Dipesh Navsaria,
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EARLY EXPERIENCES ELEVATE EVERYTHING

Early Brain & Child Development and the Future of Society

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www.facebook.com/**DrLibrarian** Twitter: **@navsaria**

Live-tweeting encouraged!

I don’t know if “mouthing” is an FDA–approved use of board books.

Image courtesy of Dipesh Navsaria

Detail from The Departure of Odysseus from the Land of the Phaeacians by Claude Lorrain, Louvre Museum. Public domain.

The Science
The Result
The Solution?
The Call

First, a story. . .

EARLY BRAIN AND CHILD DEVELOPMENT

The Science

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EARLY BRAIN AND CHILD DEVELOPMENT

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

EARLY BRAIN AND CHILD DEVELOPMENT

1

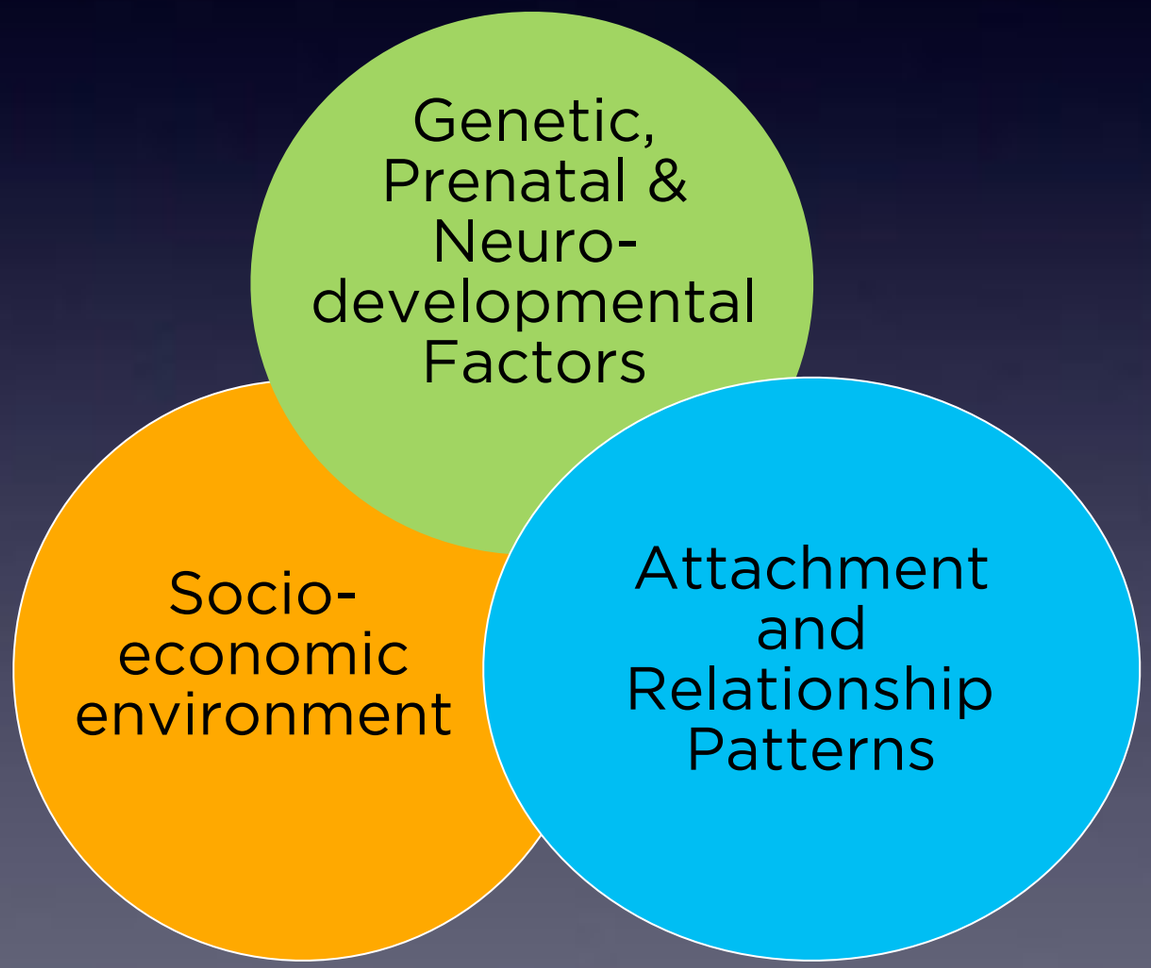
Child development is a foundation for **community** development and **economic** development, as capable children become the foundation of a prosperous and sustainable society.

2

Brains are built **over time**.

Creative Commons-licensed work by flickr user Andrew Mace—

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.

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The Face to Face Paradigm
Edward Z Tronick

Video from Zero to Three / UMass Boston. Accessible at http://youtu.be/apzXGEbZht0

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.

Creative Commons-licensed work by flickr user Liz Henry

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.

