

Understanding the Puzzle of Early Learning



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1971



Importance of Early Experience



Importance of Early Experience

- Early experience is the “smoking gun” for both education success and long-term health.
 - Things that happen early in life leave biological memories in your body.
 - “Gets under your skin”

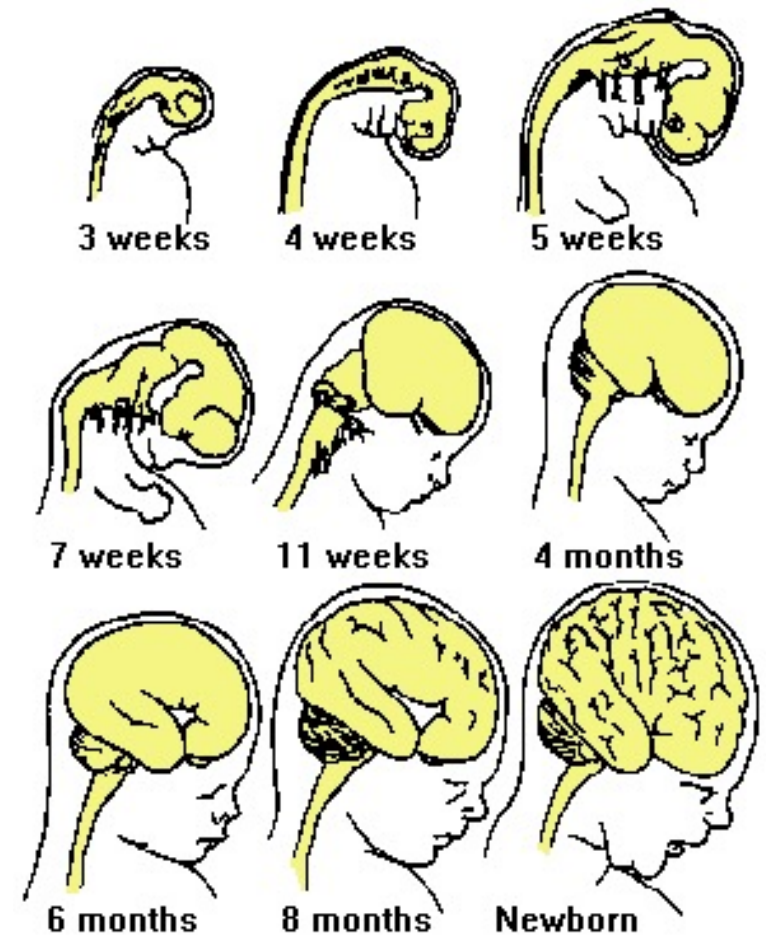
Importance of Early Experience

- Striking disparities in what children know and can do are evident well before they enter kindergarten.
 - Brain Architecture

Brain Architecture

- Major Stages of Brain Development

- Neural tube formation
- Cell proliferation
- Cell differentiation
- Cell migration
- Cell connections
- Synaptic pruning
- Myelination

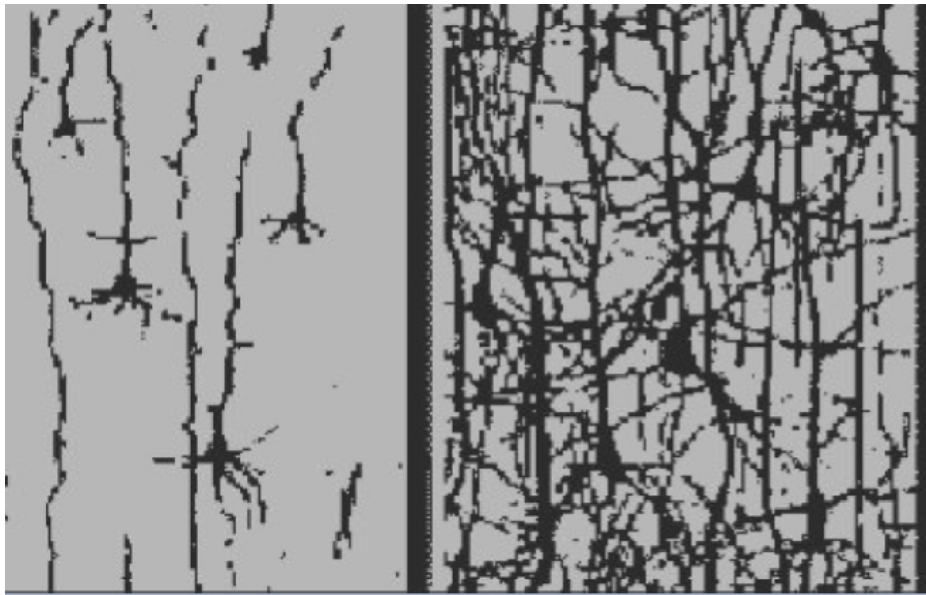


Gilkerson & Klein/Zero to Three (2008)

Cell Connections/Synapse Formation

Birth

2 Years Old



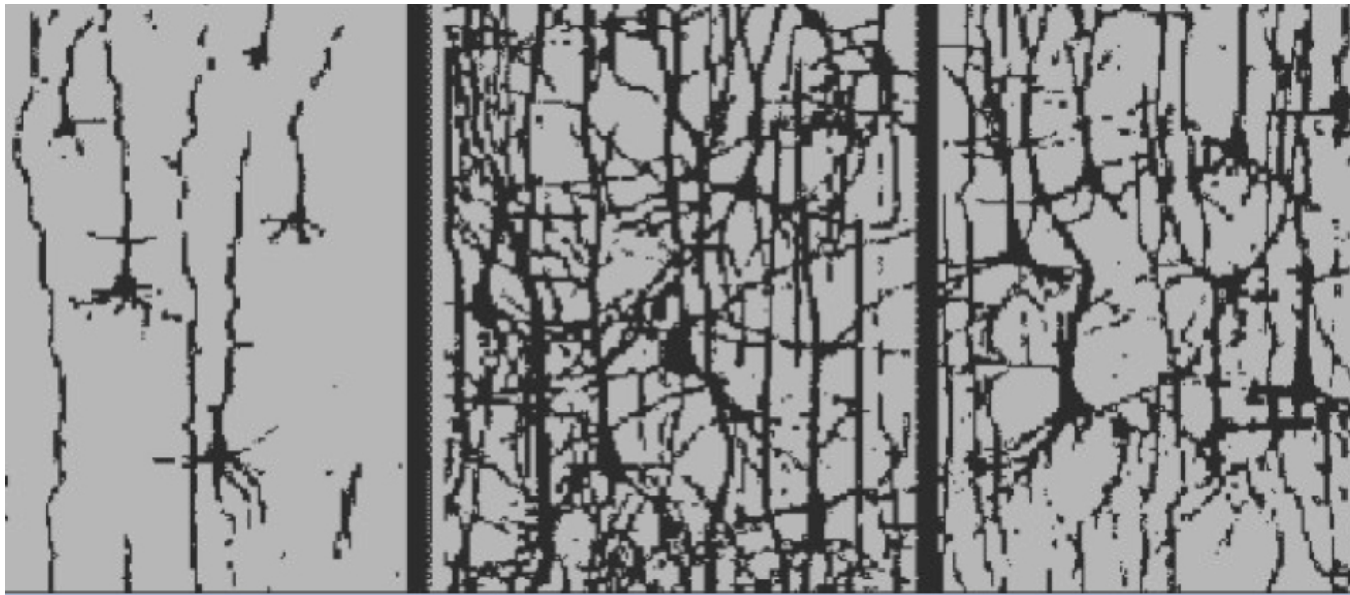
- Synapse formation peaks at the rate of 40,000 per second between 3 and 15 months of age.

Synapse Formation and Pruning

Birth

2 Years Old

6 Years Old



- Pruning is a highly selective process. It is the phase of brain development in which experience most obviously influences the brain.

