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Dipesh Navsaria,
MPH, MSLIS, MD

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EARLY EXPERIENCES ELEVATE EDUCATION

EARLY BRAIN & CHILD DEVELOPMENT
AS A FOUNDATION FOR POLICY & PRACTICE

DIPESH NAVSARIA, MPH, MSLIS, MD



DEPARTMENT OF PEDIATRICS
UW SCHOOL OF MEDICINE & PUBLIC HEALTH

SCHOOL OF LIBRARY AND INFORMATION STUDIES
UNIVERSITY OF WISCONSIN-MADISON

EARLY BRAIN & CHILD DEVELOPMENT LEADERSHIP WORKGROUP
AMERICAN ACADEMY OF PEDIATRICS



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DISCLOSURE

I have **no** relevant financial relationships to disclose.

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The Science The Result The Solution? The Call



EARLY BRAIN AND CHILD DEVELOPMENT

The Science

The AAP's EBCD Initiative

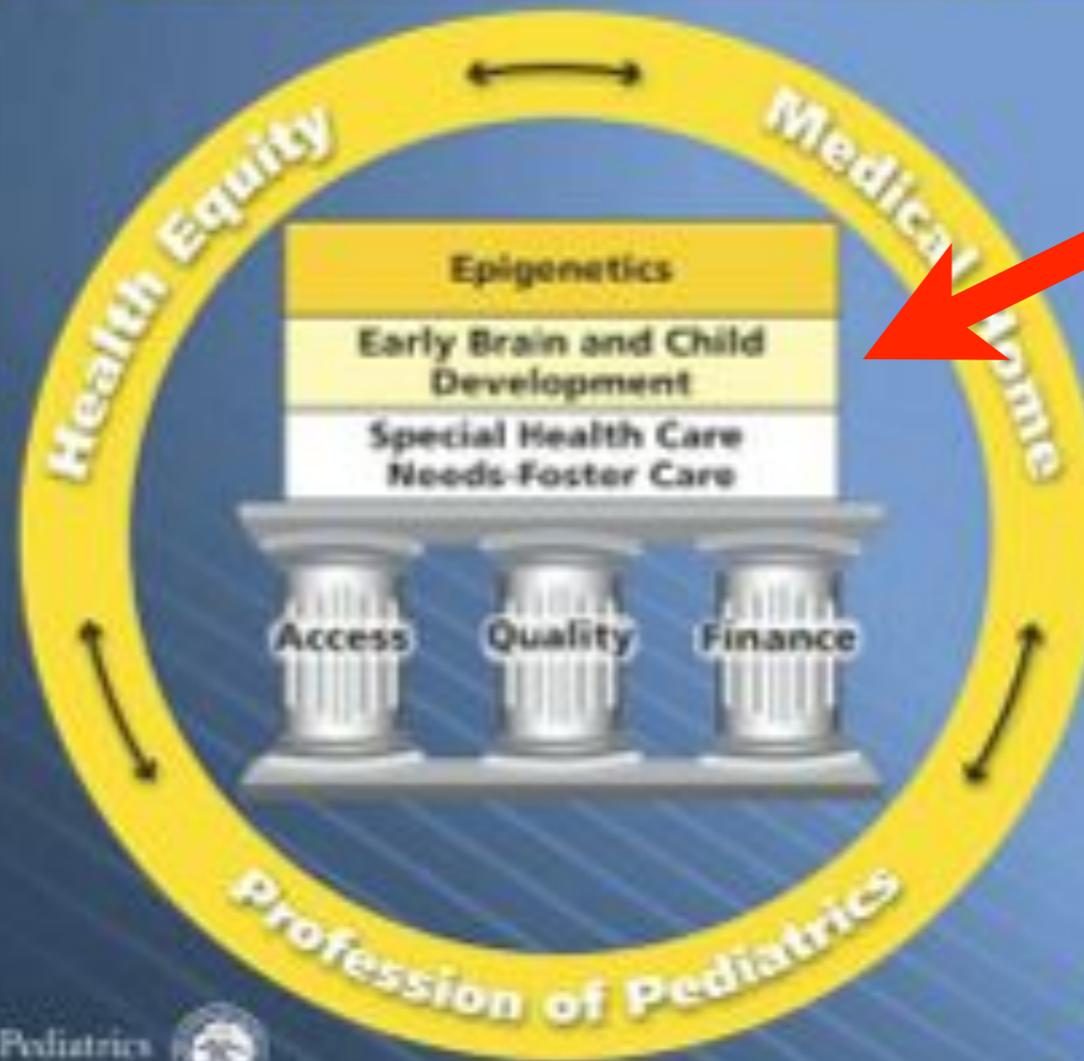
“Building Brains, Forging Futures”
“It’s all about Nurturing Relationships”

Urgency

The Essential Role of “Us”

AAP Agenda for Children 2011-2012

DEDICATED TO THE HEALTH OF ALL CHILDREN™



American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN™



© 2011 American Academy of Pediatrics

- Planning
- Implementing
- Integrating

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AMERICAN ACADEMY OF PEDIATRICS



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- խրթնացում
- իրականացում
- ընդգրկում

The background of the slide is a faded, semi-transparent version of Michelangelo's famous fresco, "The Creation of Adam". It depicts Adam on the left, reclining on a rocky surface, and God on the right, reclining on a cloud. The two figures are positioned so that their hands are just inches apart, creating a sense of tension and divine spark. The text "EARLY BRAIN AND CHILD DEVELOPMENT" is overlaid in large, white, bold, sans-serif capital letters across the center of the image.

EARLY BRAIN AND CHILD DEVELOPMENT

from *The Science of Early Childhood Development*
National Scientific Council on the Developing Child, 2007

...mind is its own place
...of Hell; a 7
~ John Milton: "Para

EARLY BRAIN AND CHILD DEVELOPMENT

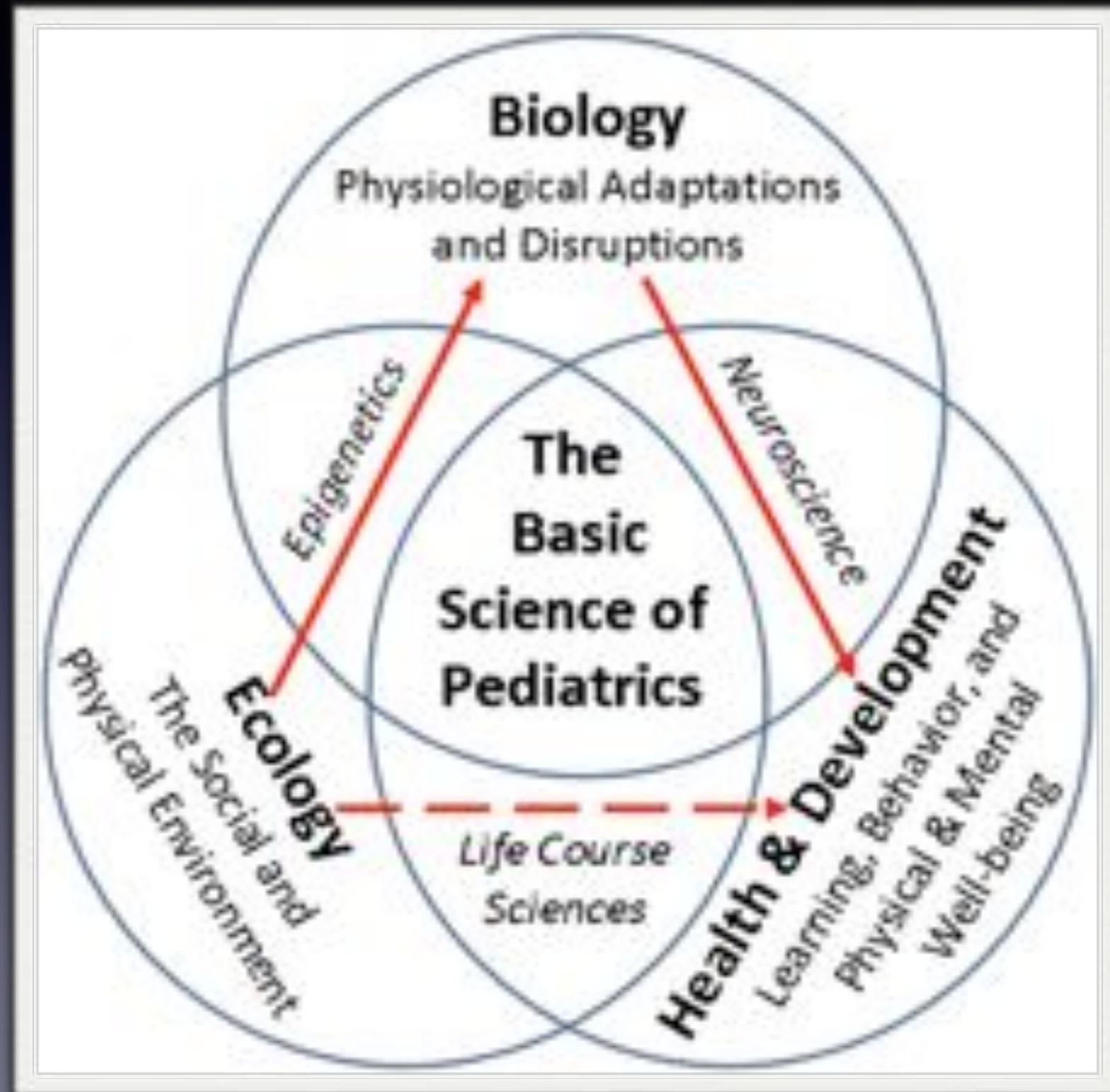
1

Child development is a foundation for **community** development and **economic** development, as capable children become the foundation of a prosperous and sustainable society.

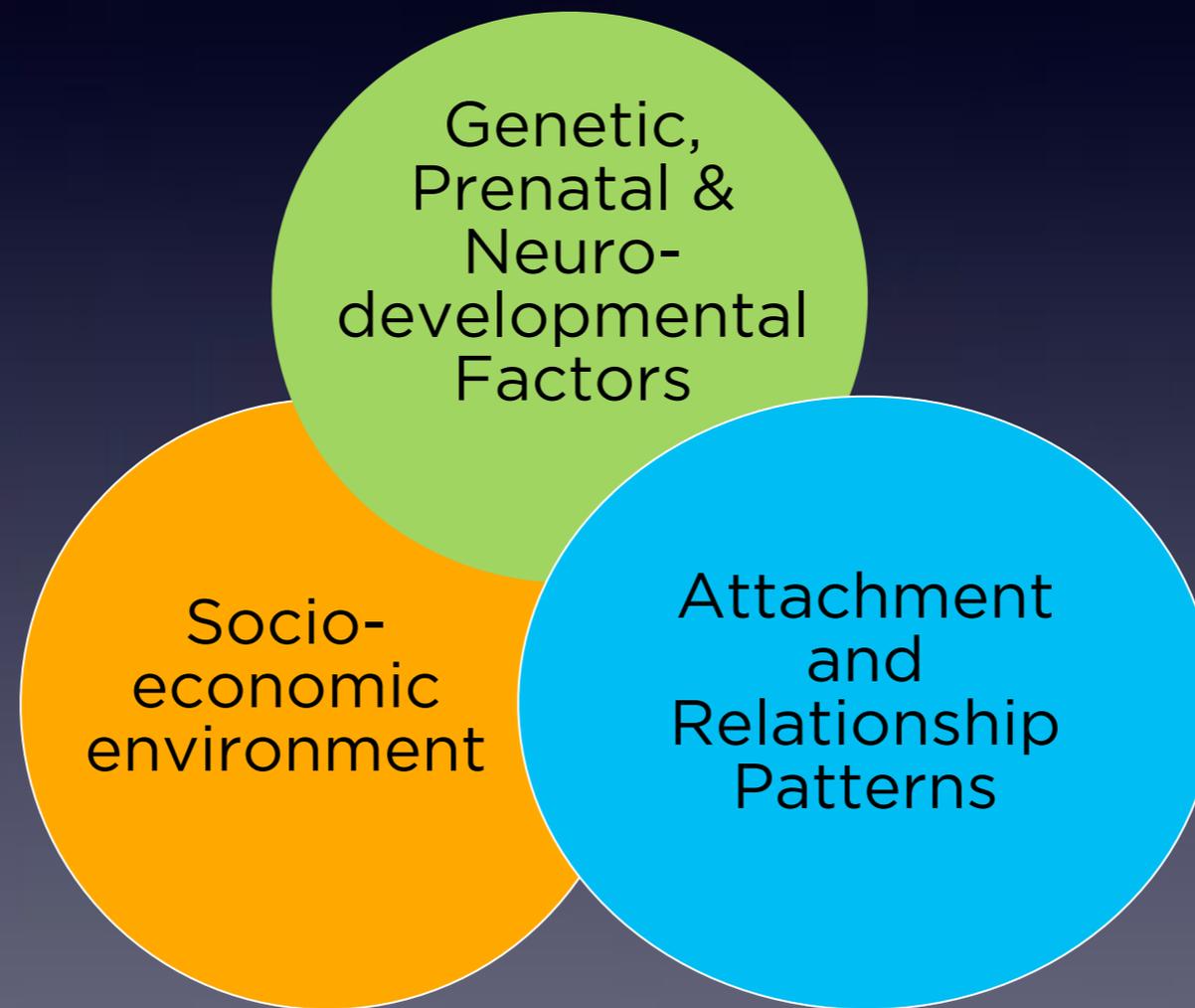
2

Brains are built **over time**.

Eco-biodevelopmental Model



The **3-legged stool** for developmental and health trajectories



EARLY BRAIN AND CHILD DEVELOPMENT

3

The interactive influences of **genes** and **experience** literally shape the architecture of the developing brain and the active ingredient is the “**serve and return**” nature of children’s engagement in **relationships** with their parents and other caregivers in their family or community.



The Face to Face Paradigm Edward Z Tronick



EARLY BRAIN AND CHILD DEVELOPMENT

4

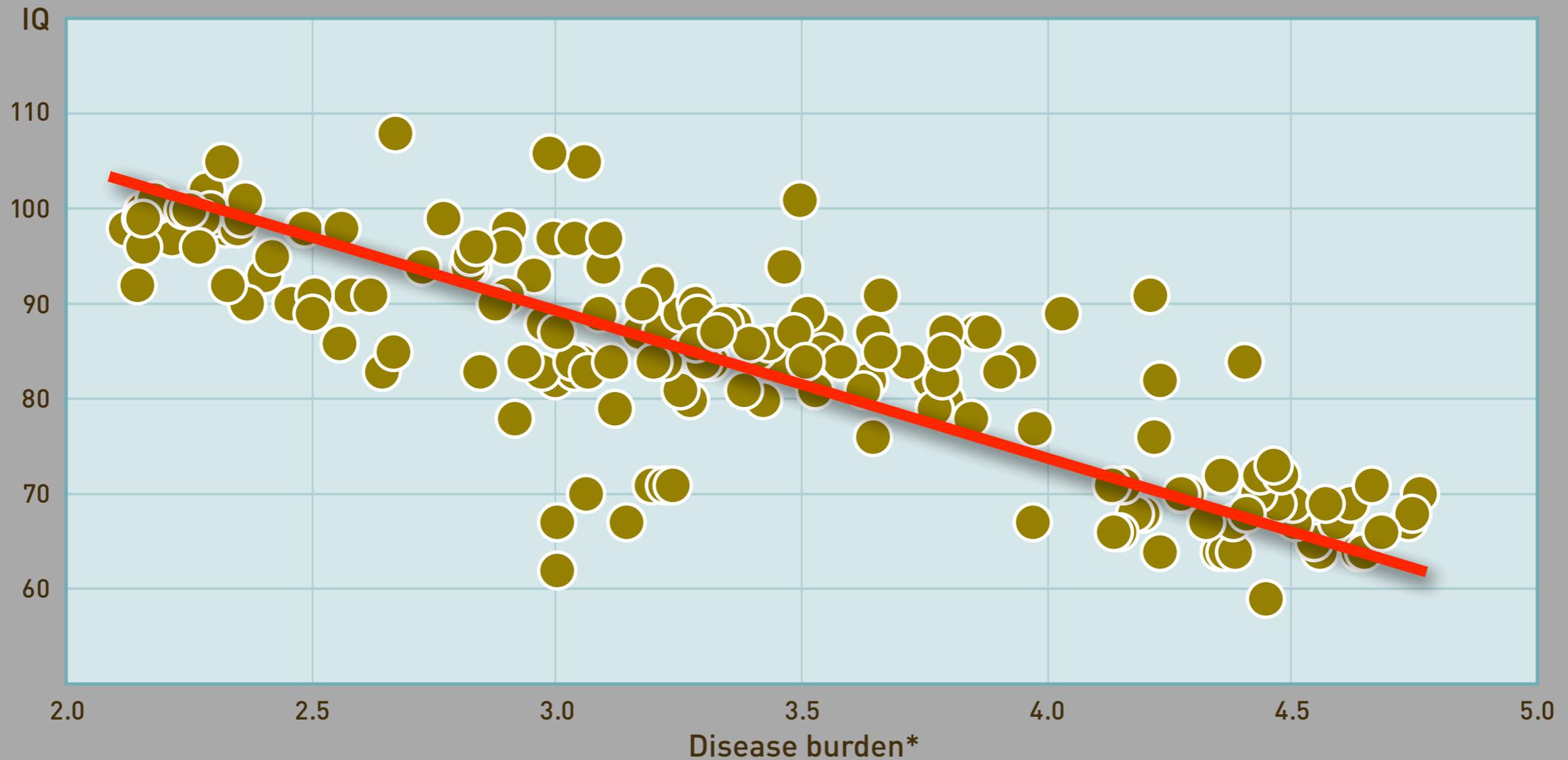
Both brain architecture and developing abilities are built “from the bottom up” with simple circuits and skills providing the **scaffolding** for more advanced circuits and skills over time.