Creative Commons-licensed work by flickr user Pedro Klien

Image from Bruce Perry, MD, PhD, ChildTrauma Academy

The Stress Response:

increases in cortisol and epinephrine

Three Levels of Stress Response

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

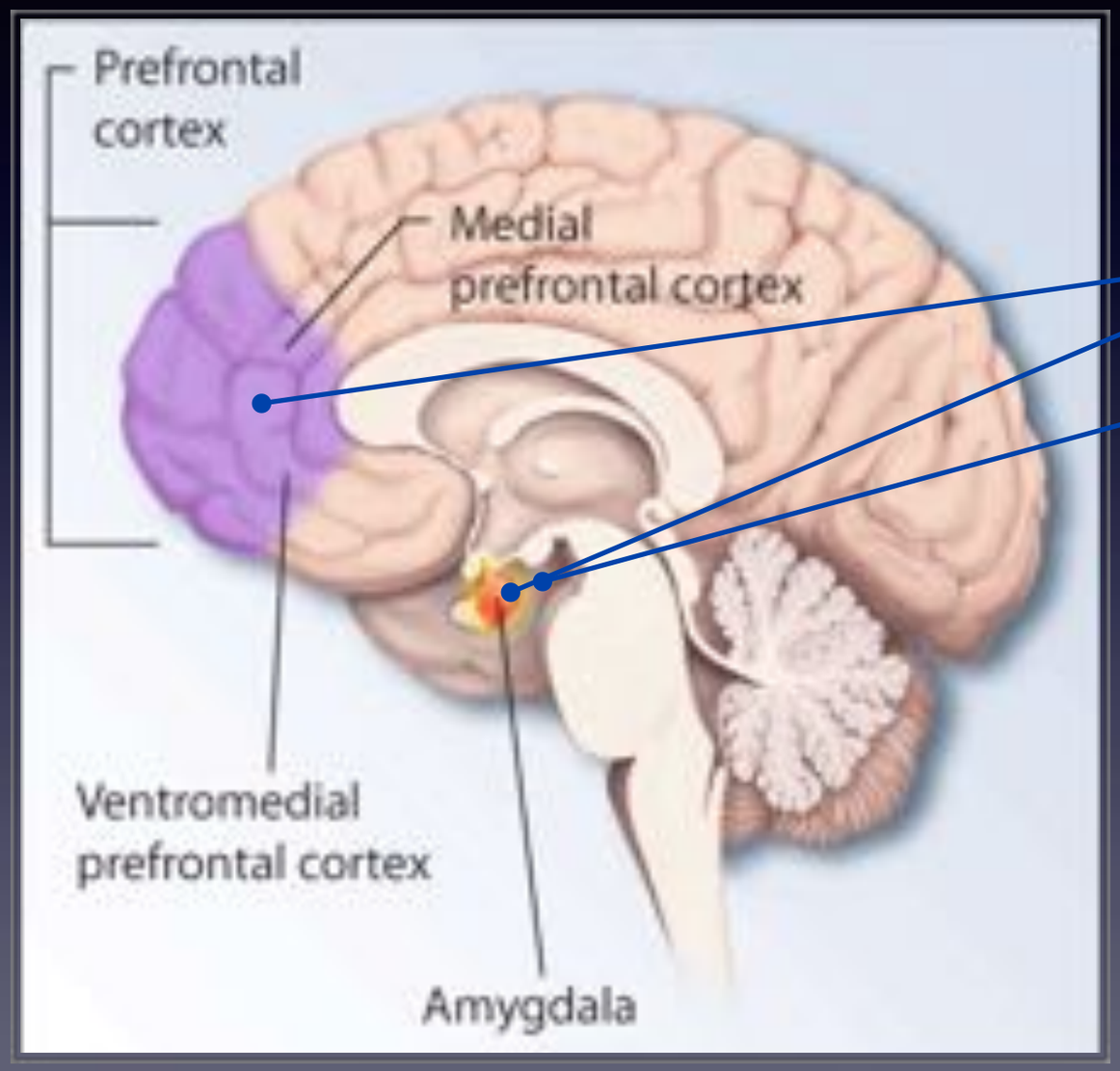
decreased calm/coping

Chronic “fight or flight”

increased cortisol / norepinephrine

Changes in Brain Architecture

What happens?



Prefrontal cortex:
Executive functioning
Planning
Delayed gratification

Amygdala:
usually checks the stress response
Fight or flight
Fear

Hippocampus:
major role in memory and mood

Toxic stress/early adversity:
smaller hippocampal volumes, poor memory, labile moods, lower neuronal density, decreased function

Toxic stress/early adversity:
Enlargement

Toxic stress/early adversity:
Overactivation

Freely-reproducible image from the National Institutes of Health

ADHD or Adversity?

Impulsive

Can’t plan ahead

Anxious

Can’t delay gratification

Labile mood

Poor memory

Brown NM et al. *Associations Between Adverse Childhood Experiences and ADHD: Analysis of the 2011 National Survey of Children’s Health.* Abstract presented at the 2014 Pediatric Academic Societies Meeting, Vancouver, BC.

EARLY BRAIN AND CHILD DEVELOPMENT

The Result

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 improverished, “at-risk” population.