The Brain Changes its Structure and Function in Response to Experience

- Plasticity
 - The brain is adaptable and can be influenced by positive experiences.
 - The brain is vulnerable and can be harmed by negative experiences.

Toxic Stress



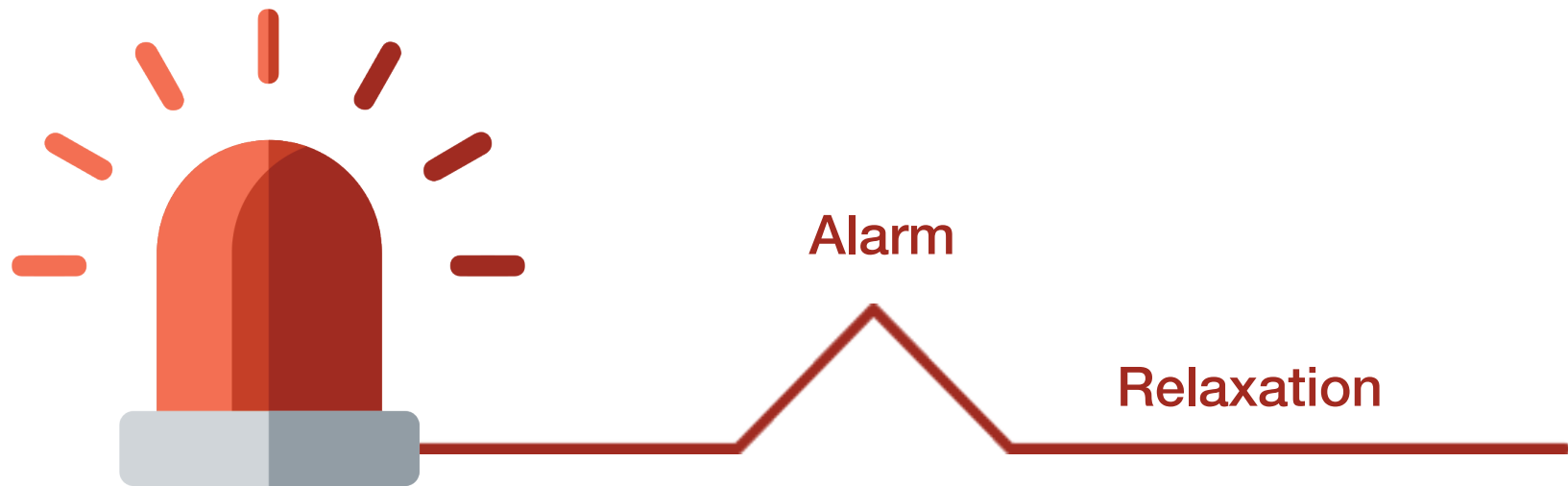
Toxic Stress



Toxic Stress

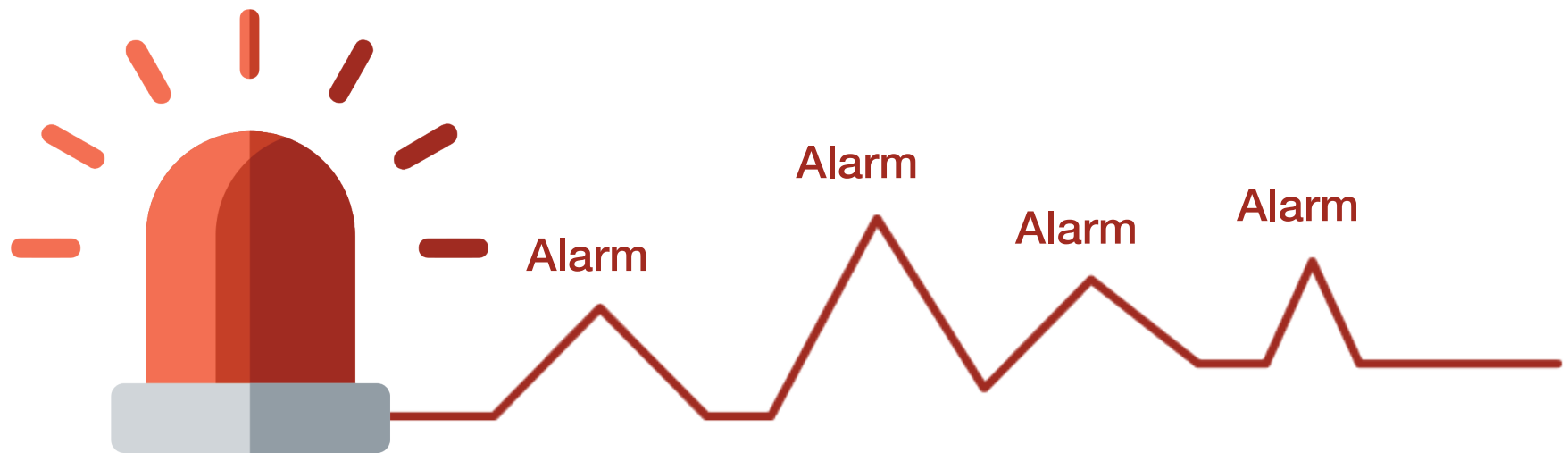
- Some causes
 - Extreme poverty
 - Physical or emotional abuse
 - Chronic neglect
 - Severe maternal depression
 - Substance abuse
 - Family violence

Tolerable Stress



Lally (2007)

Toxic Stress



Lally (2007)

The Body's Response to Stress

- Increase in heart rate
- Increase in blood pressure
- Increase in breathing rate

Cortisol

- Suppresses the immune system
- Impairs memory/shrinks hippocampus
- Impairs selective attention
- Creates anxious behavior

Cortisol

- If exposed to chronic stress, then level of hormone production becomes “normal.”
- Over arousal and tendency toward impulse
 - Over active
 - Over reactive
 - More aggressive
 - Less attentive

Adverse Childhood Experiences



Prevalence of ACEs in Study Group

Physical Abuse	28%	Substance Abuse	27%
Emotional Abuse	11%	Parental Divorce	23%
Sexual Abuse	21%	Mental Illness	19%
Physical Neglect	10%	Incarcerated Family Member	5%
Emotional Neglect	15%	Mother Treated Violently	13%

Felitti et al., 1998

ACE – Lifelong Trajectory of Increasing Risks

- Correlated with increased risk of:
 - Heart disease
 - Chronic lung disease
 - Stroke
 - Diabetes
 - Cancer
 - Liver disease
 - Suicide
 - Injuries
 - HIV and STDs
 - School failure
 - Teen pregnancy
 - Criminality

Adverse Childhood Experiences Study (ACE)

- ACE scores of 4 or higher
 - 2x as likely to smoke
 - 7x as likely to be alcoholics
 - 2x as likely to have cancer
- ACE score > 6
 - 30x more likely to have attempted suicide
- ACE score 7+ (no drinking, smoking, or overweight)
 - 360% higher risk of heart disease

ACE – Early Childhood

- By age 5 (1007 children)
 - 55% with 1 ACE
 - 12% > 2 ACE
- 1.8x as likely to have below average
 - Language skills
 - Literacy skills
 - Math Skills
- 3.5x as likely to have poor
 - Emergent literacy skills
 - Attention problems
- 2-3x as likely to have
 - Social problems
 - Aggression

Jimenez et al., 2016

ACE – Early Childhood

- Ages 2-5 (19,957 children)
- 3 or more ACEs before the age of 5
 - 55% with 1 ACE
 - 12% > 2 ACE
- 2x as likely to have
 - 1 or more physical conditions
 - 1 or more developmental conditions
- 9x increase
 - 1 or more mental health and developmental condition
- 7x increase
 - 1 or more physical, mental and developmental condition