EARLY BRAIN AND CHILD DEVELOPMENT

5

Toxic stress in early childhood is associated with **persistent** effects on the nervous system and stress hormone systems that can **damage developing brain architecture** and lead to lifelong problems in learning, behavior and both physical and mental health.

Correlation between IQ and disease burden in 184 selected countries



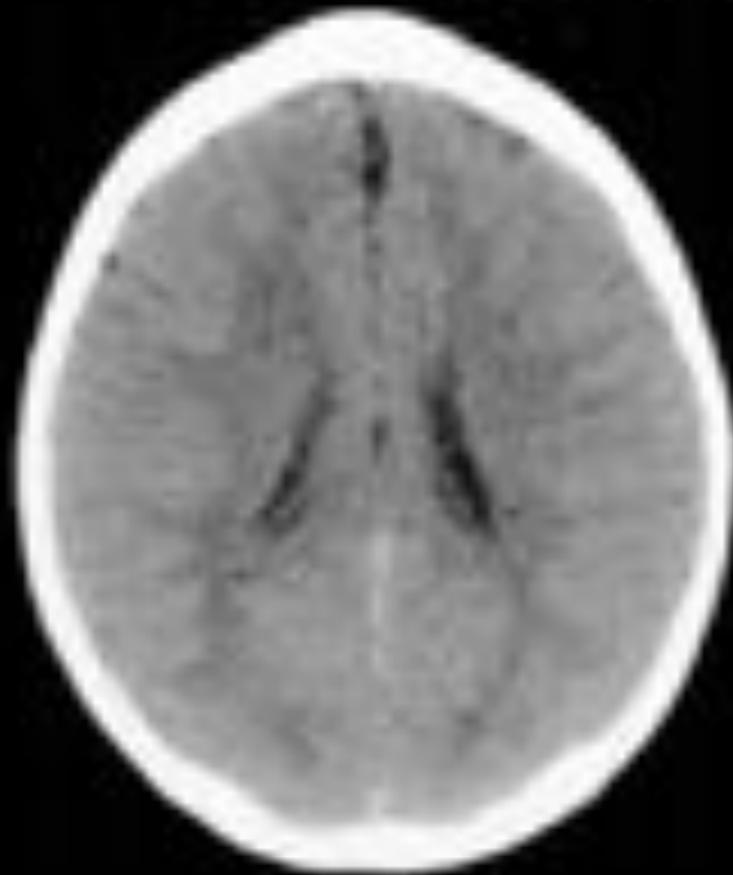
*The logarithm of disability-adjusted life years (DALYs) lost to 28 representative and important human infectious diseases.

Source: Christopher Eppig,
University of New Mexico

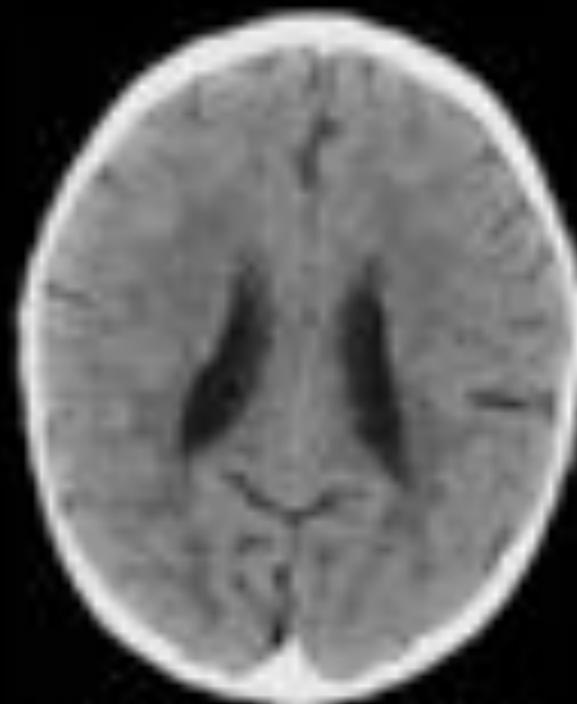
*The logarithm of disability-adjusted life years (DALYs) lost to 28 representative and important human infectious diseases.

UNIVERSITY OF NEW MEXICO
SOURCE: CHRISTOPHER EPPIG

3 Year Old Children



Normal



Extreme Neglect

Normal

Extreme Neglect

THE STRESS RESPONSE:

increases in cortisol and epinephrine

Three Levels of Stress Response

Social-emotional buffering
is the **primary factor**
distinguishing level of stress.

Andy Garner, MD

Adversity & Toxic Stress

Toxic stress is the
key intergenerational transmitter
of social and health disparities

POSITIVE STRESS

Child sees someone approaching
with their immunization syringe

Parent leaving on the first day of preschool

TOLERABLE STRESS

Death of a family member

Serious illness

Natural disaster

What if it's worse?
What if there's no supportive relationships?

Child abuse
Parental substance abuse
Homelessness

TOXIC STRESS

CHILDHOOD STRESS

**Hyper-responsive
stress response**

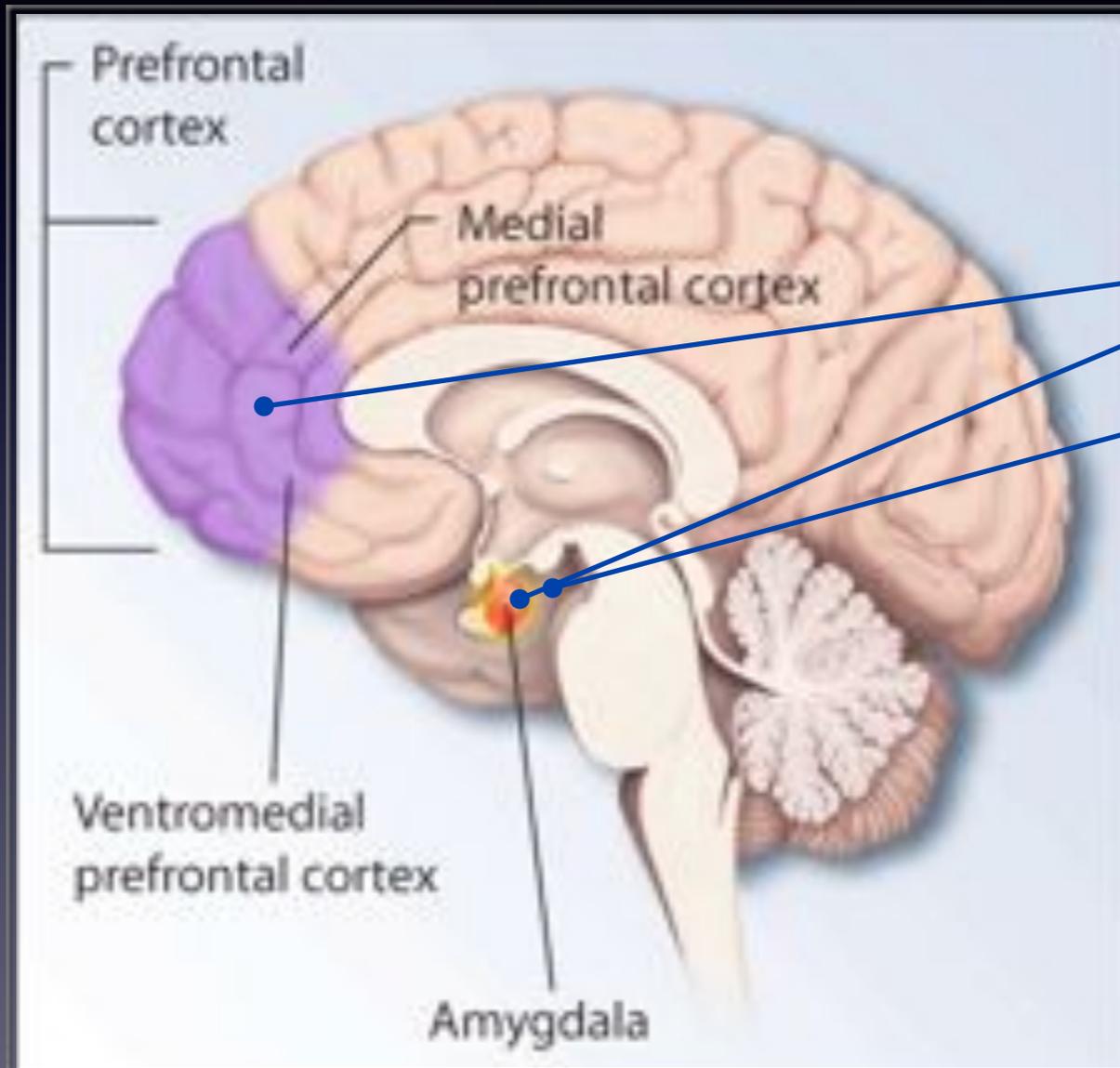
**decreased
calm/coping**

Chronic “fight or flight”

**increased
cortisol / norepinephrine**

**Changes in Brain
Architecture**

What happens?



Prefrontal cortex:
usually best link to the amygdala
Executive function
Planning

Hippocampus:
major role in memory and mood
Toxic stress/early adversity:
Delayed cognitive maturation
smaller hippocampal volumes,
poor memory, labile moods.

Toxic stress, early adversity:
Lower neuronal density,
decreased function

ADHD **or** **Adversity?**



Impulsive

Can't plan ahead

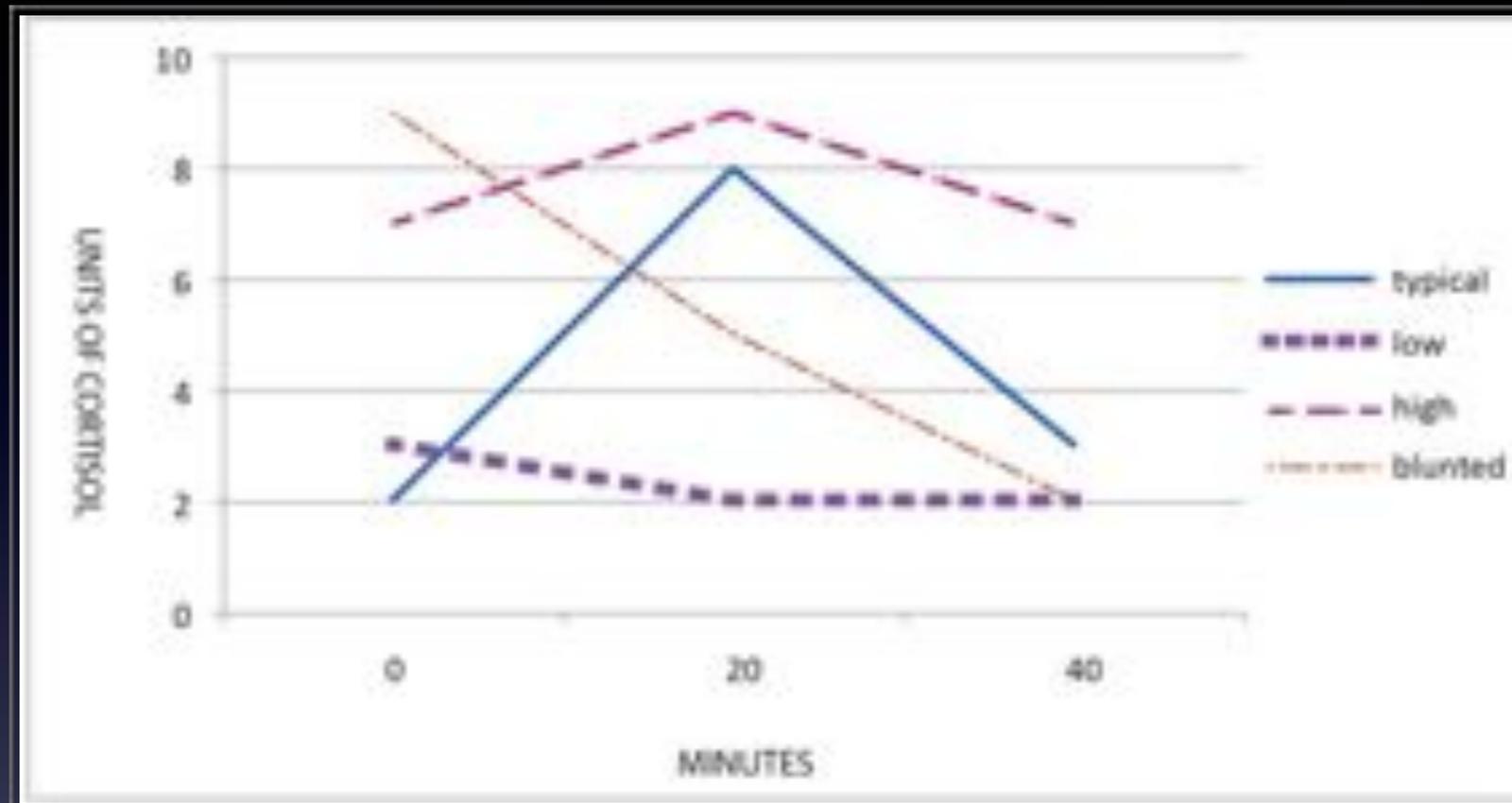
Anxious

Can't delay gratification

Labile mood

Poor memory

POVERTY IS NEUROTOXIC



Children with “typical” cortisol response had **higher** executive function, and were rated as having **more** self-control in the classroom.

Those with a flat (high or low) or blunted response had **low** levels of executive function and were rated as having **poor** self-regulation.