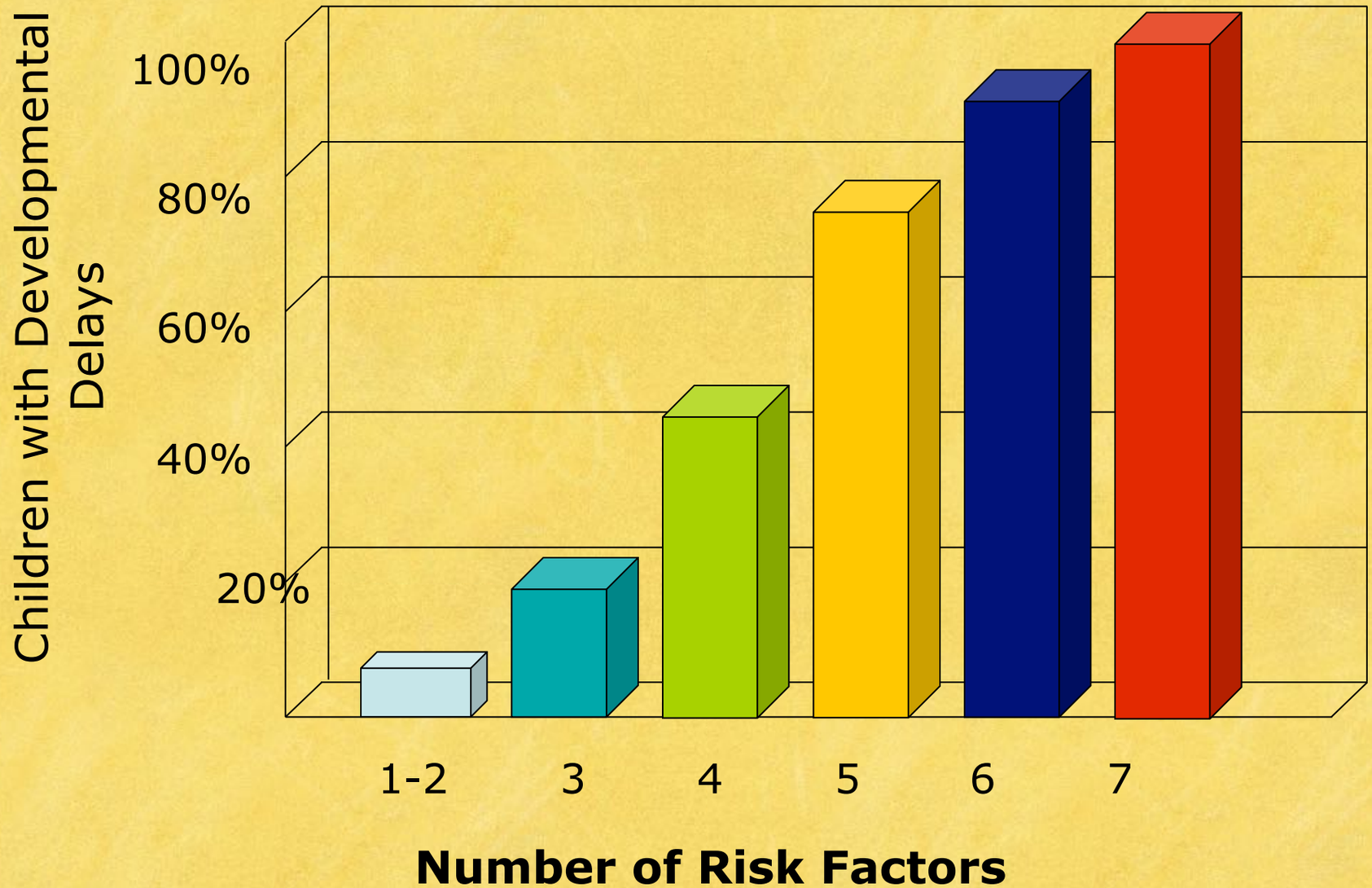
The Adverse Childhood Experiences Study

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%

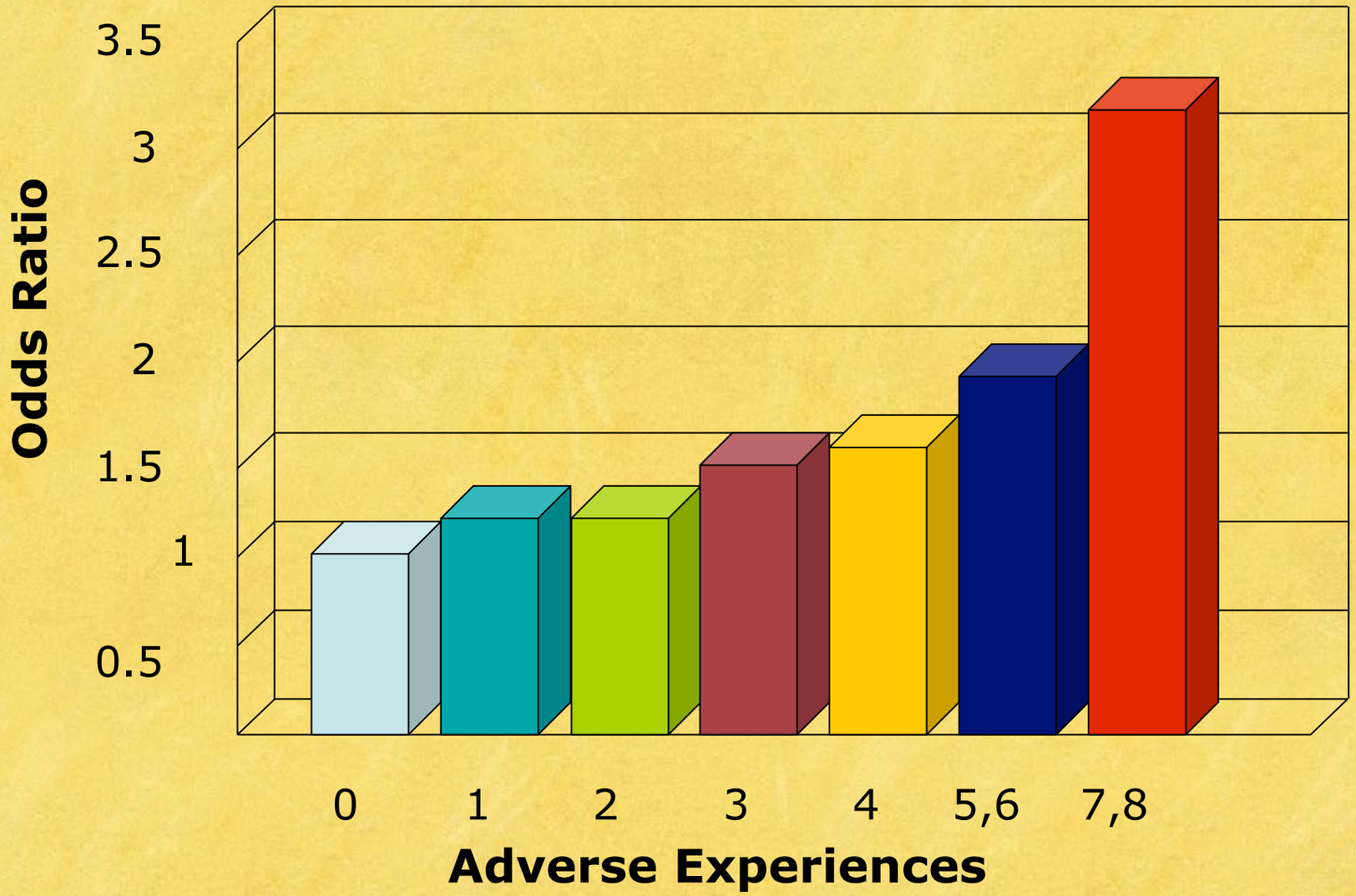
Not only are they unexpectedly common...
...their effects are **cumulative**.