Bright & Thompson, 2017

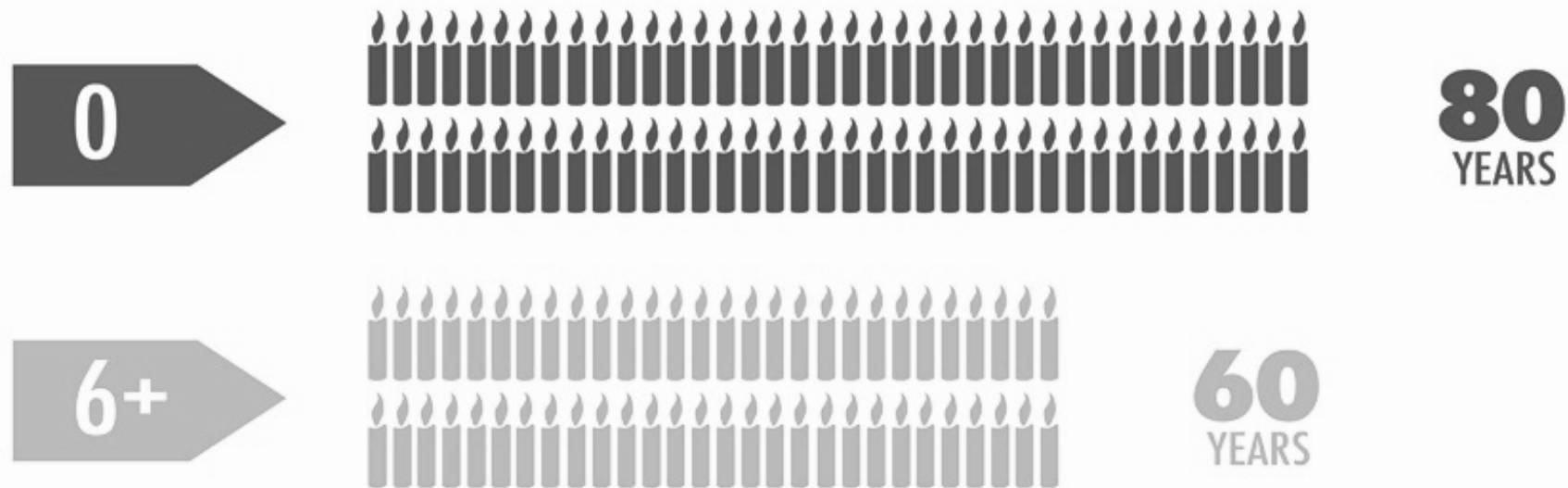
Many chronic diseases of adults are determined decades earlier, in childhood.

- Not by disease, but by life experiences

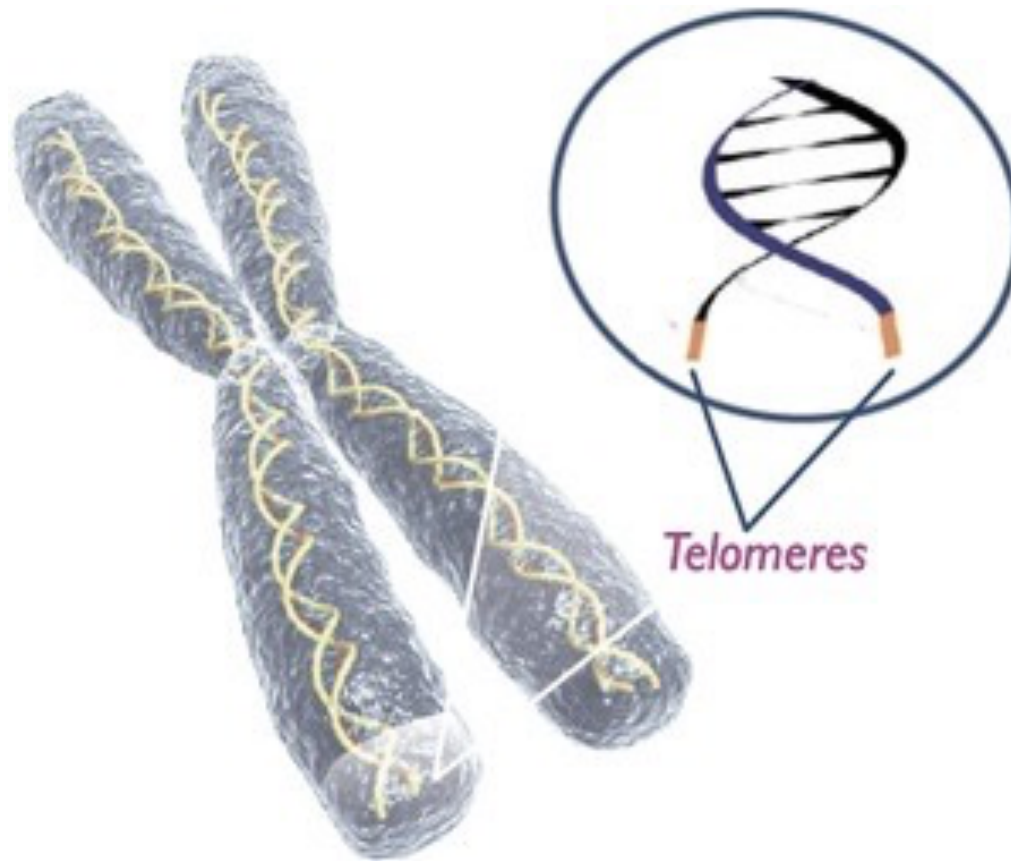
Adverse Childhood Experiences Study

LIFE EXPECTANCY

People with six or more ACEs died nearly **20 years earlier on average** than those without ACEs.



Telomeres



Sections of DNA at the end
of each chromosome

Cortisol & Telomeres

- Increased cortisol exposure



- Reduced telomere length



- Higher risk for cardiovascular disease, cognitive decline, diabetes, mental illness, obesity, other poor outcomes

Epigenetics

- The on/off switch
 - Affects gene expression without altering DNA sequence
 - Doesn't change the operation of the gene
- Genes vs. Destiny
 - Gene expression depends upon the environment/experience



Same Risk Factors



Different Outcomes

School Readiness

A group of diverse young children are sitting on the floor in a classroom, looking attentively towards the right. In the foreground, a girl with long blonde hair wearing a pink shirt and a white pearl necklace is looking towards the right. Next to her is a boy with dark hair wearing an orange shirt and blue shorts, also looking towards the right. Other children are visible in the background, some with their hands raised, suggesting an interactive activity or lesson. The background is slightly blurred, focusing attention on the children in the foreground.

Executive Function & Self-Regulation

- What are executive functions?
 - Working memory
 - Inhibitory control
 - Attention shifting/cognitive or mental flexibility

Executive Function & Self-Regulation

- Skills associated with planning, reasoning, problem solving
 - Connecting current and past information and actions

Executive Functions and Educational Disparities

- Executive-function abilities predict academic and social readiness for school.
 - Over-and-above other child characteristics
 - Intelligence
 - Prior academic knowledge

Importance of Attention

- From the ECLS-K
 - 14,537 children in 2,109 classrooms in 895 public and private kindergarten programs
- Attention
 - Attentiveness
 - Task persistence
 - Eagerness to learn
 - Learning independence
 - Flexibility
 - Organization