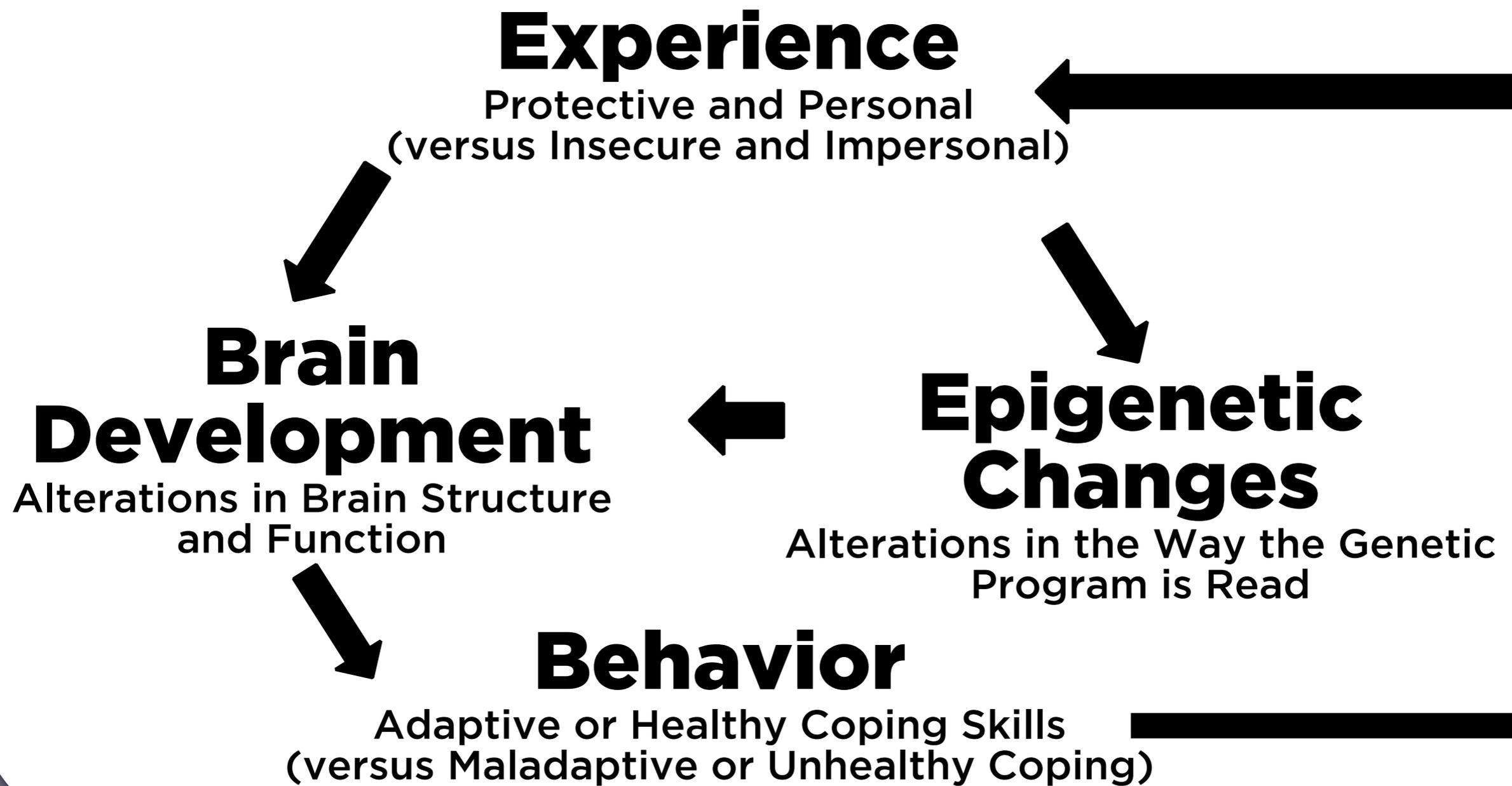
POVERTY IS NEUROTOXIC

Next, children in a large (1200) study whose mothers engaged in “scaffolding” during play found that the children had lower cortisol levels and were more attentive.

Those who were more authoritarian had higher cortisol levels and were found to be less attentive.

This was found at 7 months of age and again at 15 months.

They also found that the more **impoverished** the family, the **less likely** they were to engage in scaffolding.



EPIGENETICS

“Which genes are turned on or off,
when and where.”

Structural Genome = ~23,000 inherited genes

Epigenome = built over time, determines what
genes are expressed

Structural Genome : Epigenome
Hardware : Operating System

Twins have same genome; different epigenomes

EPIGENETICS

Switches: nutritional status, toxin exposure, environmental interactions.

Lasting marks: Higher maternal stress in a child's **first year** of life correlated with methylation levels on 139 DNA sites in those same children...
in **adolescence**.

Fetal exposures can lead to epigenetic changes that can be **passed on** to future generations.

EPIGENETICS

Repetitive, highly stressful experiences damage creation of **adversity response** systems.

Positive experiences, rich learning and supportive relationships **activate genetic potential** for countering adversity.

THE ADVERSE CHILDHOOD EXPERIENCES STUDY

The Most Important Study
You've (Probably) Never Heard Of.

In 1985, Dr Vincent Felitti noticed many patients in his obesity treatment programs had prior history of abuse or trauma

The CDC worked with Kaiser Permanente and looked retrospectively at over 17,000 patients.

This was the first study to simultaneously assess childhood exposure to multiple types of abuse, neglect, domestic violence and serious household dysfunction.

THE ADVERSE CHILDHOOD EXPERIENCES STUDY

Study participants were middle-class Americans from San Diego, 80% white, 74% attended college, average age of 57, split evenly between men and women.

Not exactly an impoverished, “at-risk” population.

THE ADVERSE CHILDHOOD EXPERIENCES STUDY

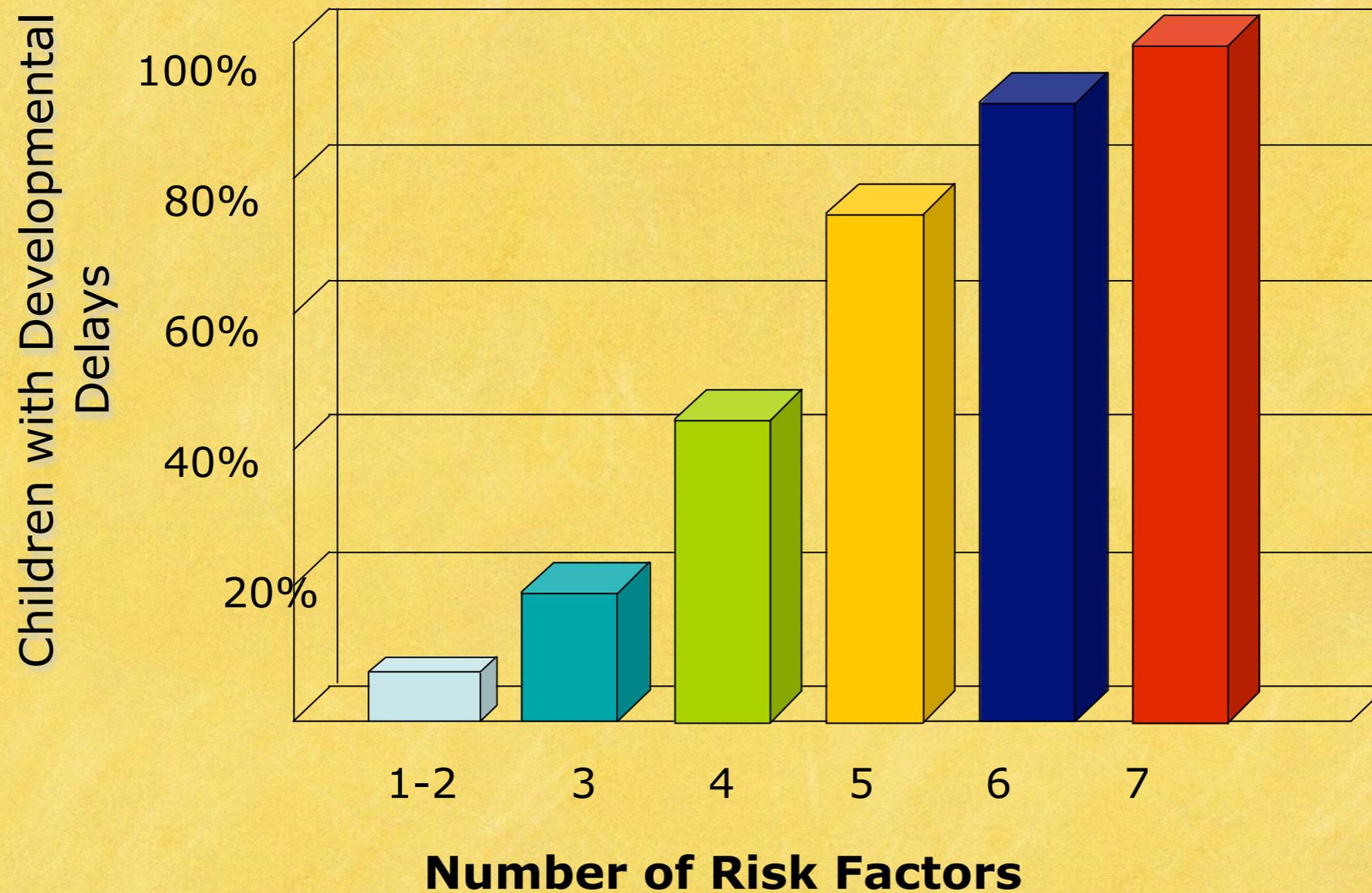
Emotional abuse	10%
Physical abuse	26%
Sexual abuse	21%
Emotional neglect	15%
Physical neglect	10%
Mother treated violently	13%
Household substance abuse	28%
Household mental illness	20%
Parental separation or divorce	24%
Incarcerated household member	6%



ACE Score (one point for each category listed)	Prevalence in study
0	33%
1	26%
2	16%
3	10%
4	6%
5	5%
6	6%

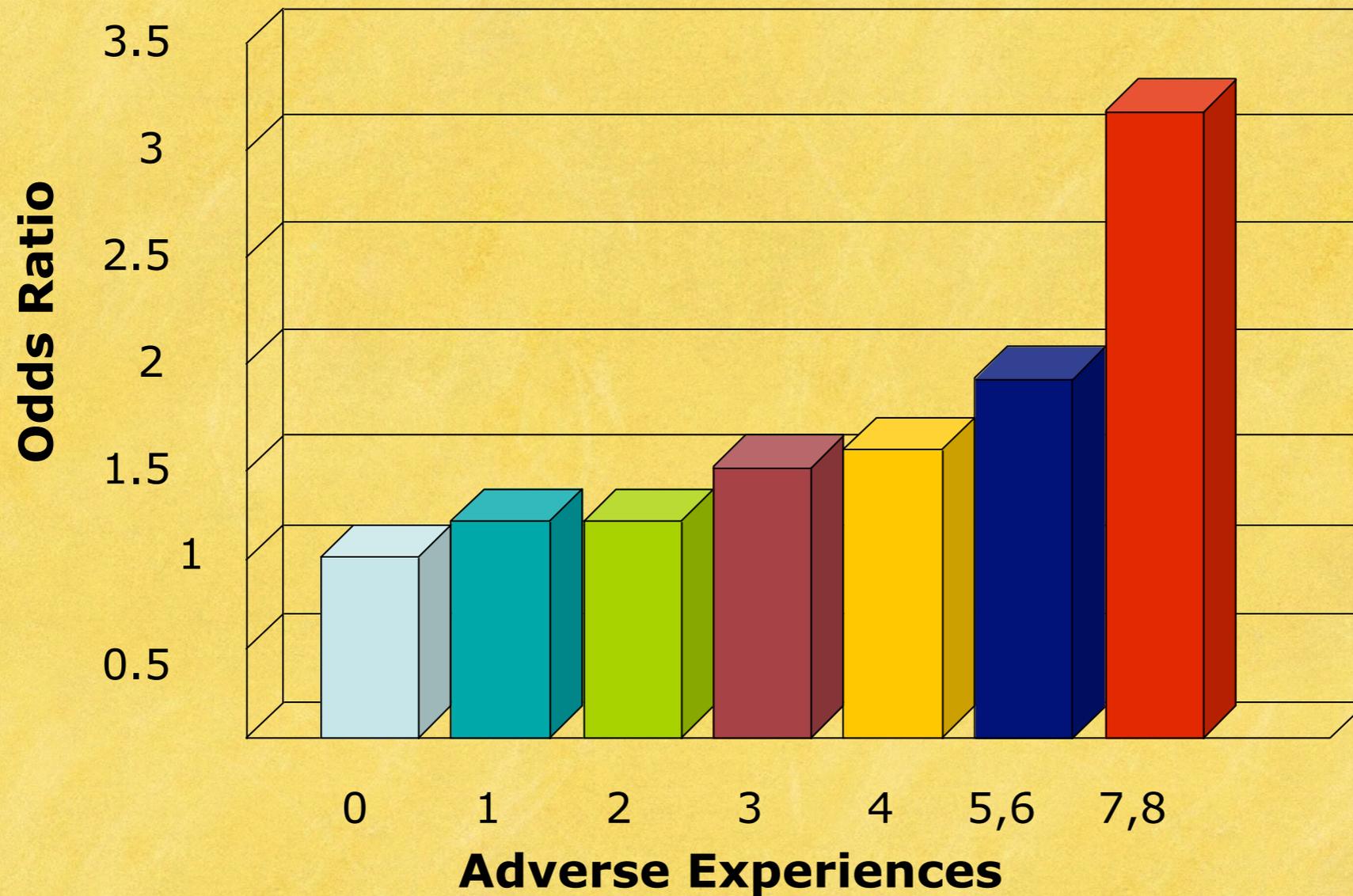
Not only are they unexpectedly common...
...their effects are **cumulative**.

Significant Adversity Impairs Development in the First Three Years



Source: Barth, et al. (2008) via Center on the Developing Child at Harvard University

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



Source: Dong, et al. (2004) via Center on the Developing Child at Harvard University