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

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.

Creative Commons-licensed work by flickr user River Beach

PROTECTIVE INTERVENTIONS

ADVERSITY

Developmental Progress

"Healthy" Trajectory

Health Services

Pre-school

Appropriate Discipline

Reading to child

"At Risk" Trajectory

High quality ECE

Anticipatory Guidance

Language Stimulation

"High risk" Trajectory

Specialized services

Parent Responsiveness

Home visiting

Birth

Late Infancy

Late Toddler

Late Preschool

6 mo

12 mo

18 mo

24 mo

3 yrs

5 yrs

Age

Early Infancy

Early Toddler

Early Preschool

Three Promising Domains for EBCD Innovation

Jack Shonkoff, MD

Reduce emotional and behavioral barriers to learning.

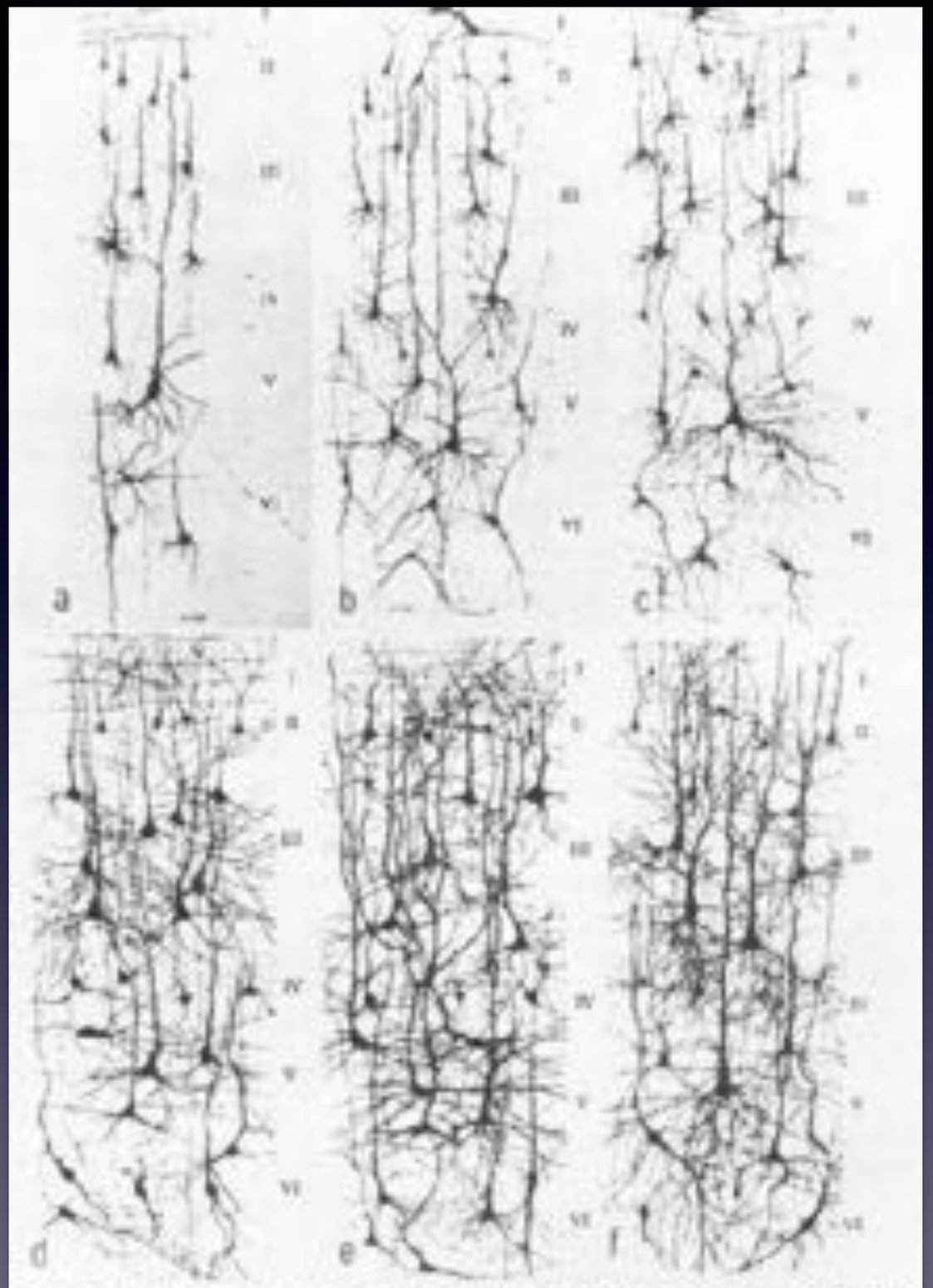
Enhance the healthy development of children by transforming the lives of their parents.

