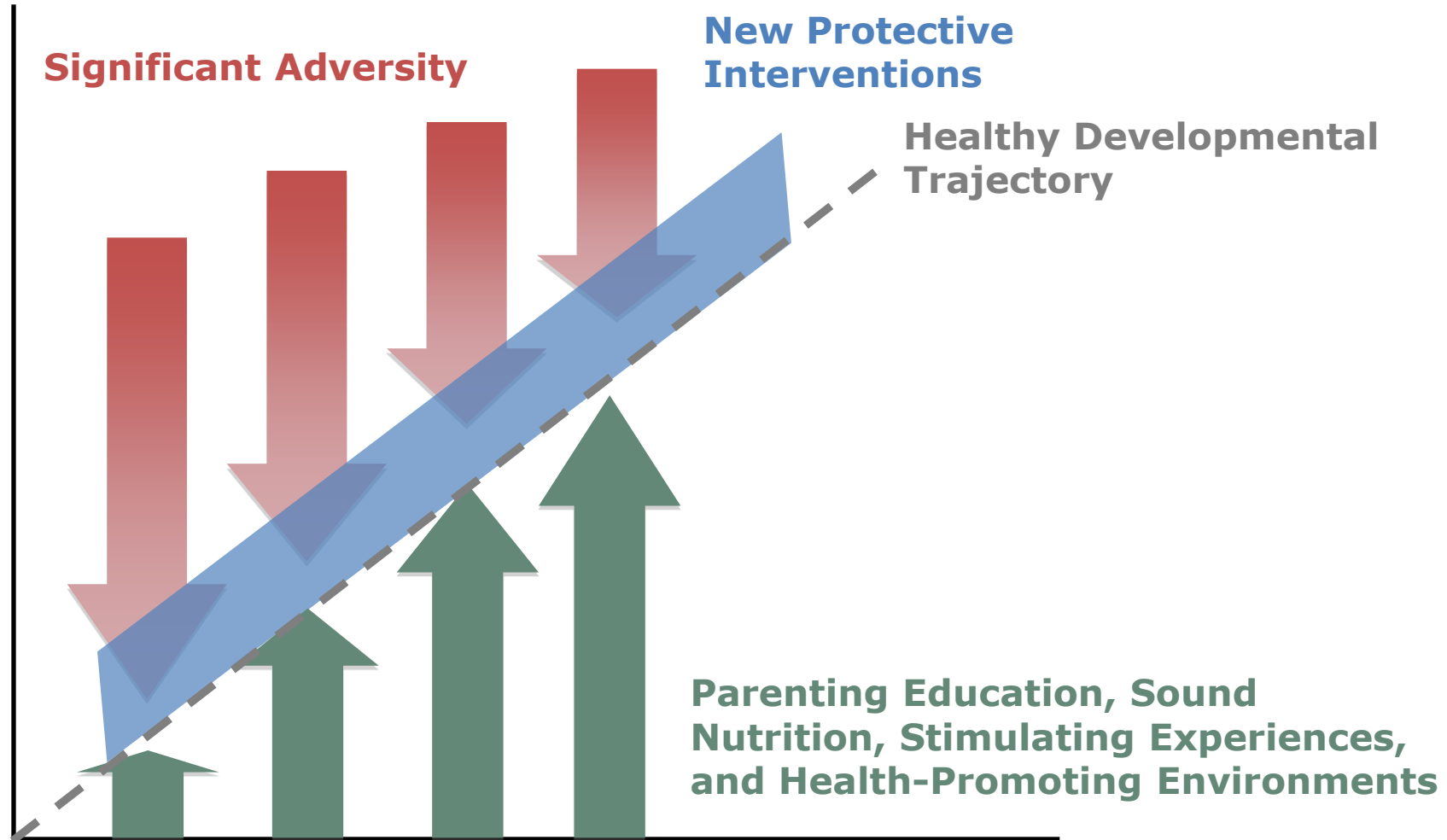
Conclusions: Early Life Experiences on Social Development

- The *timing* of early stressful life experience plays a critical role in determining the outcome of stress exposure on behavior.
- Early social bond disruption can lead to changes in *brain anatomy* and *gene expression* in the brain.
- *Early intervention can prevent long-term consequences* of social bond disruption, but the timing of intervention is important.

Current Conceptual Framework



Protective Interventions Can Improve Life-long Health



Relationships Buffer the Effects of Stress

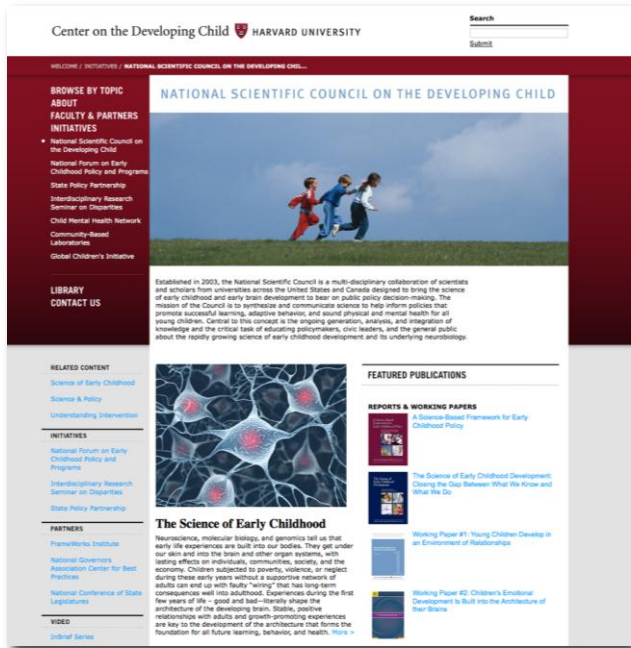
Learning how to cope with moderate, short-lived stress can build a healthy stress response system.

Toxic stress—when the body's stress response system is activated excessively—can weaken developing brain architecture.

Without caring adults to buffer children, toxic stress associated with extreme poverty, neglect, abuse, or severe maternal depression can have long-term consequences for learning, behavior, and both physical and mental health.



Further Information:



<http://www.developingchild.net>

Center on the Developing Child  HARVARD UNIVERSITY

NATIONAL SCIENTIFIC COUNCIL ON THE DEVELOPING CHILD

NATIONAL FORUM ON EARLY CHILDHOOD PROGRAM EVALUATION

Knudsen EI, Heckman JJ,
Cameron JL, Shonkoff JP.

Economic, neurobiological
and behavioral perspectives
on building America's future
workforce.

World Economics 7: 17-41, 2006

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