SMOKING & COPD



Regular Smoking by Age 14

COPD

18.00

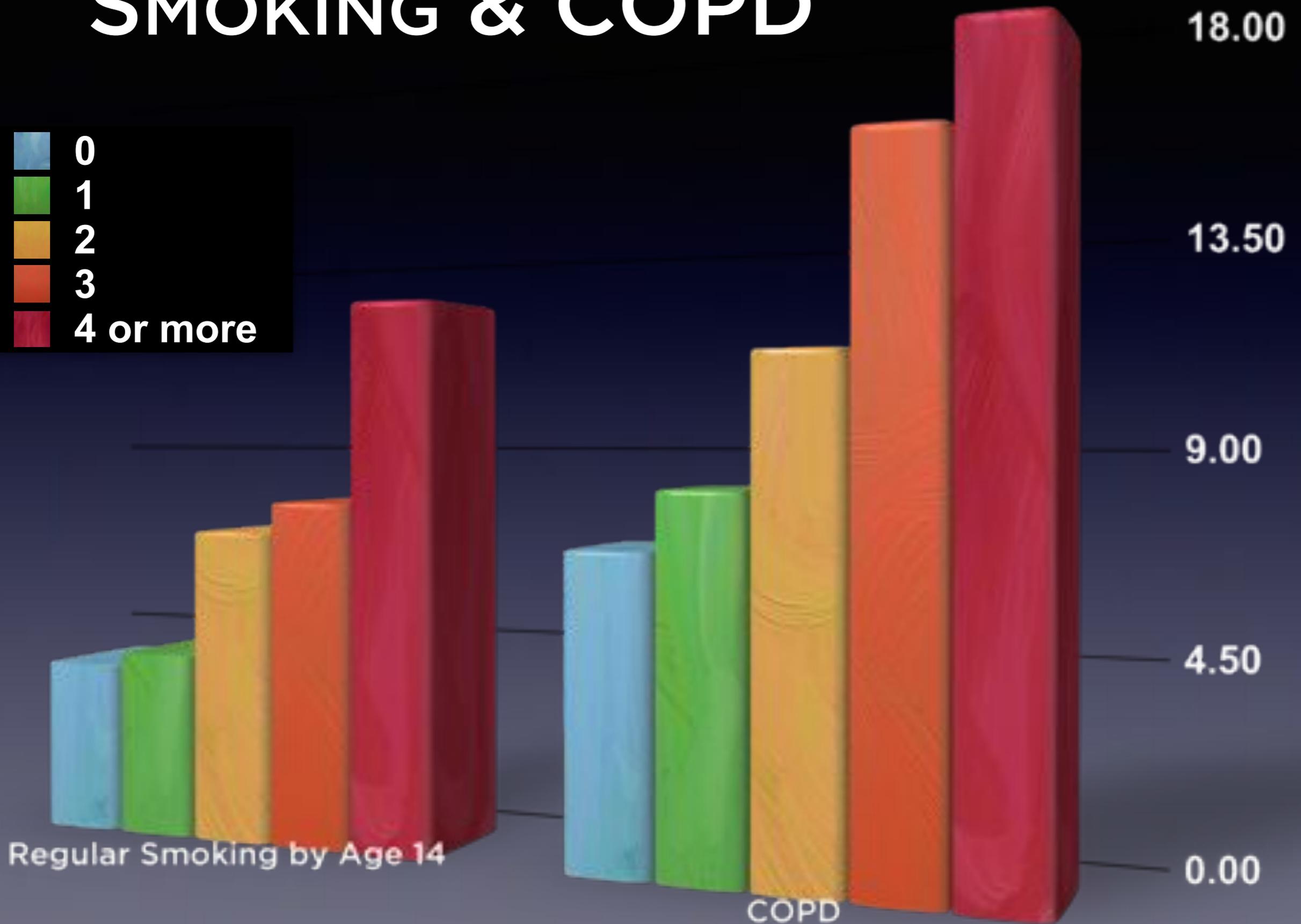
13.50

9.00

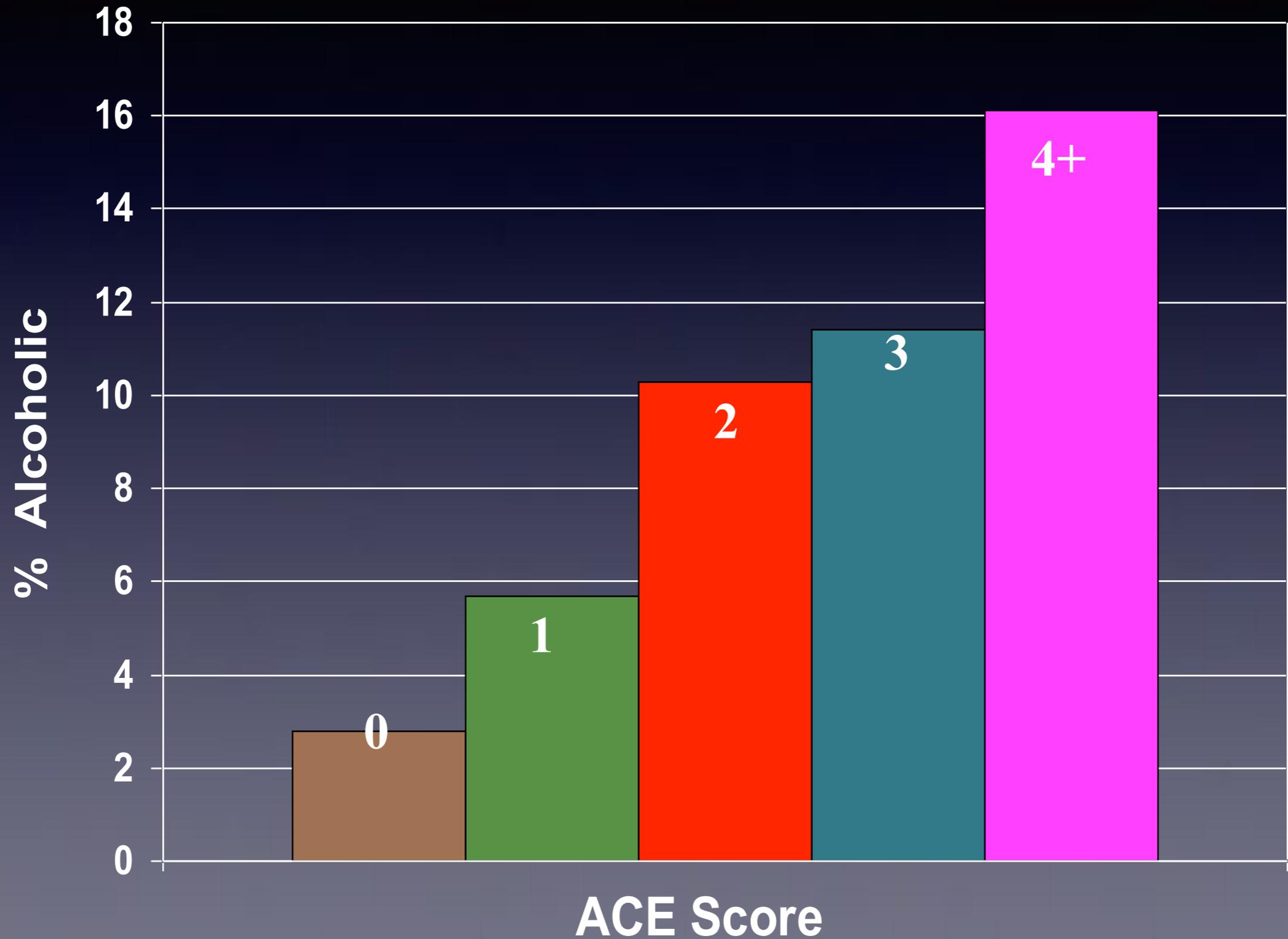
4.50

0.00

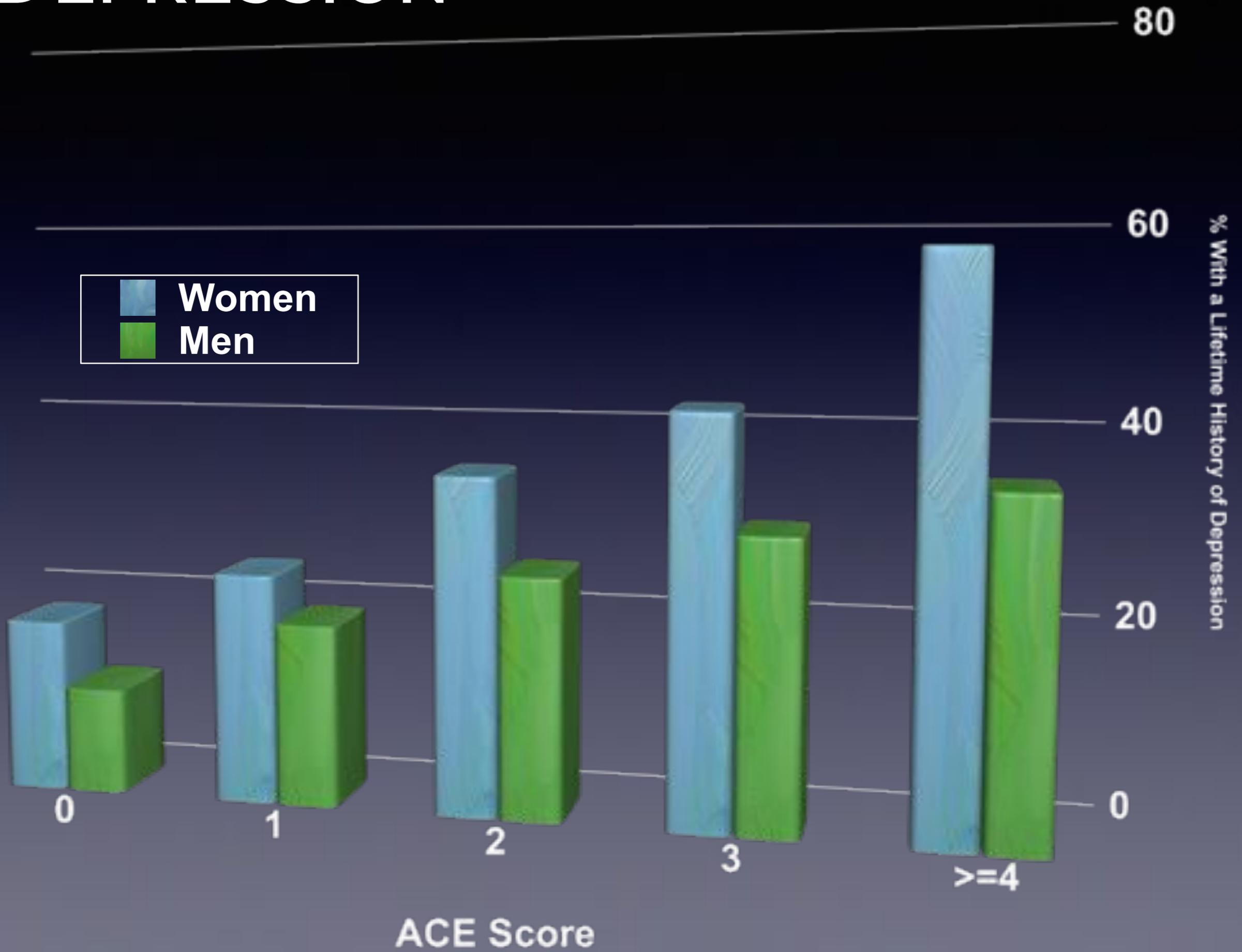
Adverse Childhood Experiences Score



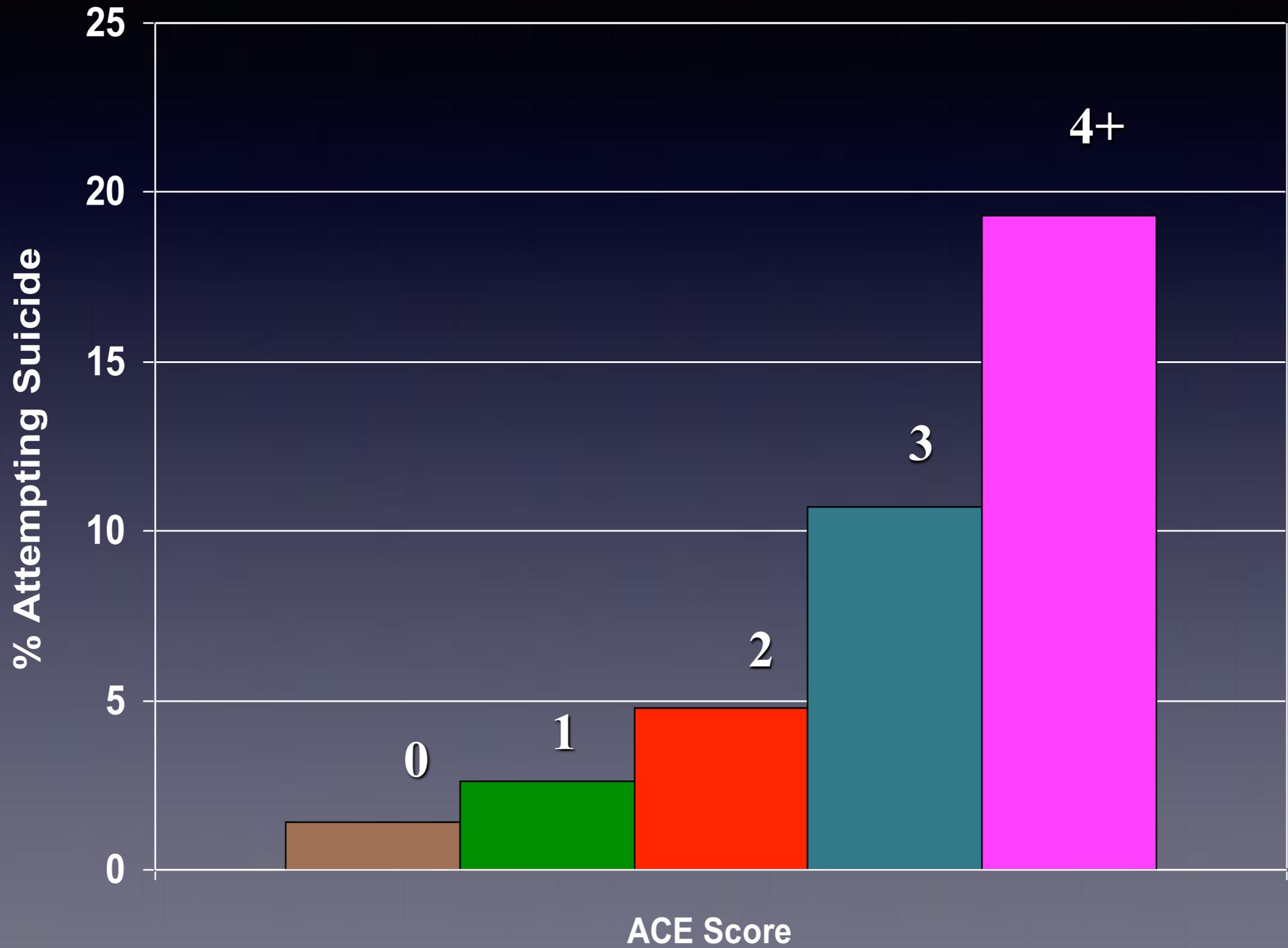
Childhood Experiences vs. Adult Alcoholism