Reconceptualize the health dimension of early childhood policy and practice.

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)

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:

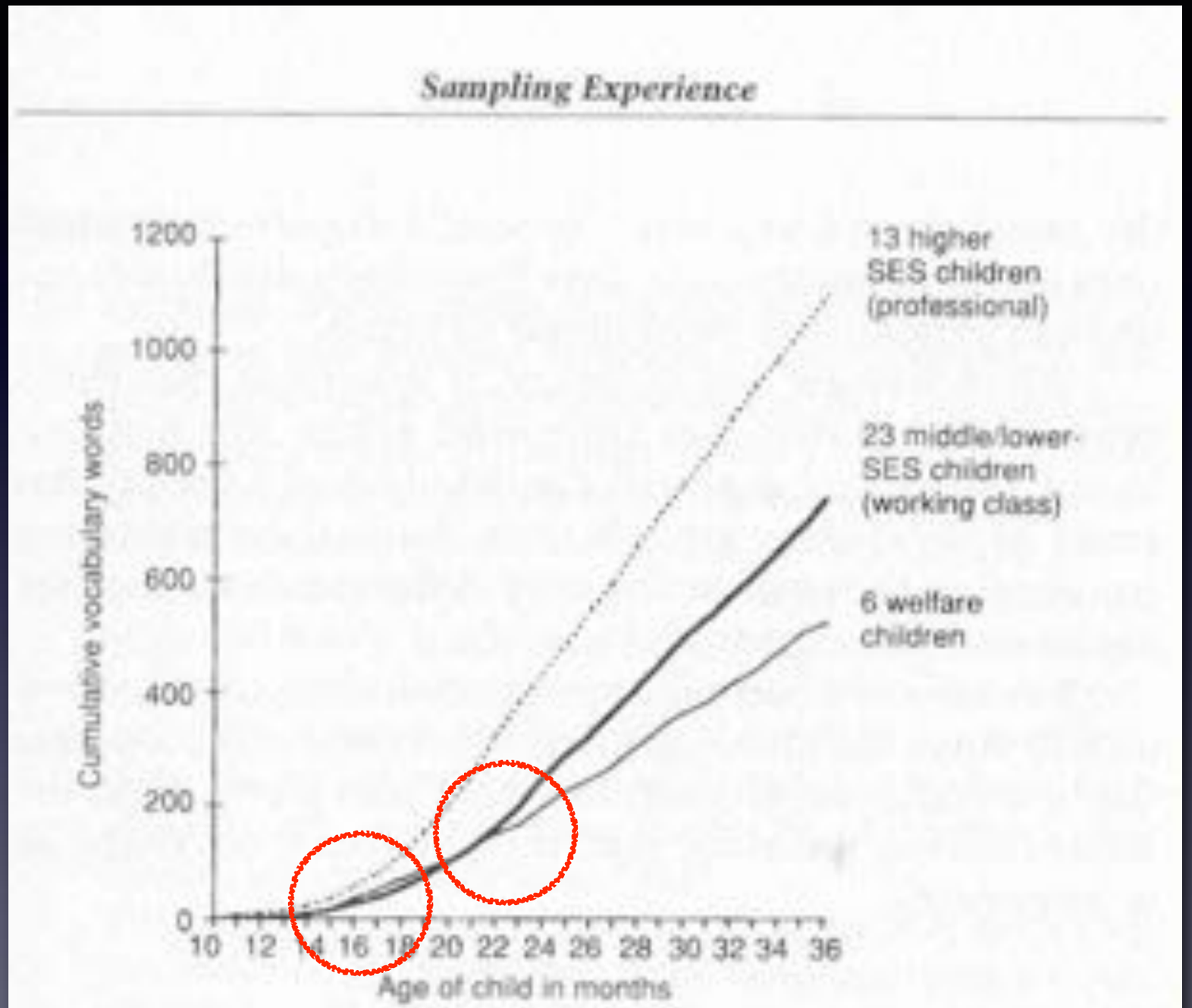


Figure 2. The widening gap we saw in the vocabulary growth of children from professional, working-class, and welfare families across their first 3 years of life. (See Appendix B for a detailed explanation of this figure.)