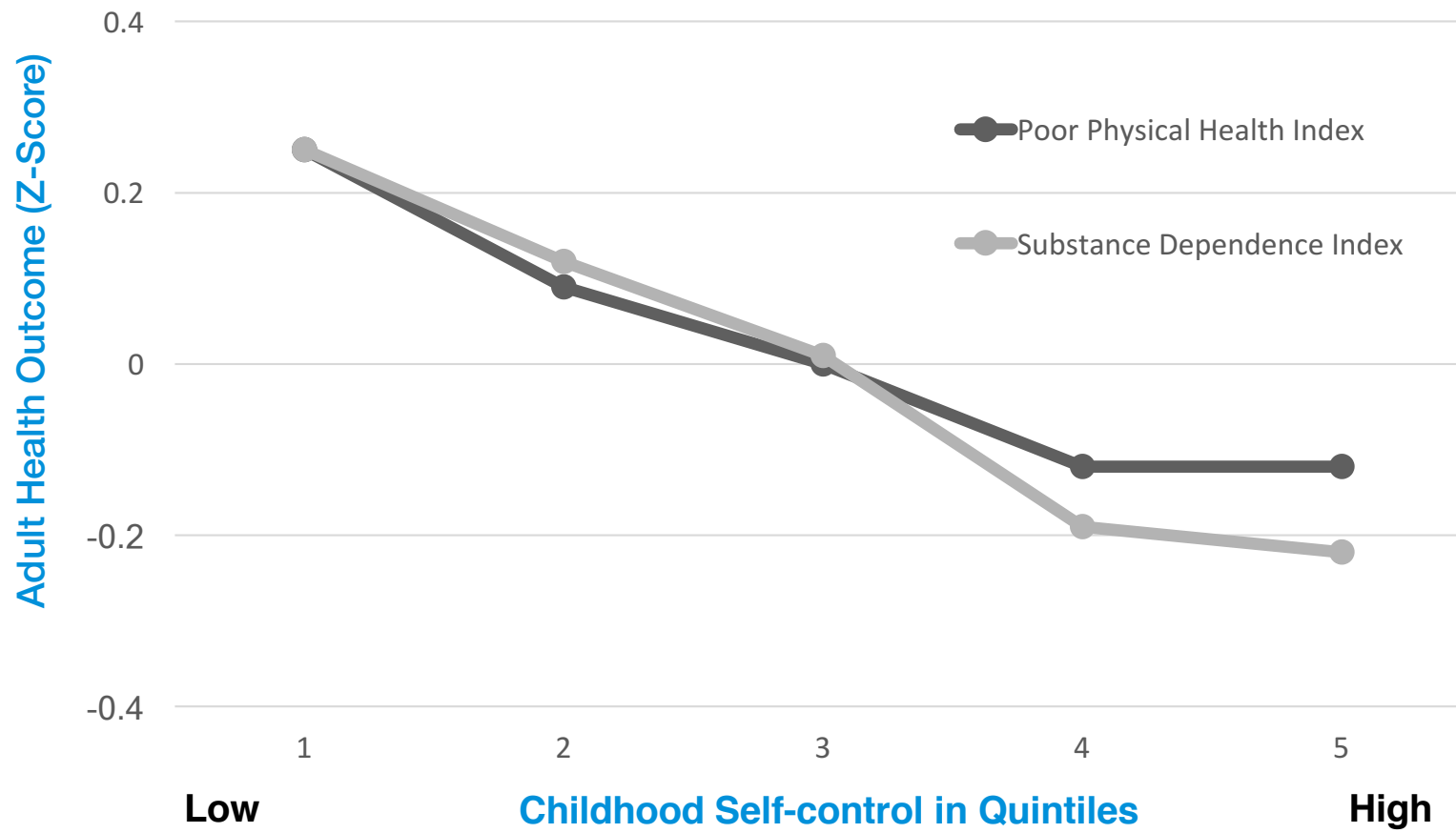
Georges et al., 2012

Importance of Attention

- Test score gaps
 - Attention problems > aggressive behavior, SES, race/ethnicity, and gender
 - 7% lower in math
 - 8% lower in reading