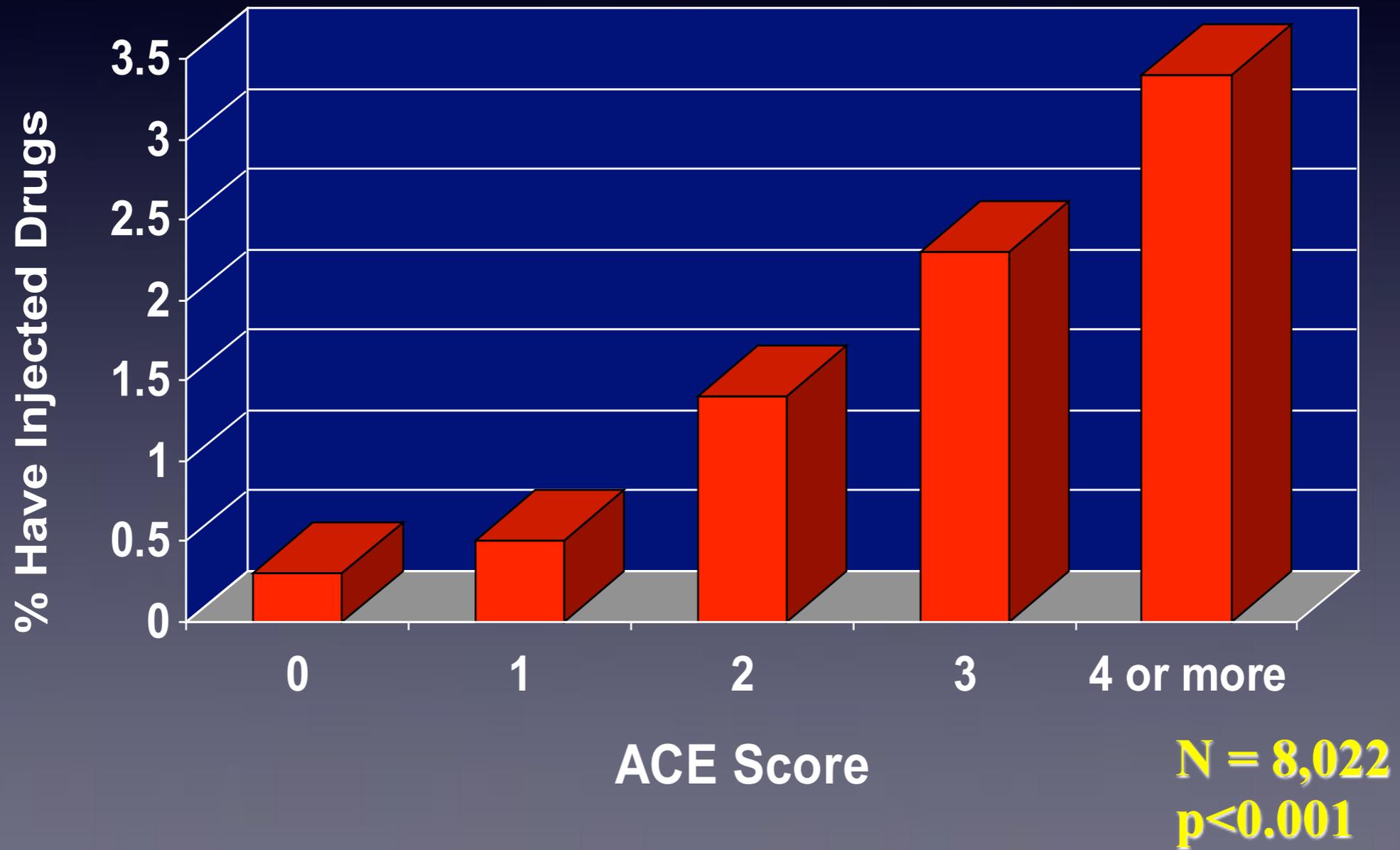
DEPRESSION



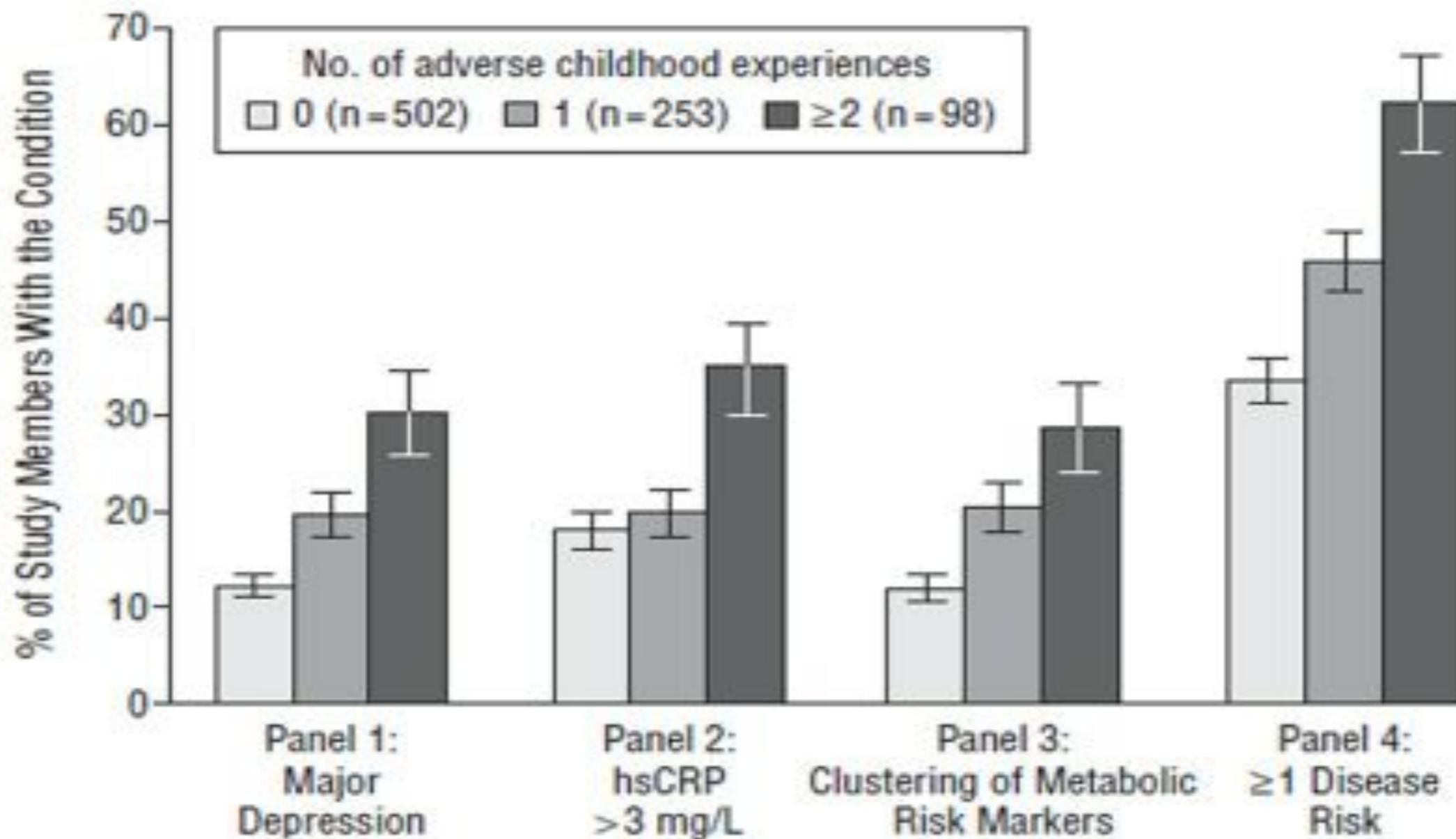
SUICIDE ATTEMPTS

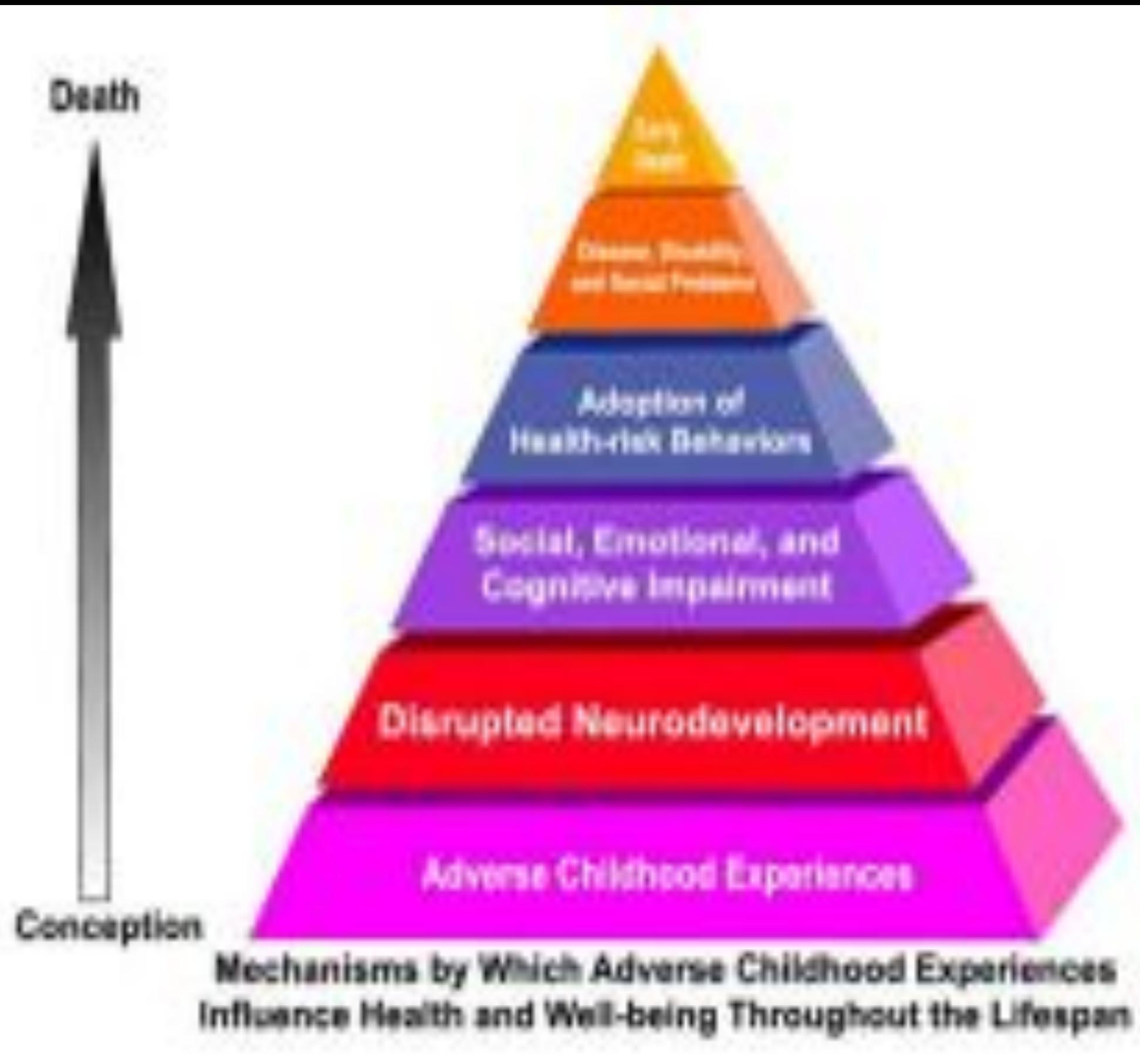


IV DRUG USE



EVEN SMALL INCREASES IN ACEs...





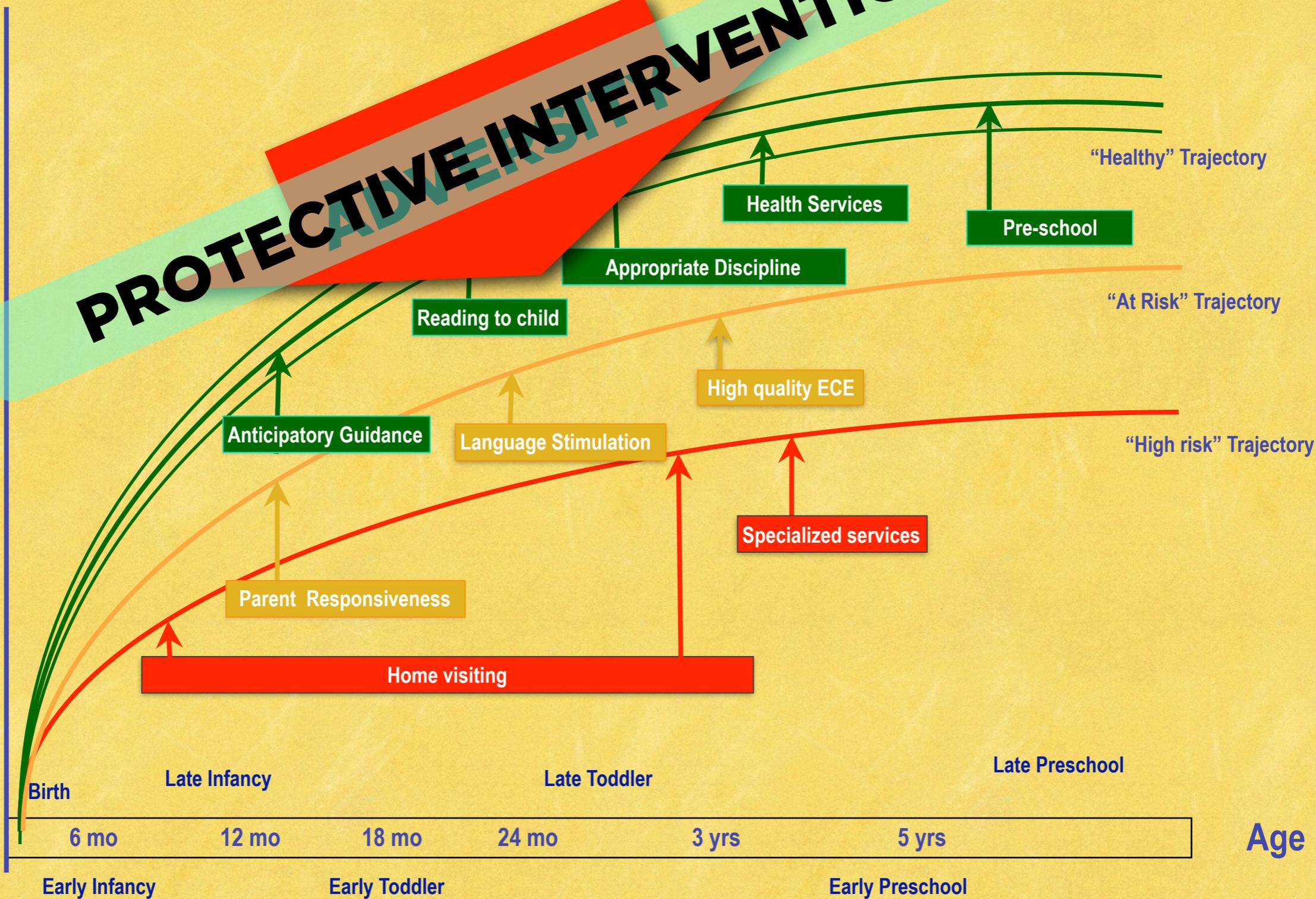
EARLY BRAIN AND CHILD DEVELOPMENT

6

Creating the right conditions for early childhood development is likely to be **more effective and less costly** than addressing problems at a later age.

PROTECTIVE INTERVENTIONS

Developmental Progress



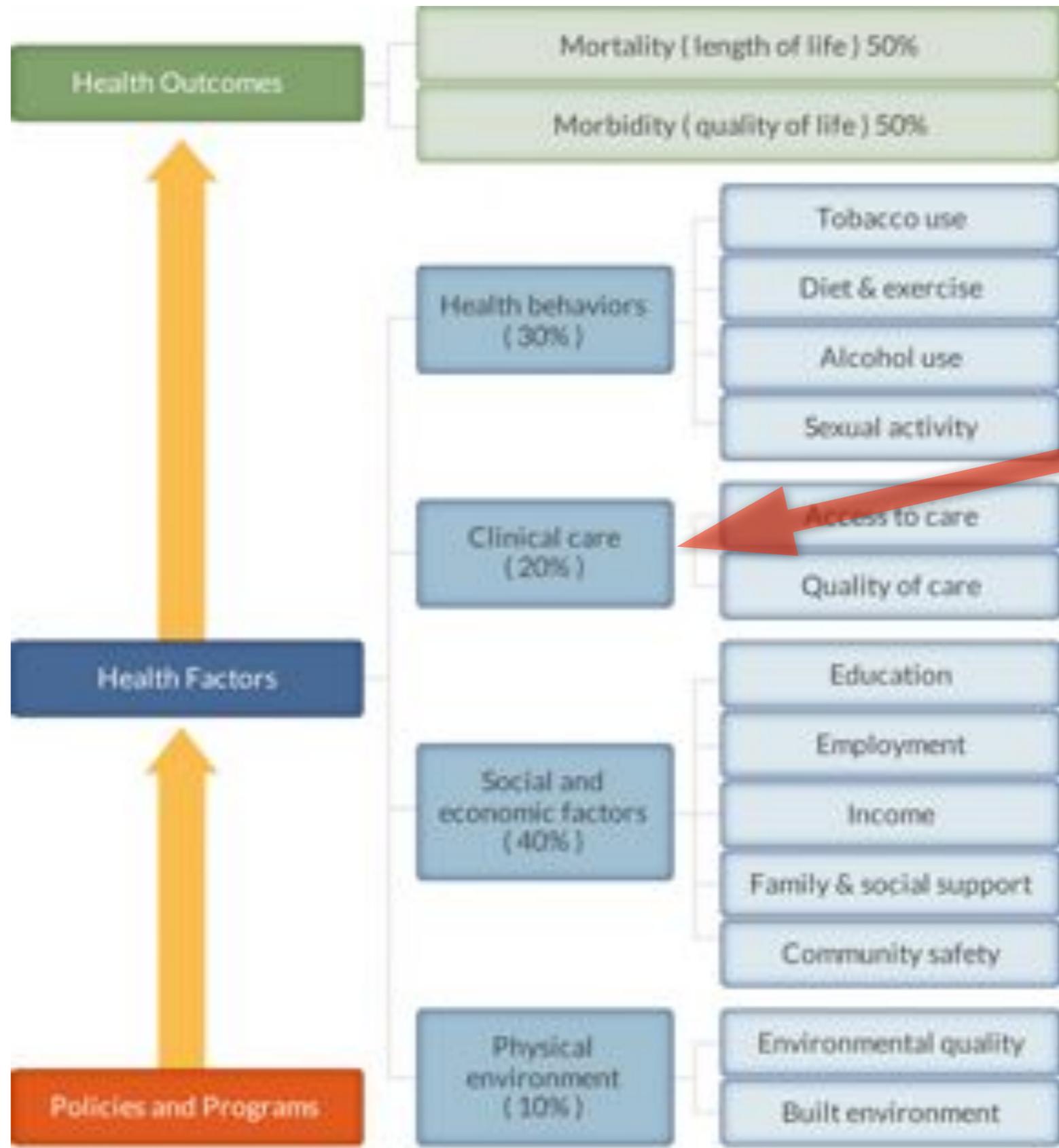
Three Promising Domains for EBCD Innovation

Jack Shonkoff, MD

Reduce emotional and behavioral barriers to learning.

Enhance the healthy development of children by transforming the lives of their parents.

Reconceptualize the health dimension of early childhood policy and practice.



The Brave New World of Pediatrics:

DEVELOPMENTAL ASSURANCE

**Building a healthy mind, brain and body
for social purpose.**

NONE OF THIS IS TO SAY...