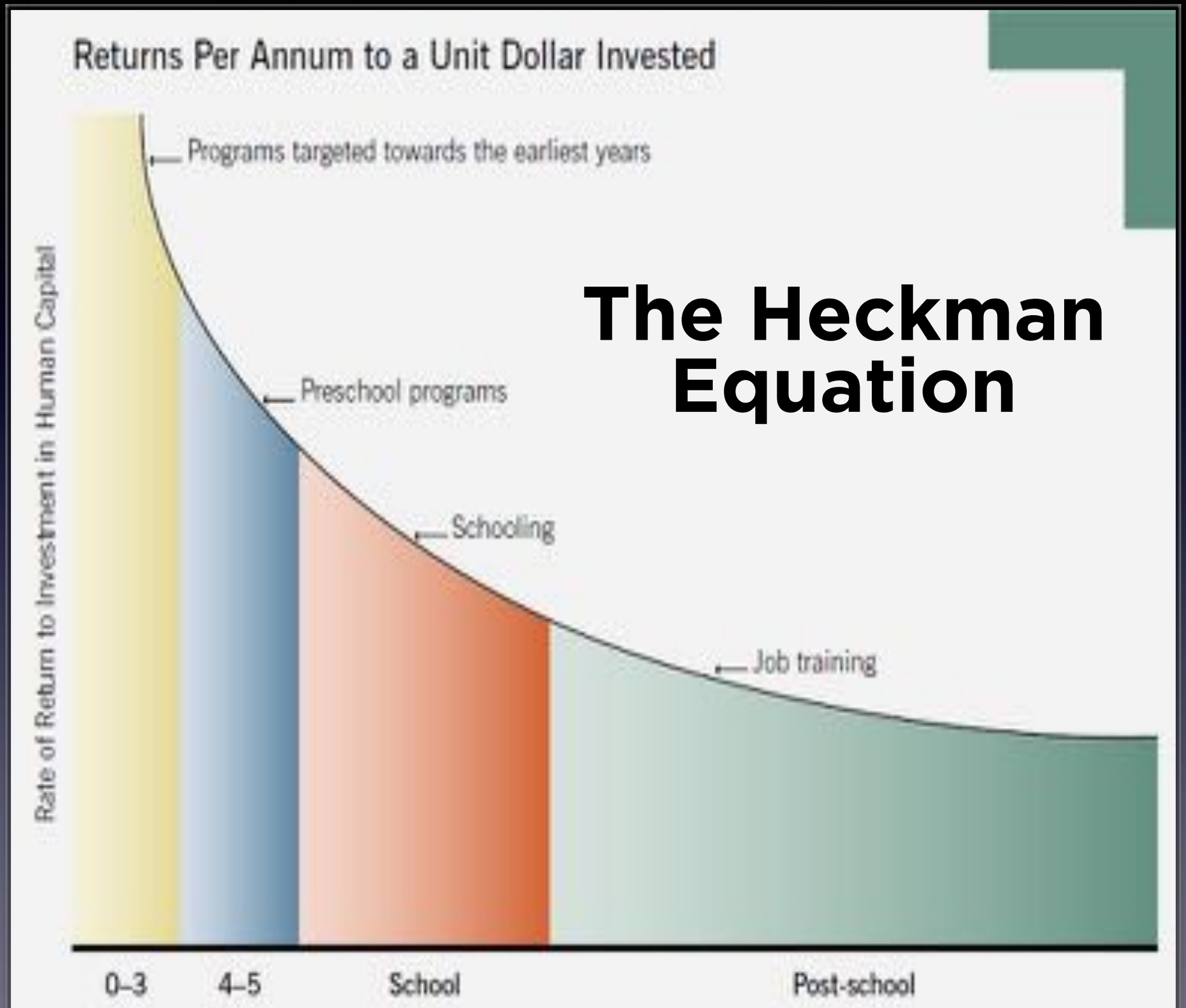
From Risley, T & Hart, B, 1995

$4-$9

in Returns for Every Dollar Invested in Early Childhood Programs

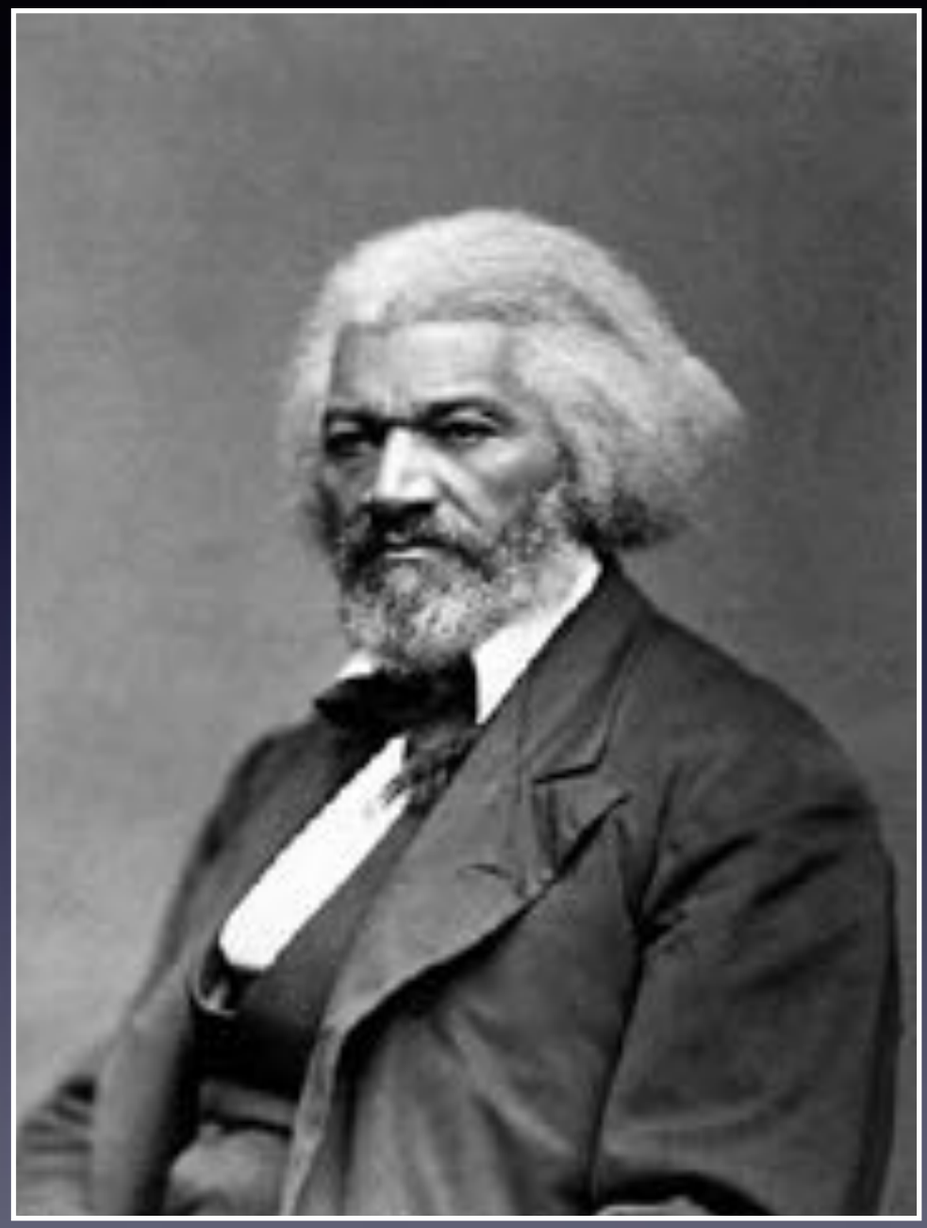
Creative Commons-licensed work by flickr user Tracy O