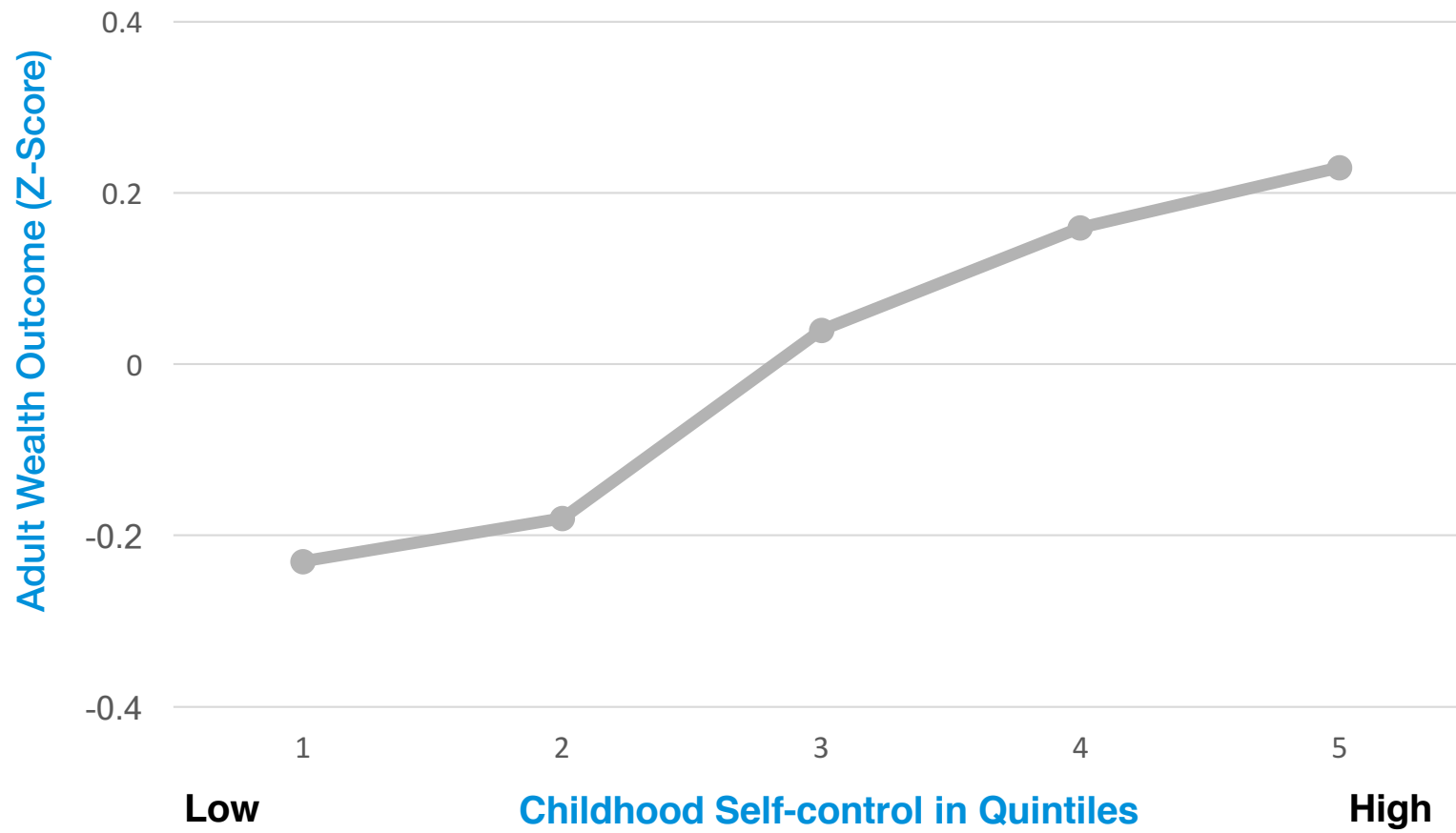
Georges et al., 2012

Self-Regulation in Childhood Predicts Later Outcomes: Health



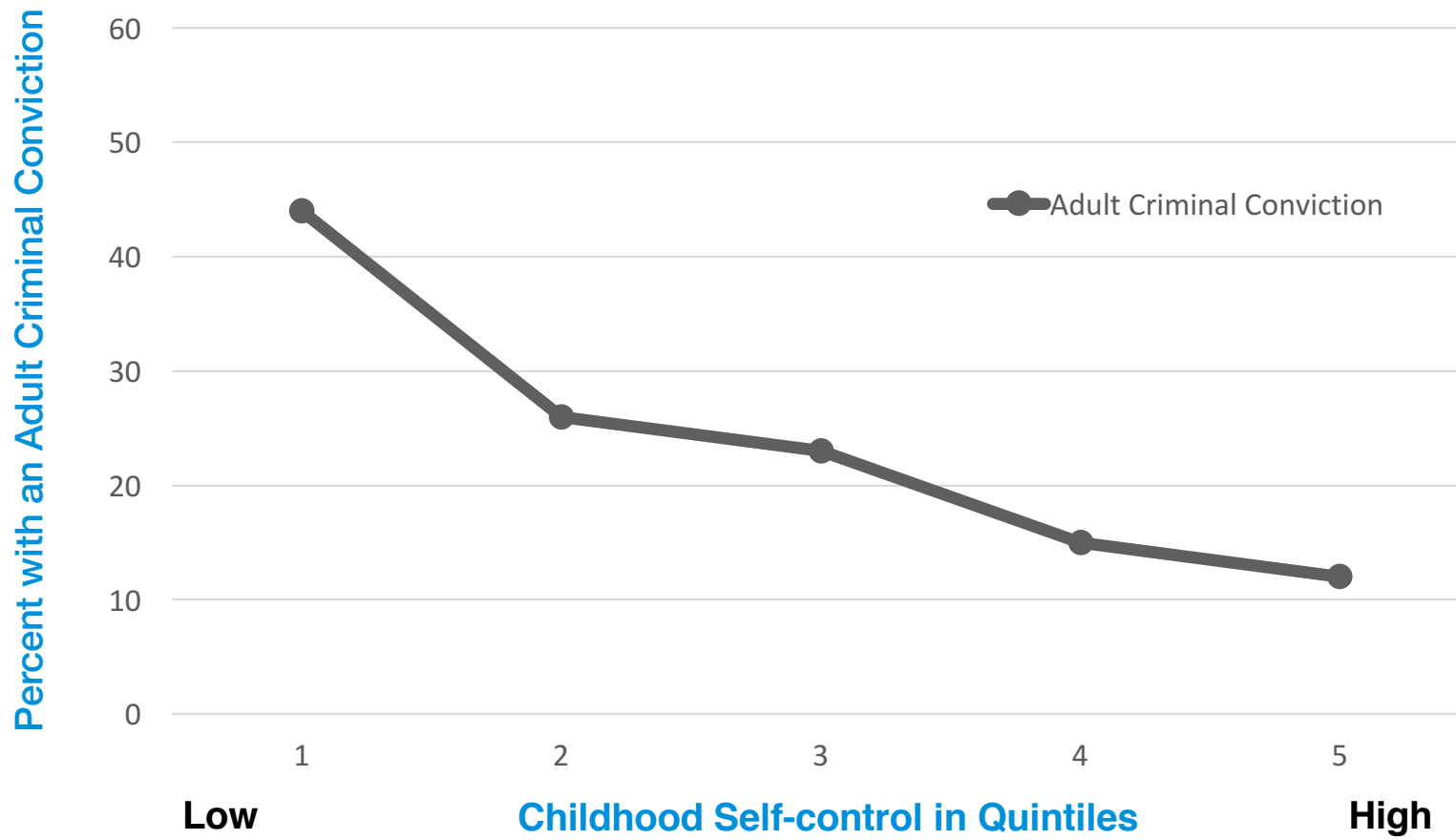
Moffitt et al., 2011

Self-Regulation in Childhood Predicts Later Outcomes: **Wealth**



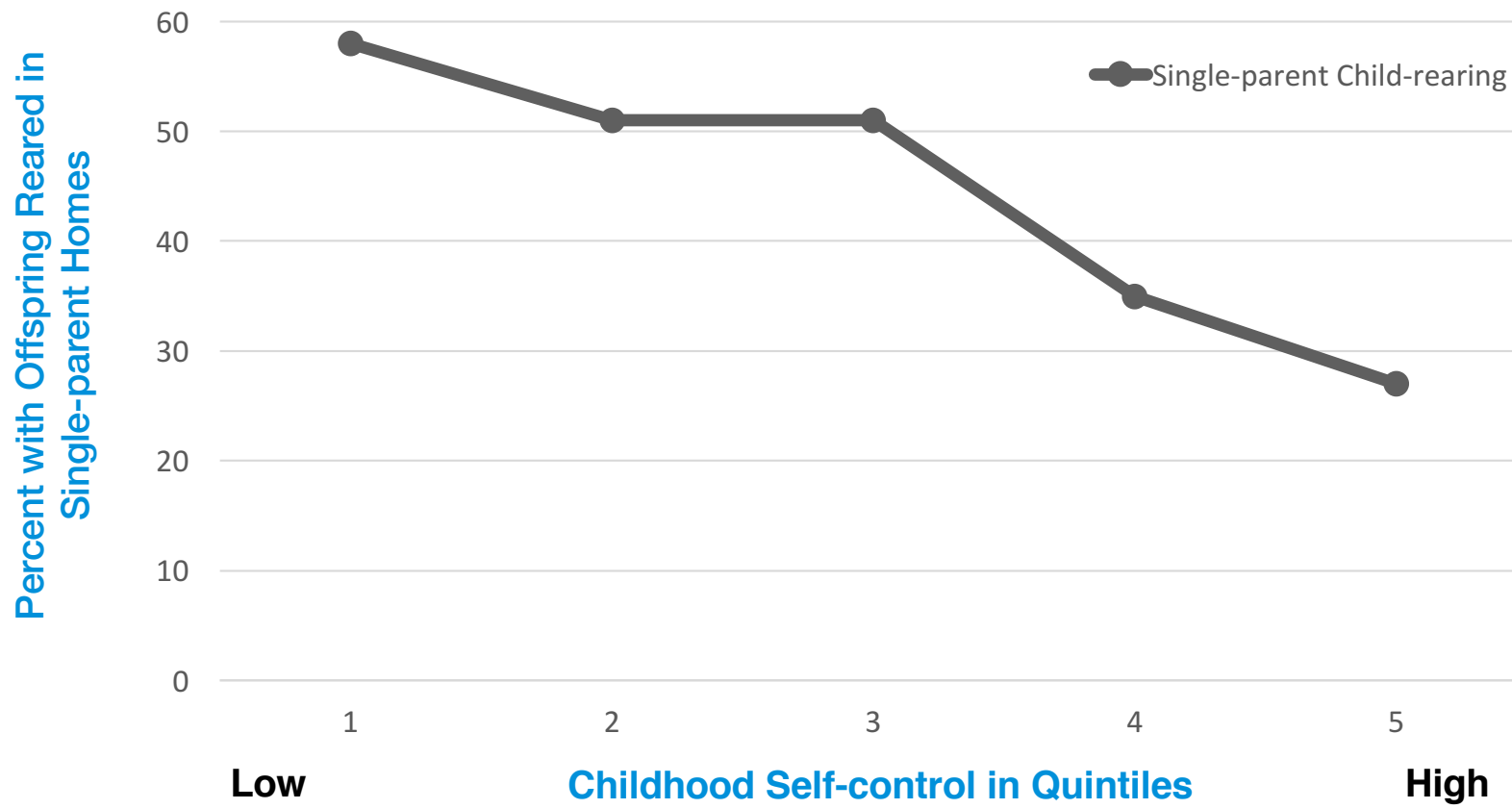
Moffitt et al., 2011

Self-Regulation in Childhood Predicts Later Outcomes: Crime



Moffitt et al., 2011

Self-Regulation in Childhood Predicts Later Outcomes: Single-parent



Moffitt et al., 2011

School Readiness

- Acquiring self-regulation
 - Emotions, behaviors and attention
- Communicating and learning
 - Language, reasoning and problem-solving
- Getting along with peers
 - Parent-child relationship is the first opportunity to experience trust, love, and nurturing, and forms the basis for learning to relate well to others.