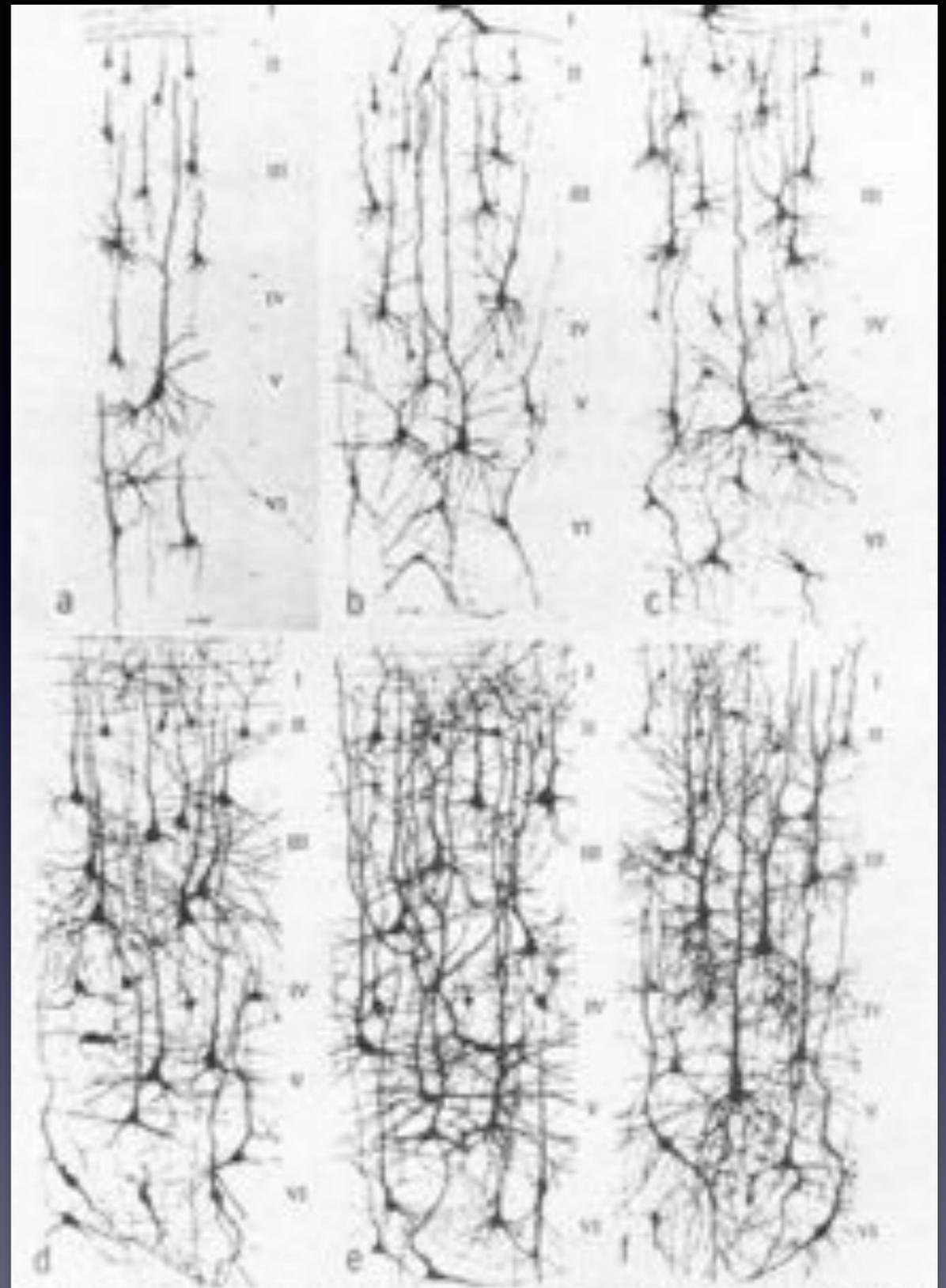
...that children should be engaged constantly

...that “bad things” are necessarily a long-term negative

...that children should not be appropriately disciplined

FIVE NUMBERS TO REMEMBER

700 New Neural Connections per Second



Postnatal development of human cerebral cortex around Broca's Area (FCBm); camera lucida drawings from Golgi-Cox preparations. a: newborn; b: 1 month; c: 3 months; d: 6 months; e: 15 months; f: 24 months.

(from Conel, 1939-1959)

(FROM CONEL, 1939-1959)

PLASTICITY

Synaptic

Variation in
Strength of
connections

“A whisper
to a shout”

Lifelong

Cellular

Variation in
Number of
Connections

“One shout
to a stadium
shouting”

Declining by
age 5!

Diminishing Cellular Plasticity

Limits Remediation

18 Months:

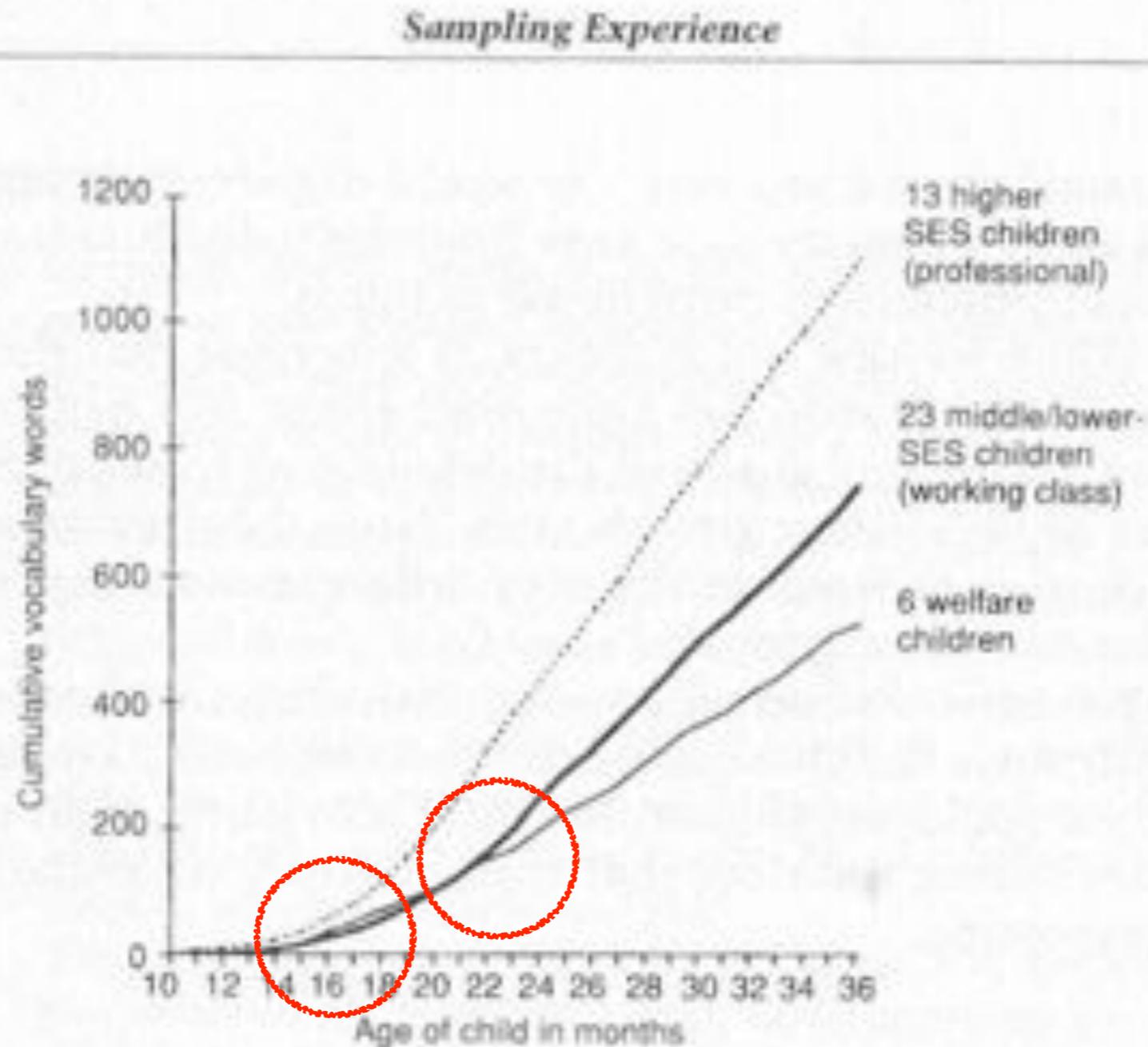


Figure 2. The widening gap we saw in the vocabulary growth of children from professional, working-class, and welfare families across their first 3 years of life. (See Appendix B for a detailed explanation of this figure.)

90-100%

Chance of
Developmental Delays
when Children Experience
6-7 Risk Factors

3:1 Odds

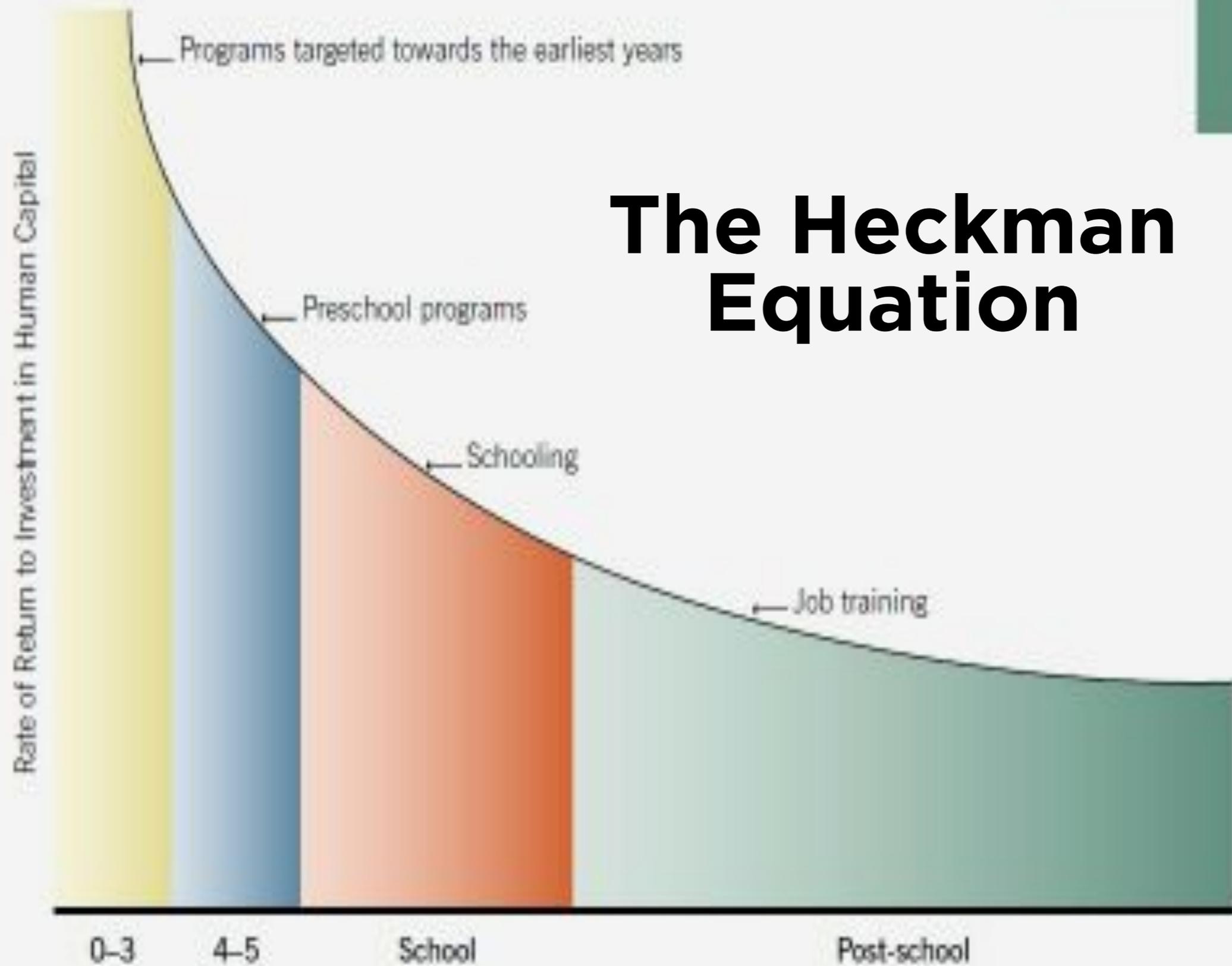
**of Adult Heart Disease
after 7-8 Adverse
Childhood Experiences**



\$4-\$9

**in Returns for
Every Dollar Invested
in Early Childhood Programs**

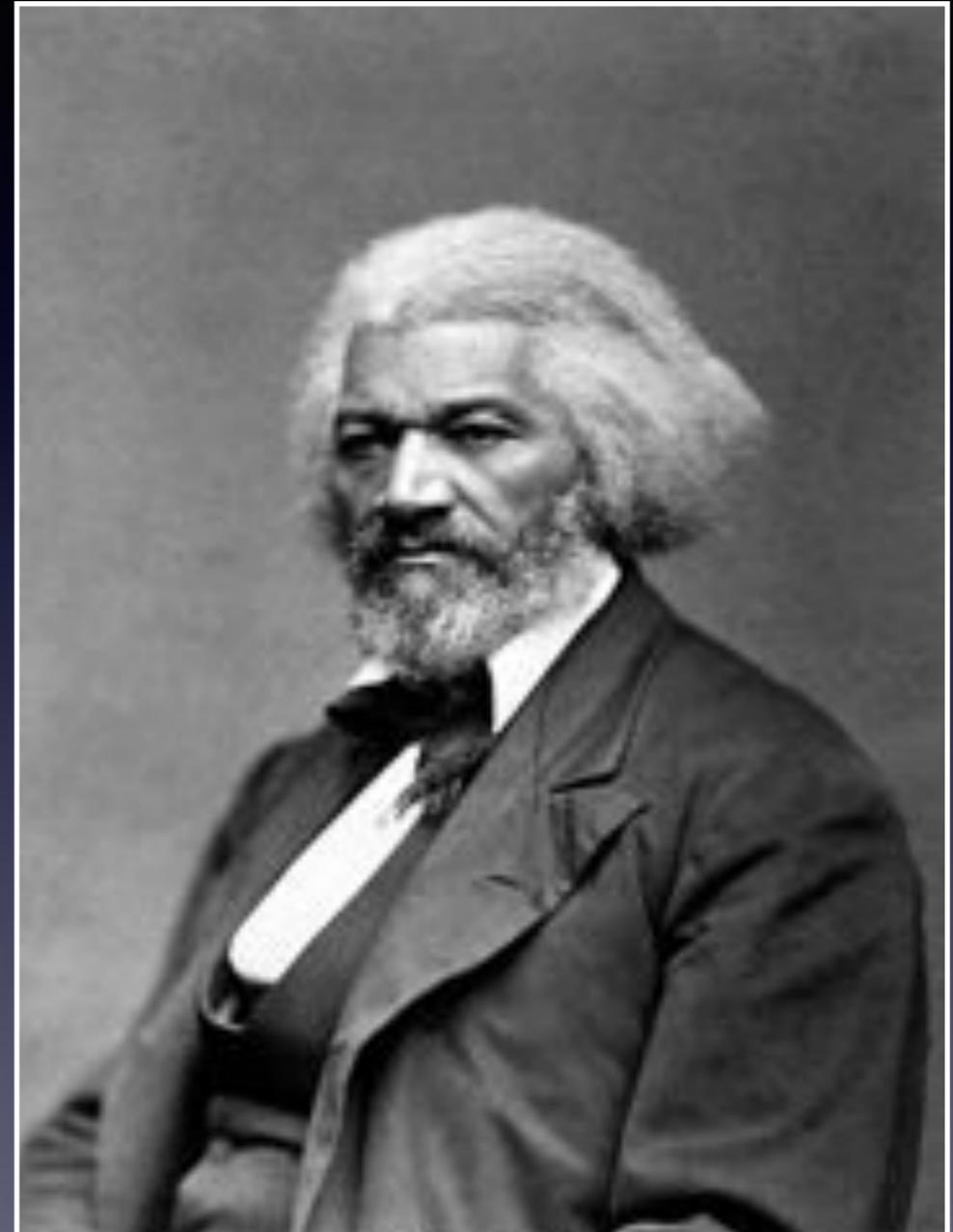
Returns Per Annum to a Unit Dollar Invested