The Heckman Equation



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

— Frederick Douglass
(1817–1895)



Public-domain image

What can we do about it?

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

Images from Reach Out and Read National Center

Image courtesy of Dipesh Navsaria

Prescription for Reading

Name: _____

Date: _____ Age: _____

℞ *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.

Reading
is a
triumph
of the
early brain.

— Perri Klass, MD

Public domain work by Itcho Hanabusa

owl.li/TDMfc

THE ELEPHANT IN THE CLINIC

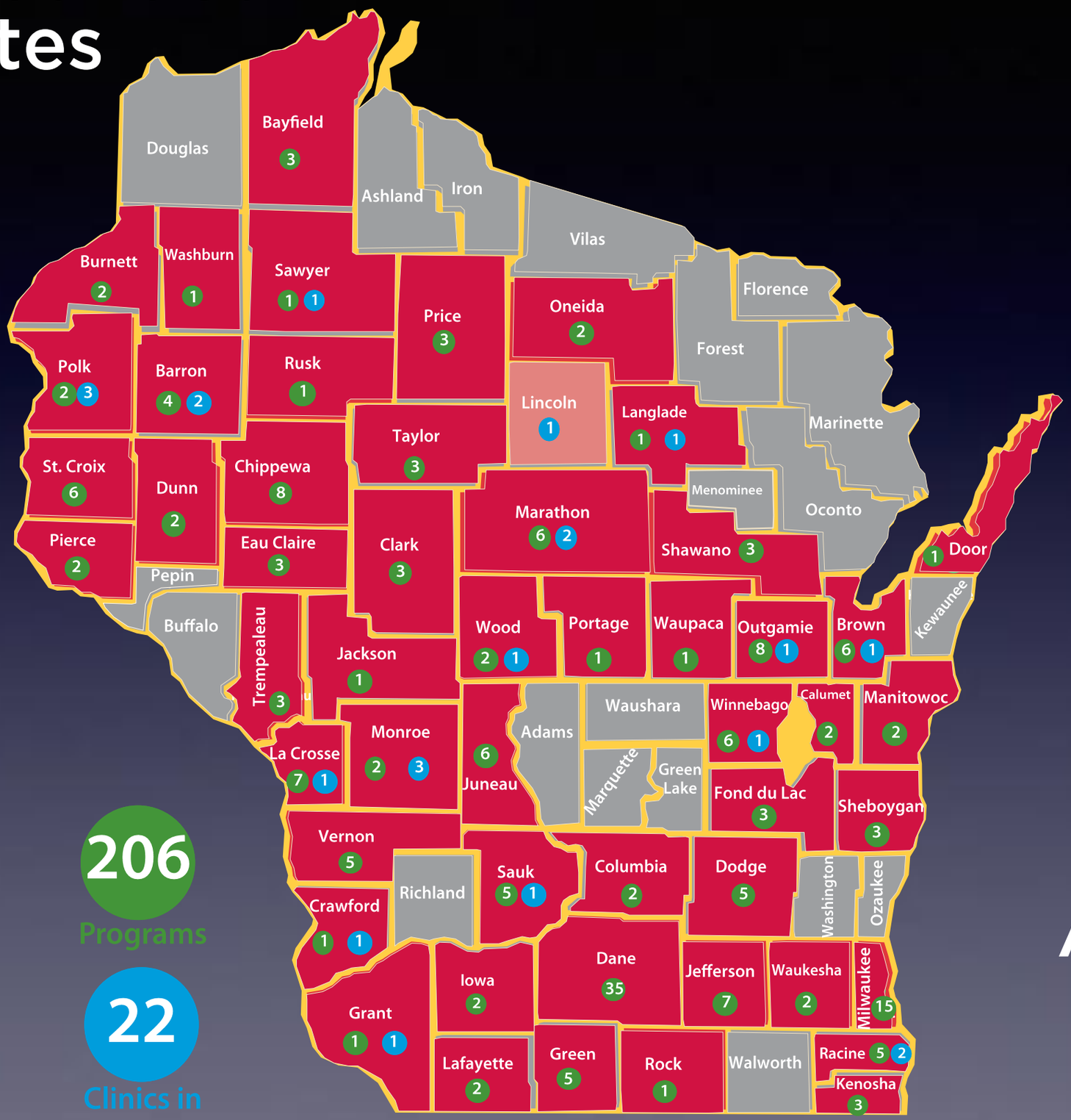
EARLY LITERACY AND FAMILY WELL-BEING

DIPESH NAVSARIA, MPH, MSLIS, MD
AMY SHRIVER, MD

ASCEND
THE ASPEN INSTITUTE

Reach Out & Read®