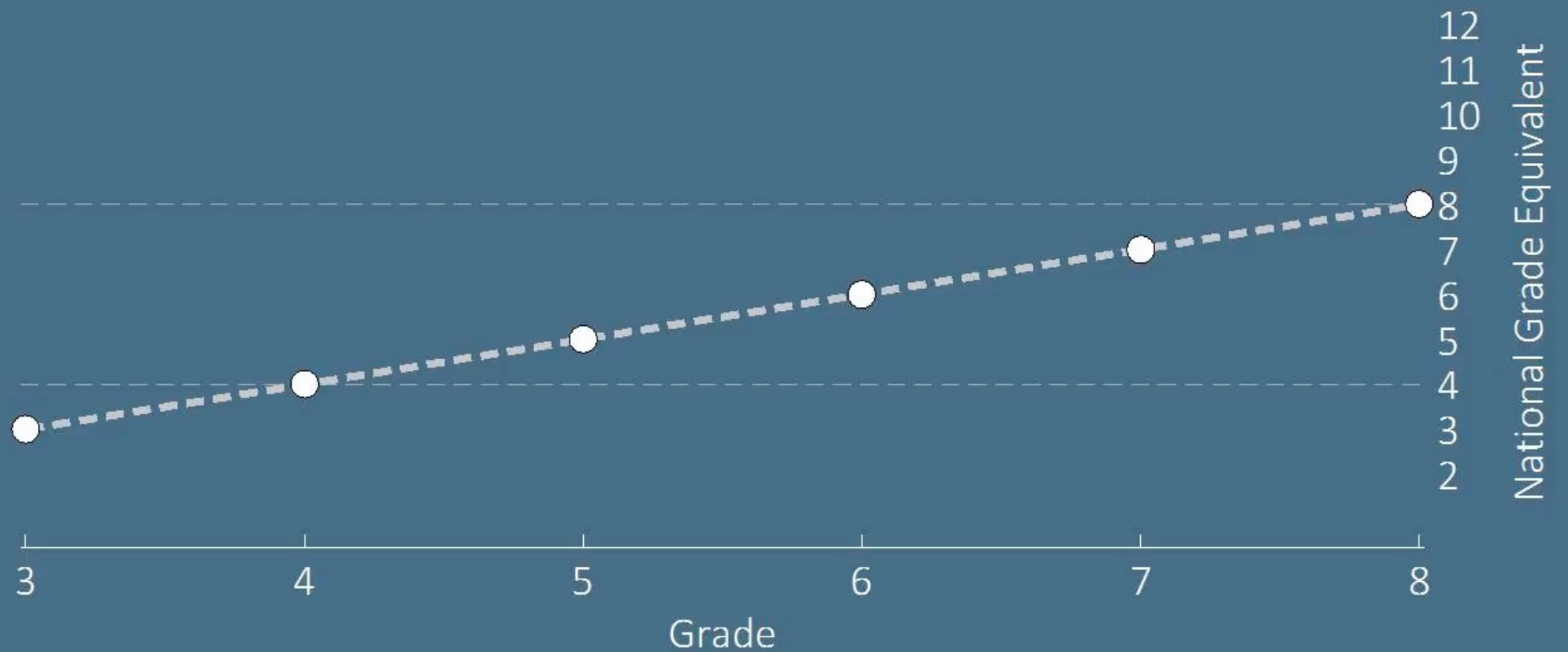
(National Research Council and Institute of Medicine, 2000)