The Heckman Equation

**“It is easier to build
strong children than to
repair broken men.”**

**— Frederick Douglass
(1817–1895)**

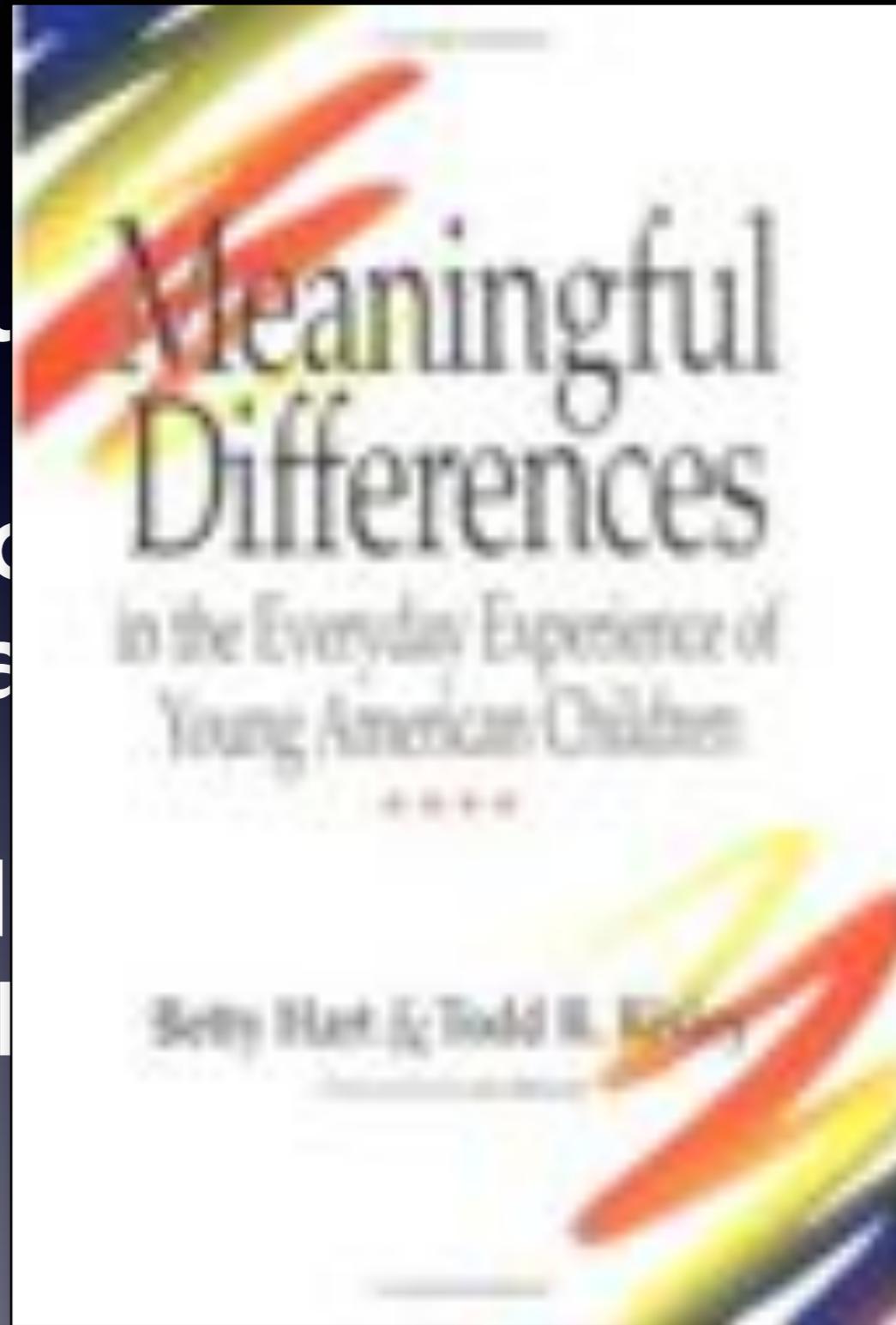


EARLY BRAIN AND CHILD DEVELOPMENT

The Result

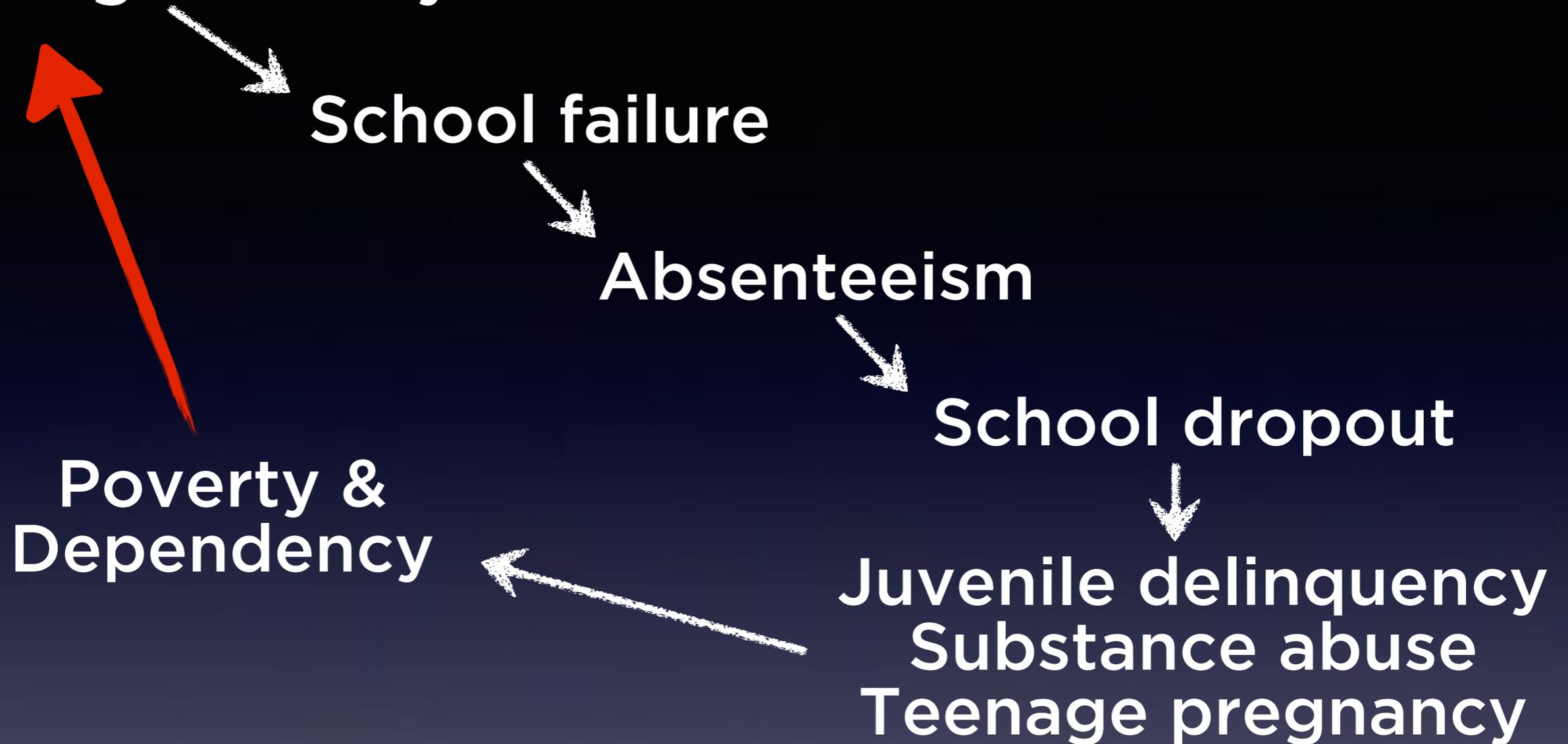
Meaningful
in the
Experience
America

Todd
Betty



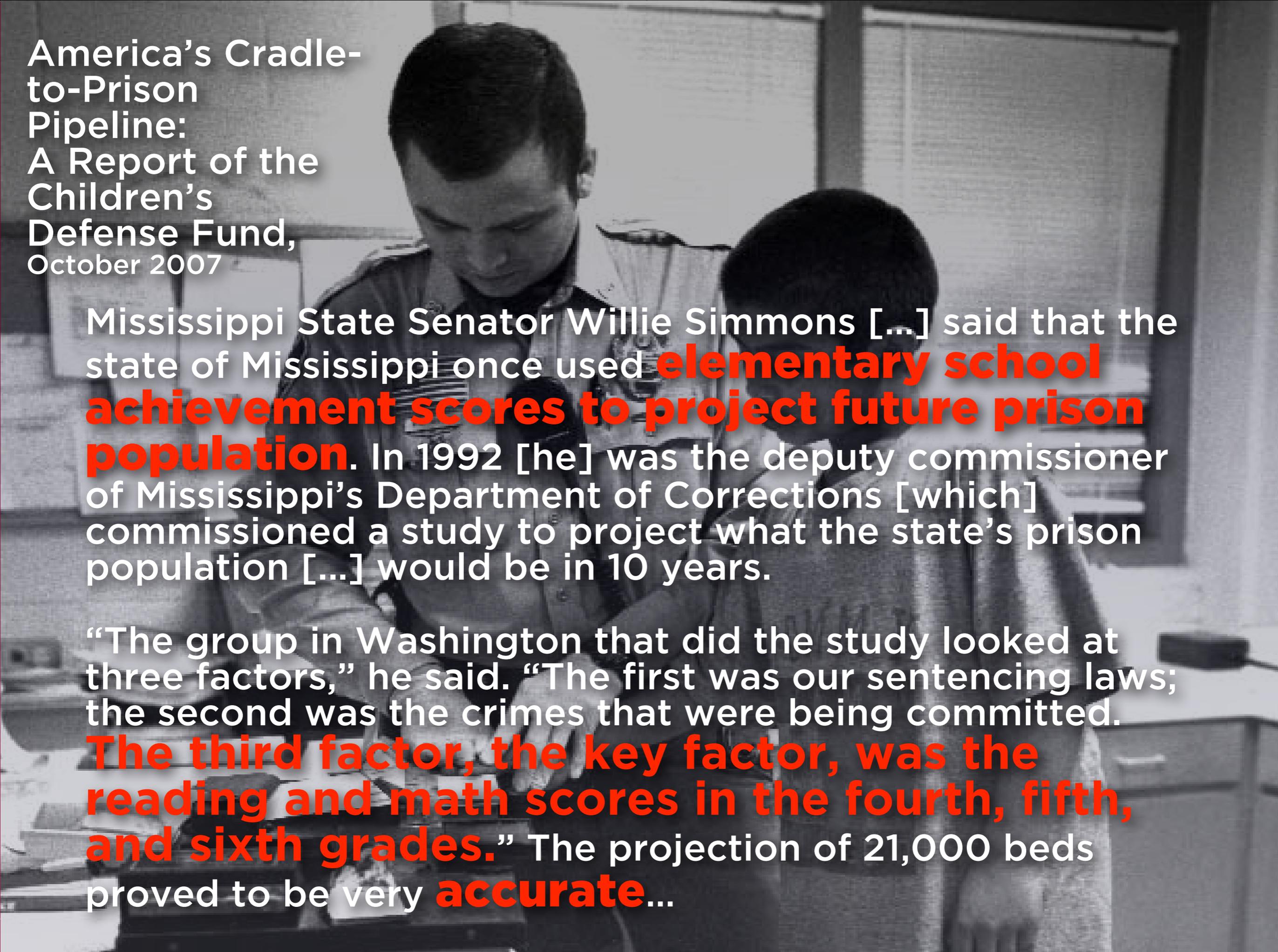
Children from low-income families hear as many as **30 million fewer** words than their more affluent peers before the age of 4.

Reading difficulty



School intervention is too late.

Innate interest in learning and curiosity can be irreparably damaged if reading is not enjoyable at an early age.



America's Cradle-
to-Prison
Pipeline:
A Report of the
Children's
Defense Fund,
October 2007

Mississippi State Senator Willie Simmons [...] said that the state of Mississippi once used **elementary school achievement scores to project future prison population**. In 1992 [he] was the deputy commissioner of Mississippi's Department of Corrections [which] commissioned a study to project what the state's prison population [...] would be in 10 years.

"The group in Washington that did the study looked at three factors," he said. "The first was our sentencing laws; the second was the crimes that were being committed. **The third factor, the key factor, was the reading and math scores in the fourth, fifth, and sixth grades.**" The projection of 21,000 beds proved to be very **accurate**...

MENTORING ACTIVITY

Split into **groups of 3** at your tables.

(If you work with or know the people at your table, quickly trade with another table so you are in a group with people you don't know.)

One person should speak for **1 minute** about a project, program, idea or challenge they face with respect to working on these issues.

The other two group members will offer constructive ideas, feedback and perspective (particularly based on what you've just heard) for **2 minutes**.

Repeat until each group member has presented.

Principles of ~~The~~ Solutions

We **need** solutions which...

Build capabilities

Build capacities

Are based in homes
& communities

Address root causes

Have long-term effects

Address prevention

Leverage the
first 1000 days

Are evidence-guided

Are scalable

Clinical Practice

PEDIATRICIANS are Encouraged to →		<u>E</u> xplore the child's environment		<u>B</u> uild relationships / reciprocity	
General Principles →		What pediatricians might briefly assess during well child care		How pediatricians might strengthen the parent-child bond or attachment	
Brief Description →		<u>C</u> ultivate development		<u>D</u> evelop parenting confidence	
Well Child Care Visit ↓		What pediatricians might teach parents about development		How pediatricians might support parents as they nurture their child's development	
Prenatal/Newborn/Week 1		Assess foundation: *Food and sleep *Safety *Social and emotional supports *Strengths and barriers to success		Assess for food (planned breastfeed?), safety, parental supports	
2-4 weeks		Assess overall parental well-being (maternal depression or substance use?)		Encourage responsive caregiving (responding promptly to cries of distress builds trust)	
2 months		Assess for family adjustment – parent self-care, return to work/childcare, time with partner, impact of new infant on siblings		Encourage smiling back at the baby's social smile (the beginning of the parent-child interaction, or "dyadic dance," that leads to cooing, feeding and speaking)	

Reach
Out
& Read®



where great stories begin™



Prescription for Reading



Name: _____

Date: _____ Age: _____

Rx *Read Books*

- Every night at bedtime
- For _____ minutes every day
- As needed

Refills: as requested at local public library

Signature: _____

Dipesh Navsaria, MPH, MSLIS, MD
Pediatrician & Occasional Children's Librarian

Families: Please visit reading.pediatrics.wisc.edu for more information on the joy of sharing books together and how it can make a huge difference in your child's life.

of sharing books together and how it can make a huge difference in your child's life.
Families: Please visit reading.pediatrics.wisc.edu for more information on the joy