where great stories begin™

December 2010
Coalition founded
~50 sites



206
Programs

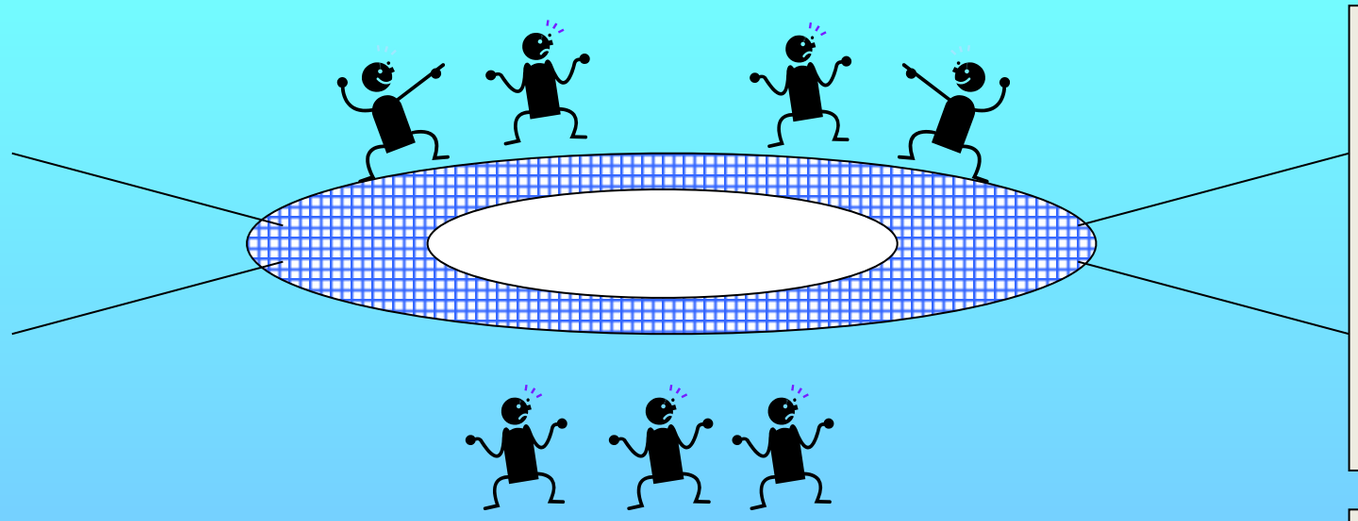
22
Clinics in application

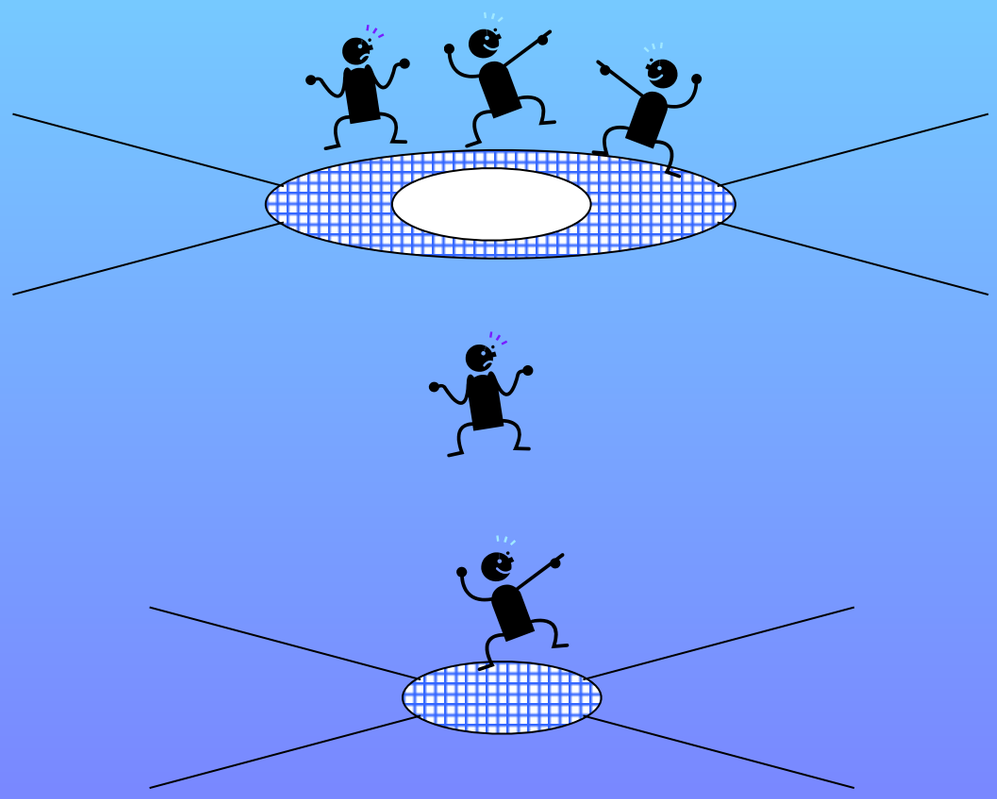
August 2017

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

Screening/Targeted Interventions

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

Evidence-Based Treatments

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

Everyone

At-risk

Symptomatic

Image from Andy Garner, MD

dot
Peter H. Reynolds

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/navsaria
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THE END

Public-facing Social Media
Please follow along!

Image courtesy of Dipesh Navsaria

MADE ON A Mac