Successful Schools



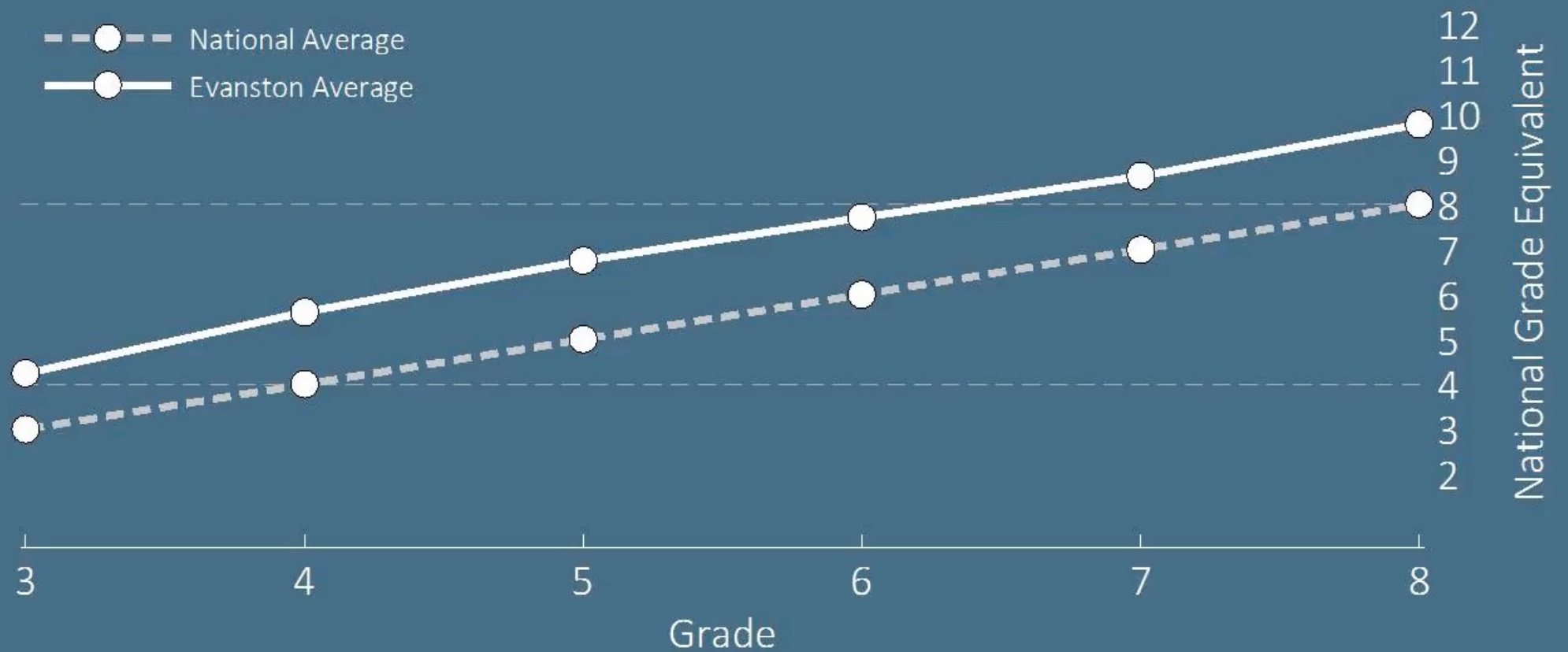
Average Academic Achievement, by Grade

National Average, 2009-2013



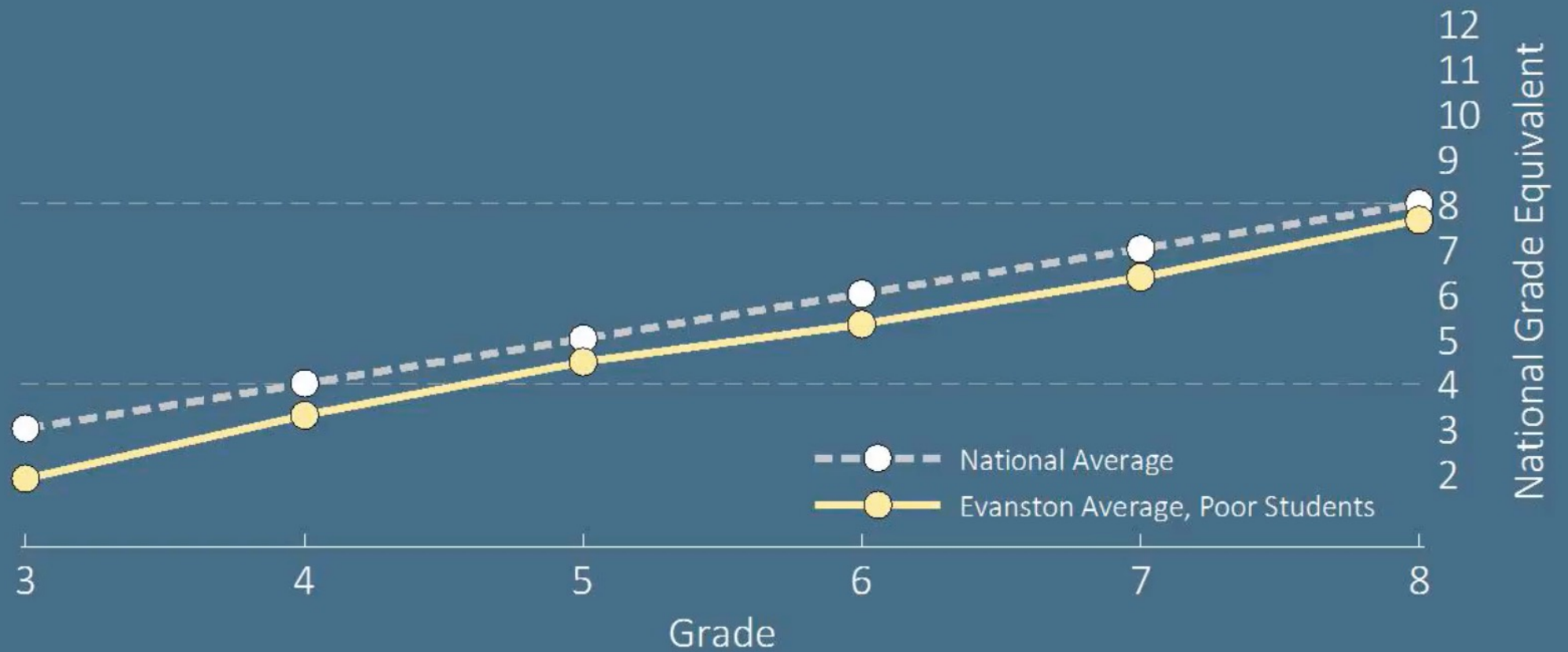
Average Academic Achievement, by Grade

Evanston, 2009-2013



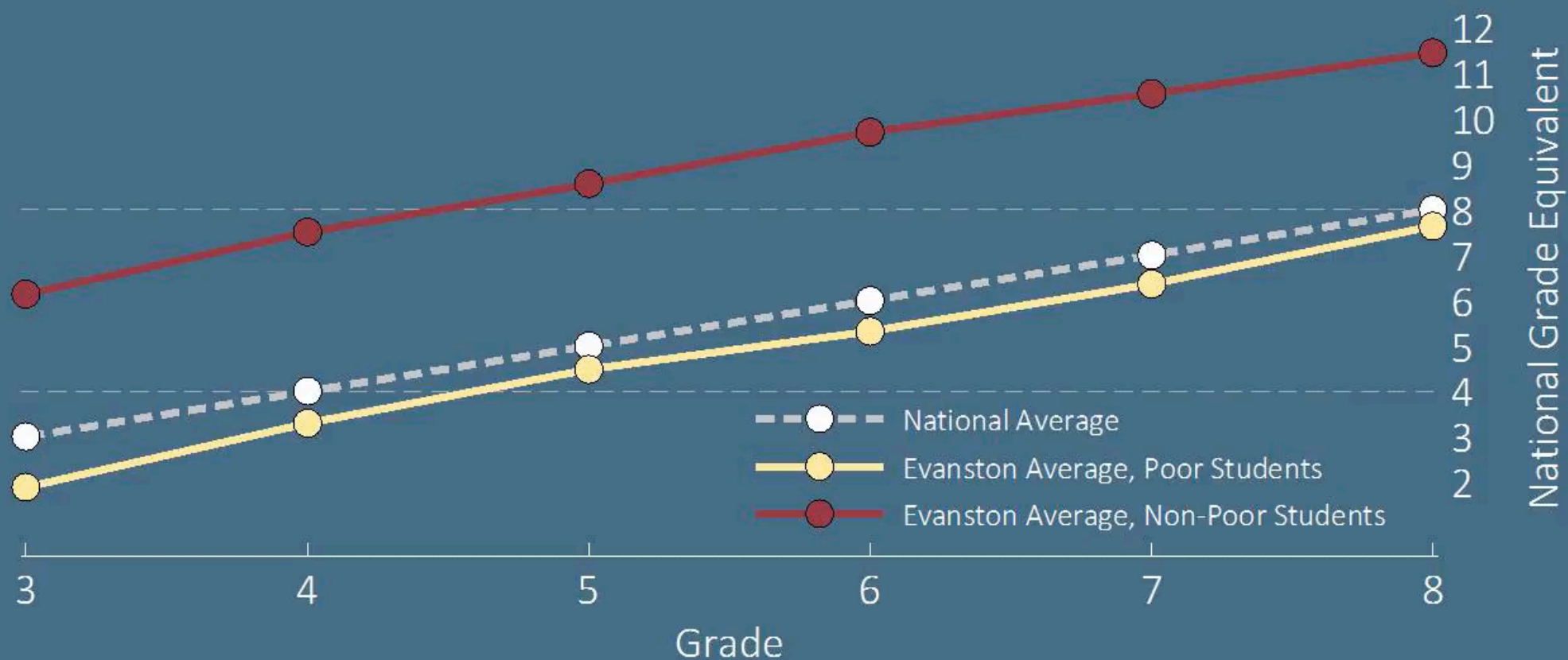
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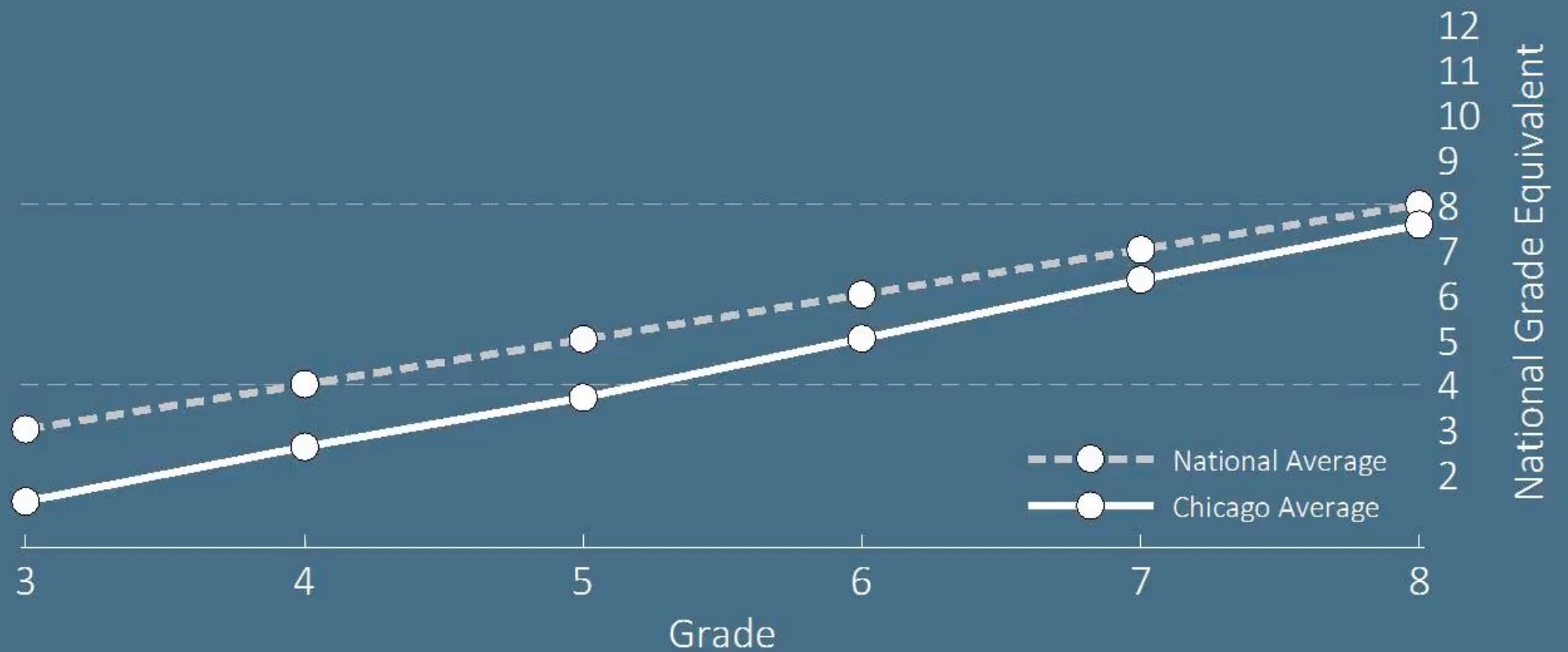
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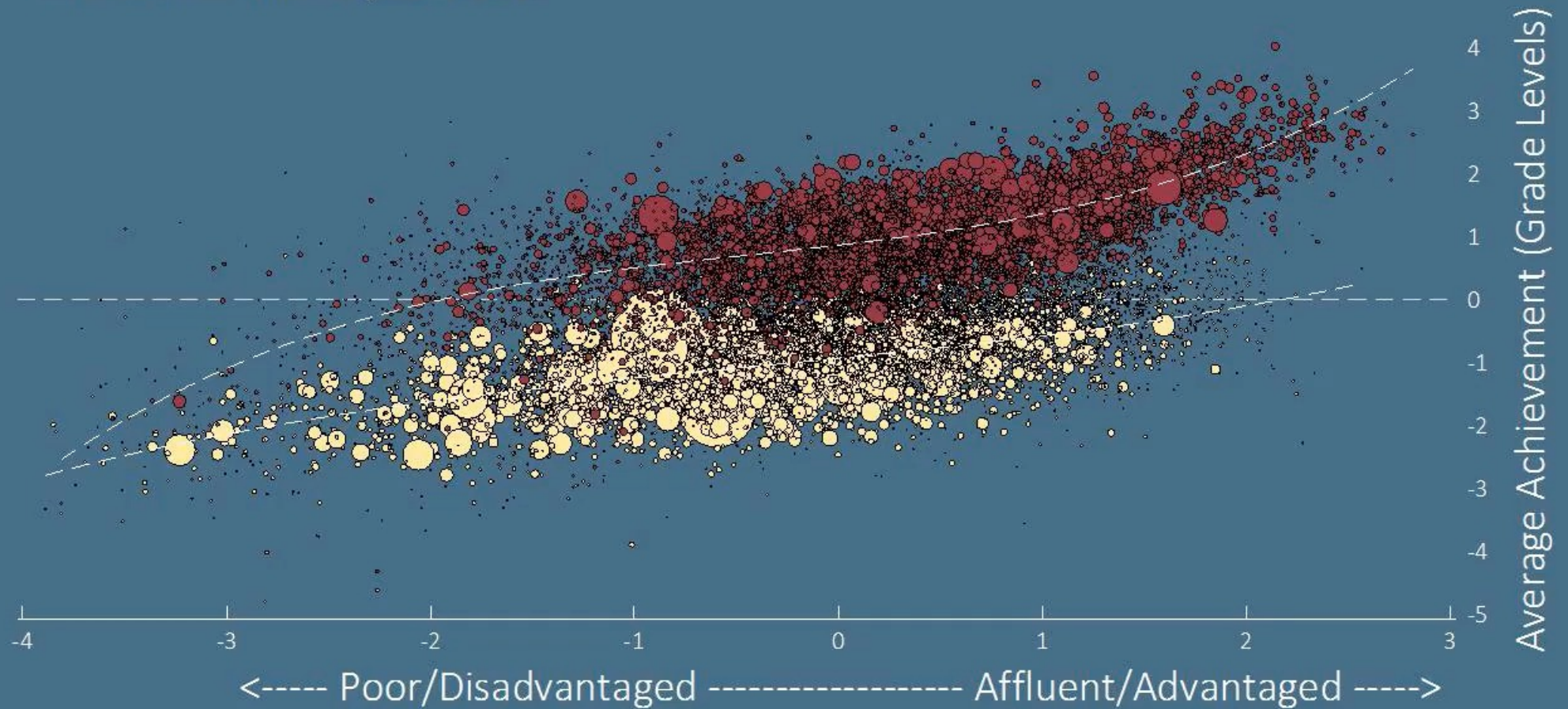
Average Academic Achievement, by Grade