Clinic? / Hospital? / Home Visiting

Resilience Training (7 Cs)

competence
confidence
connectedness
character
contribution
coping
control

Optimism

Emotional coaching

Positive Parenting

Poverty-aware approaches to care

Community

EBCD education

Investment in new strategies

Invest in community-based mentoring activities

after-school programs

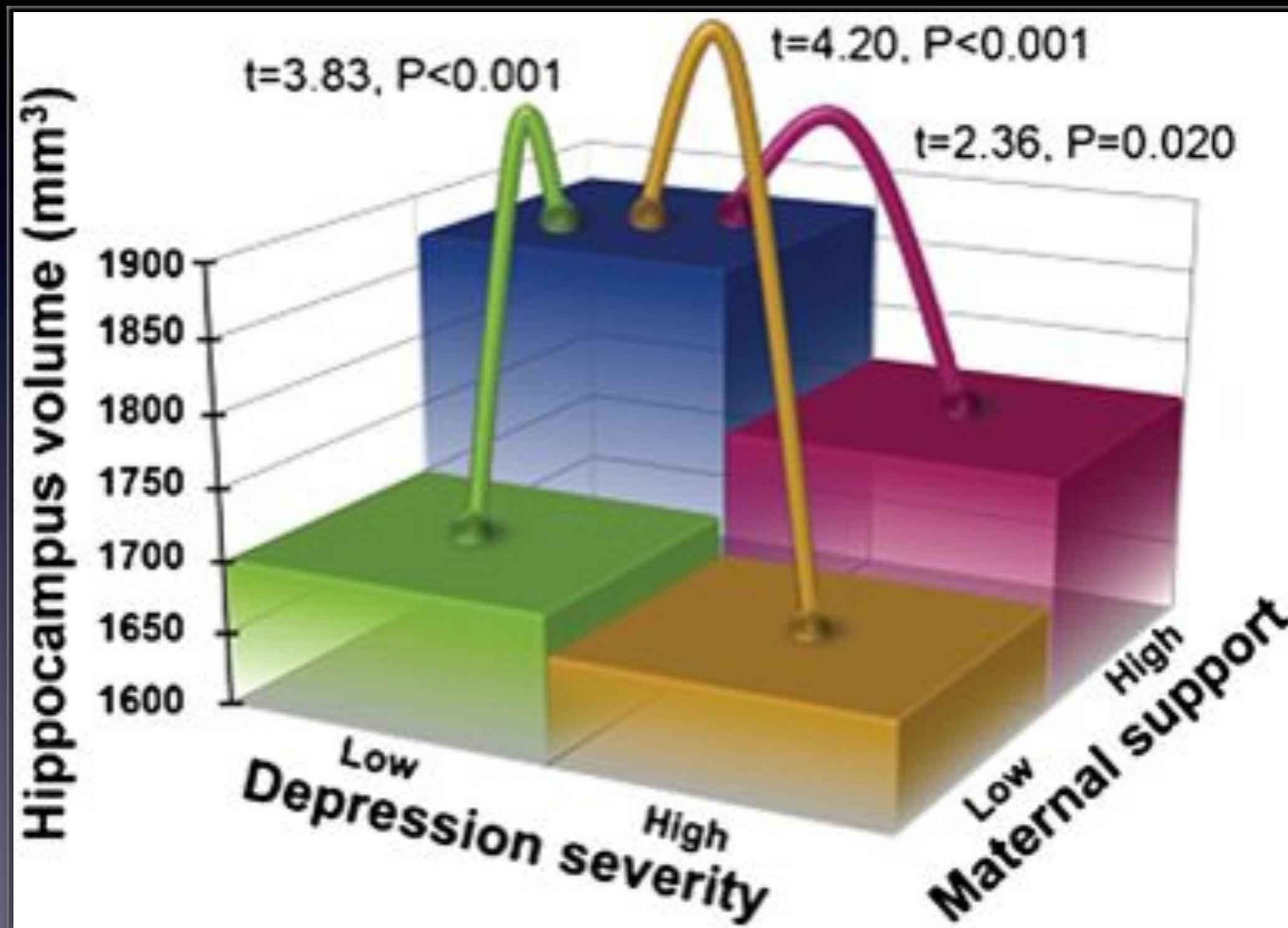
Big Brother/Big Sister

Little League

gymnastics

martial arts

Hippocampus Volume by Preschool Depression Severity and Maternal Support



Outside the Clinical Realm

Intentional Skill Building

Invest in EI programs

Education for those in judicial/foster care systems

Collaborate with social workers, mental health, etc.

QRIS for early childhood education

Parental leave policies

Policy & Programmatic Changes

Advocacy

ReadyNation



A business partnership for
early childhood and economic success

formerly the Partnership for America's Economic Success

State Network

Business leader organizations in many states have started supporting proven investments in early childhood. ReadyNation has sponsored business leader summits and provided other types of assistance to support business leader engagement in over half the states. There are also many other business groups in the states working in early childhood.

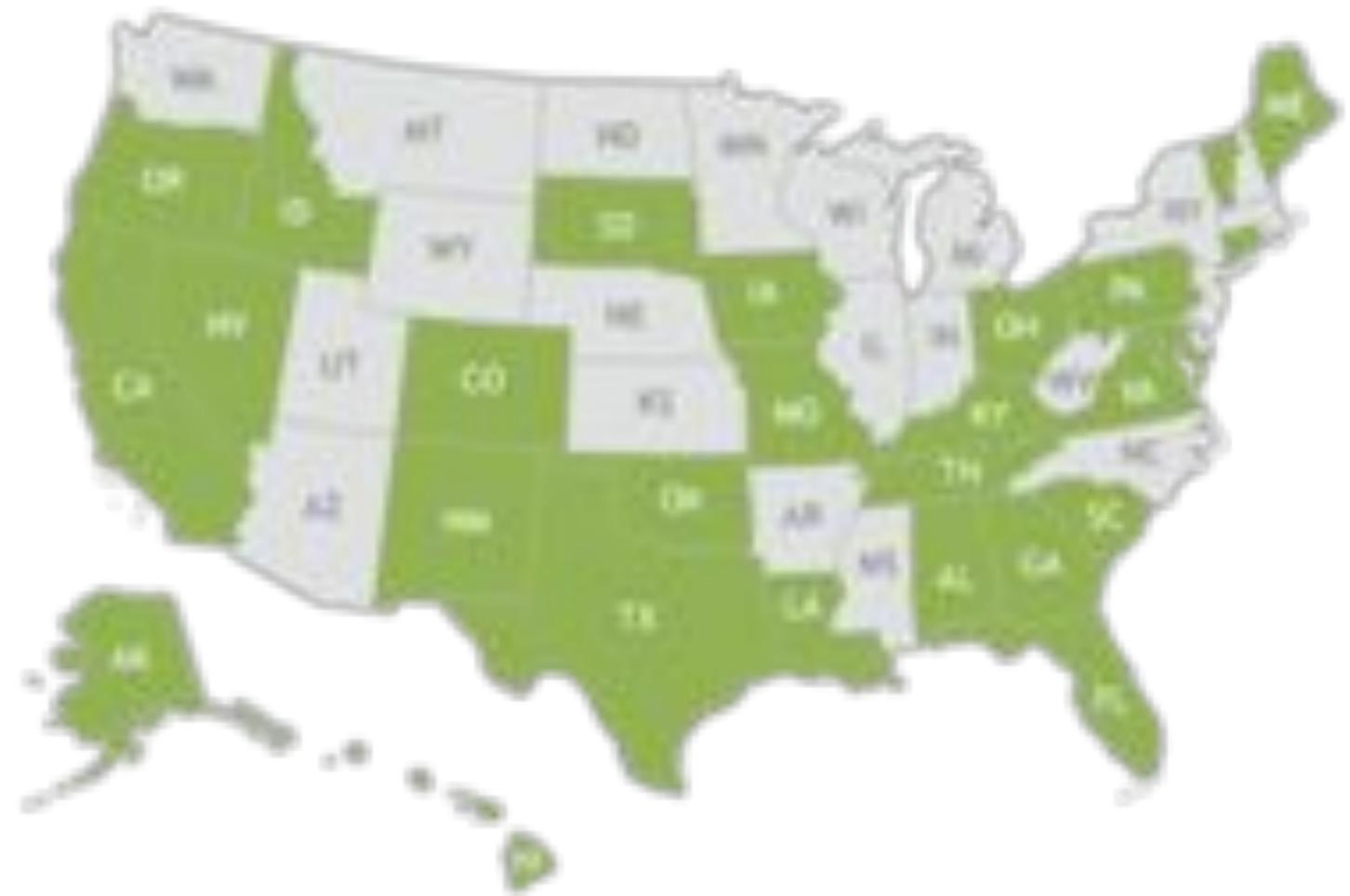
Click on the map to find out more about business organizations promoting early childhood policy in that state.

Learn more about our [National Network](#) of business organizations.

The States at a Glance

Looking for data on your state that illustrates both the status of children and the power of early investment? We recommend the following:

<http://www.readynation.org/state-network/>



Treatment

Traumatic Stress networks

Appropriately trained professionals

Insurance coverage for services

BUILDING ADULT CAPACITIES

A C C O U N T A B I L I T Y

Ultimately, *every* child deserves the opportunity to make good choices.

obho/raur? to make good choices?

Developing Brain, Developing Accountability:

Using Science to Direct Our Policy and Practice for Educating, Disciplining and Growing Our Children into Accountable Adults



Name _____

Email _____ Date _____

Rx

A prescription for better policies for children.

In the next 3 minutes:

Write a “policy prescription” for *specific* policies, programs or resources that would help the children and families you support.

You are **not allowed to write “more money”.**

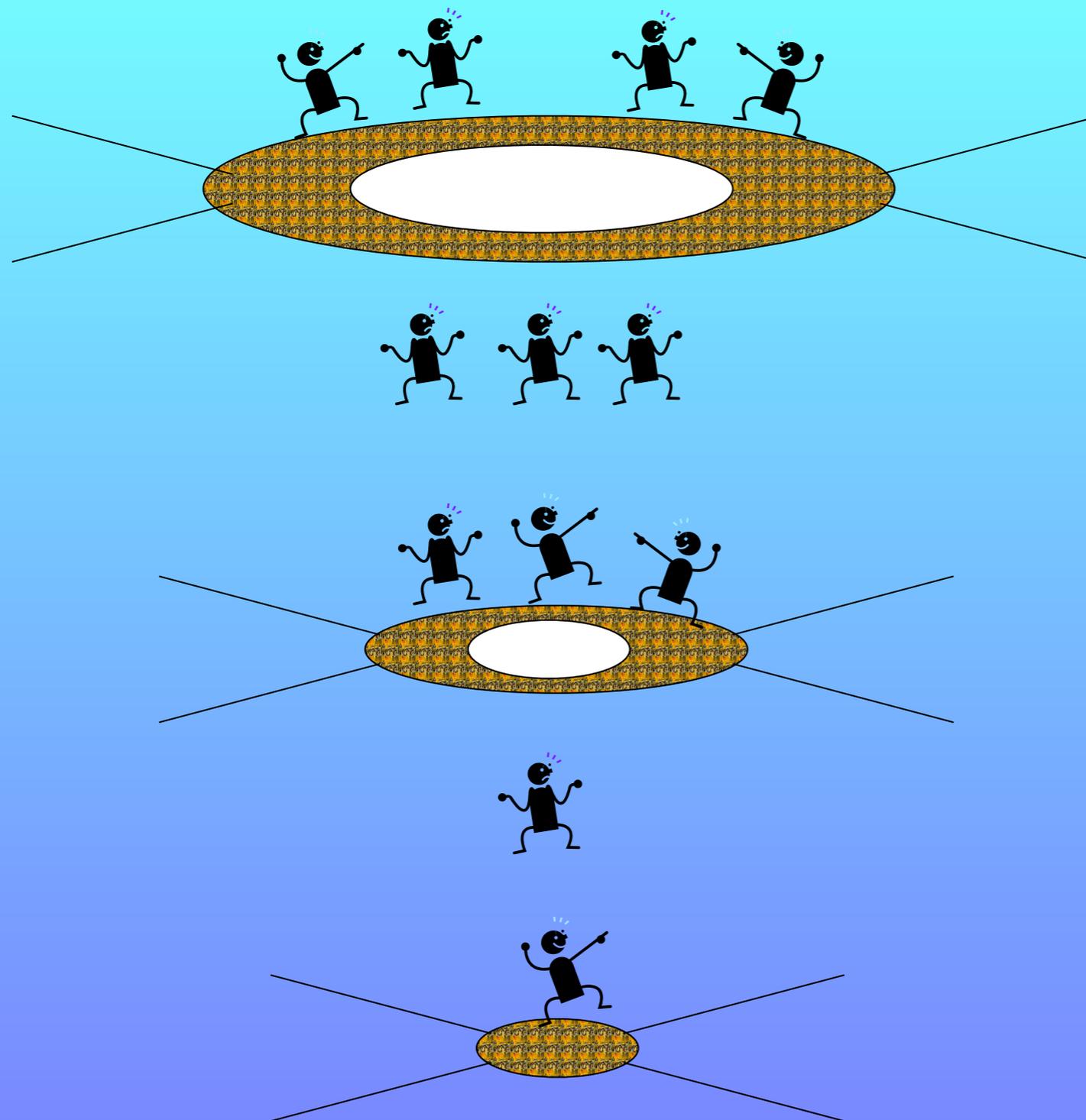
Refill _____ Times

[#developingbrain](https://twitter.com/developingbrain)

EARLY BRAIN AND CHILD DEVELOPMENT

The Call

Using A Public Health Approach to Building Healthy Brains



Universal Primary Preventions

Anticipatory Guidance
Bright Futures
Reach Out and Read
Social Supports
Relational Health
High Quality Child Care

Everyone

Screening/Targeted Interventions

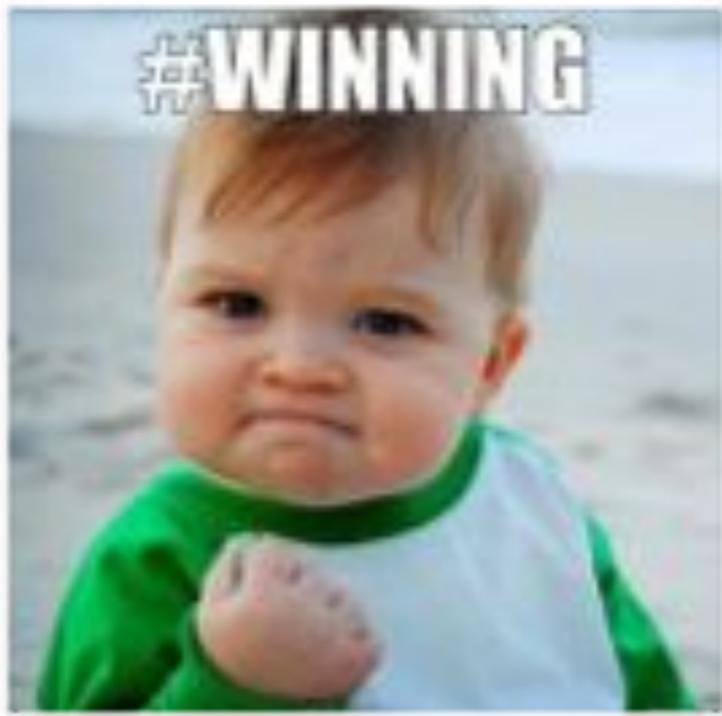
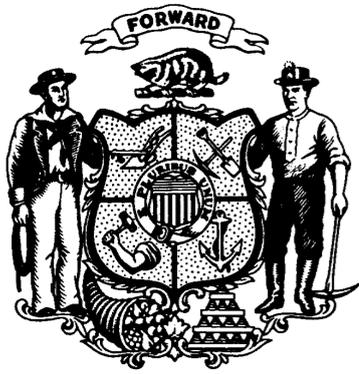
Developmental/Risk Screening
Home Visiting
Head Start
Parenting Education/Support
Early Intervention

At-risk

Evidence-Based Treatments

CPP, COS, PCIT, TB-CBT
Intensive Home Visiting
Intensive Parenting Education
Care Coordination

Symptomatic



sin
RE



LRB-3486/1
SRM:eev:ev

2013 SENATE RESOLUTION 59

Resolved by the senate, the assembly concurring, That policy decisions enacted by the Wisconsin state legislature will acknowledge and take into account the principles of early childhood brain development and will, whenever possible,

November 4, 2013
Noted on the 4, 2013 of toxic stress, by Senators, LASSA, OLSEN, HANSEN, DANIELSON, LEHMAN, L. TAYLOR, RISSER and C. LARSON, cosponsored by Representatives BALLEWEG, PASCH, KESTELL, SARGENT, MASON, JOHNSON, BARNES, WRIGHT, OHNSTAD, GOYKE, WACHS, SPIROS, KRUG and HULSEY. Referred to Committee on Senate Organization.

important strategies to achieve a lasting foundation for a more prosperous and sustainable state through investing in human capital.

(END)

Relating to: early childhood brain development.

Public Investment in Children by Age



Change the First Five Years and You Change Everything

Ounce of Prevention Fund

Accessible at <http://youtu.be/GbSp88PBe9E>

“While schools can do much to raise achievement among children who initially lag behind their peers, all too often pre-school gaps set in train a pattern of **ever increasing inequality** during school years and beyond. Any drive to improve social mobility must begin with an effective strategy to **nurture the fledgling talent in young children** so often lost before it has had a chance to flourish.”

The Sutton Trust

facebook.com/DrLibrarian
twitter.com/dnavsaria
dnavsaria@pediatrics.wisc.edu

**THE
END**

Public-facing Social Media
Please follow along!