Chicago, 2009-2013



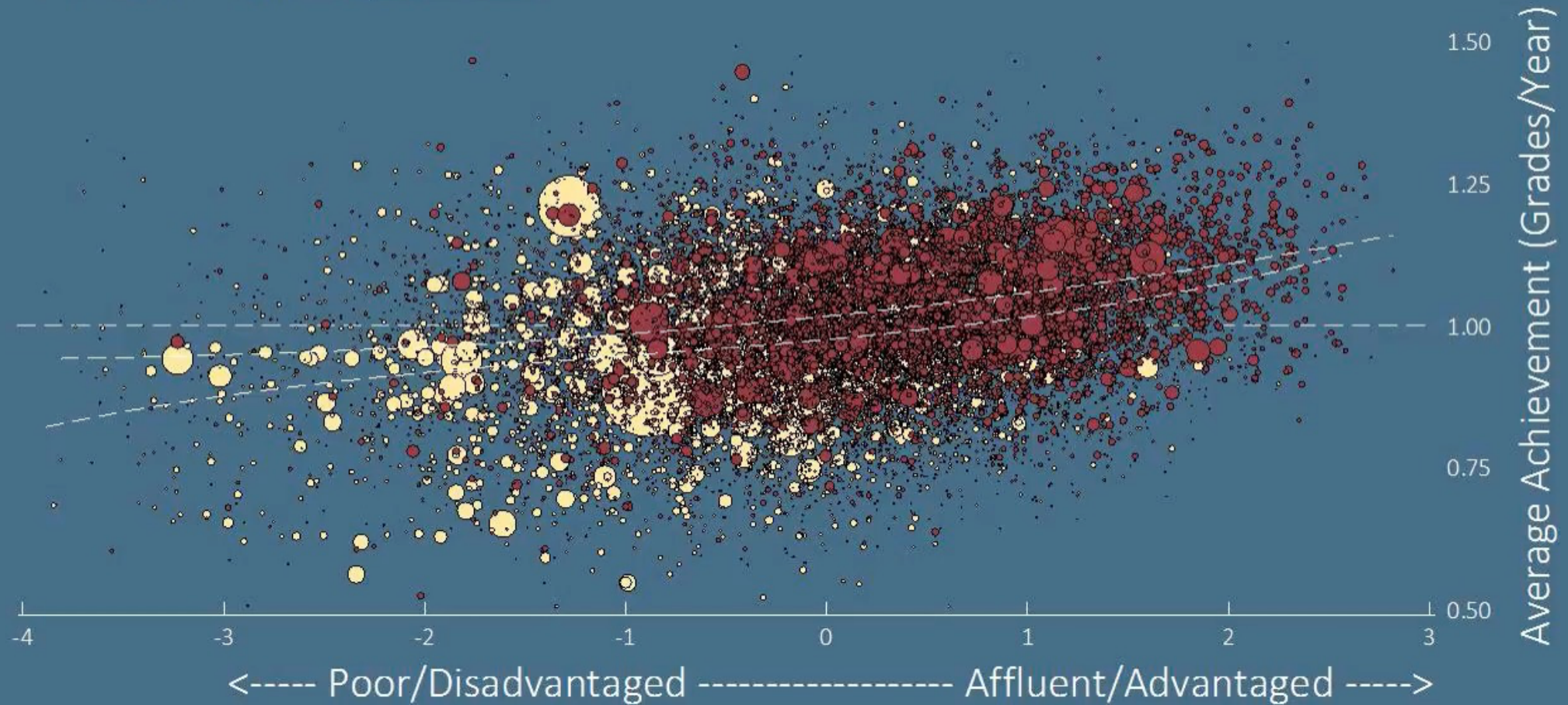
Academic Achievement and Socioeconomic Status

All US School Districts, 2009-2013



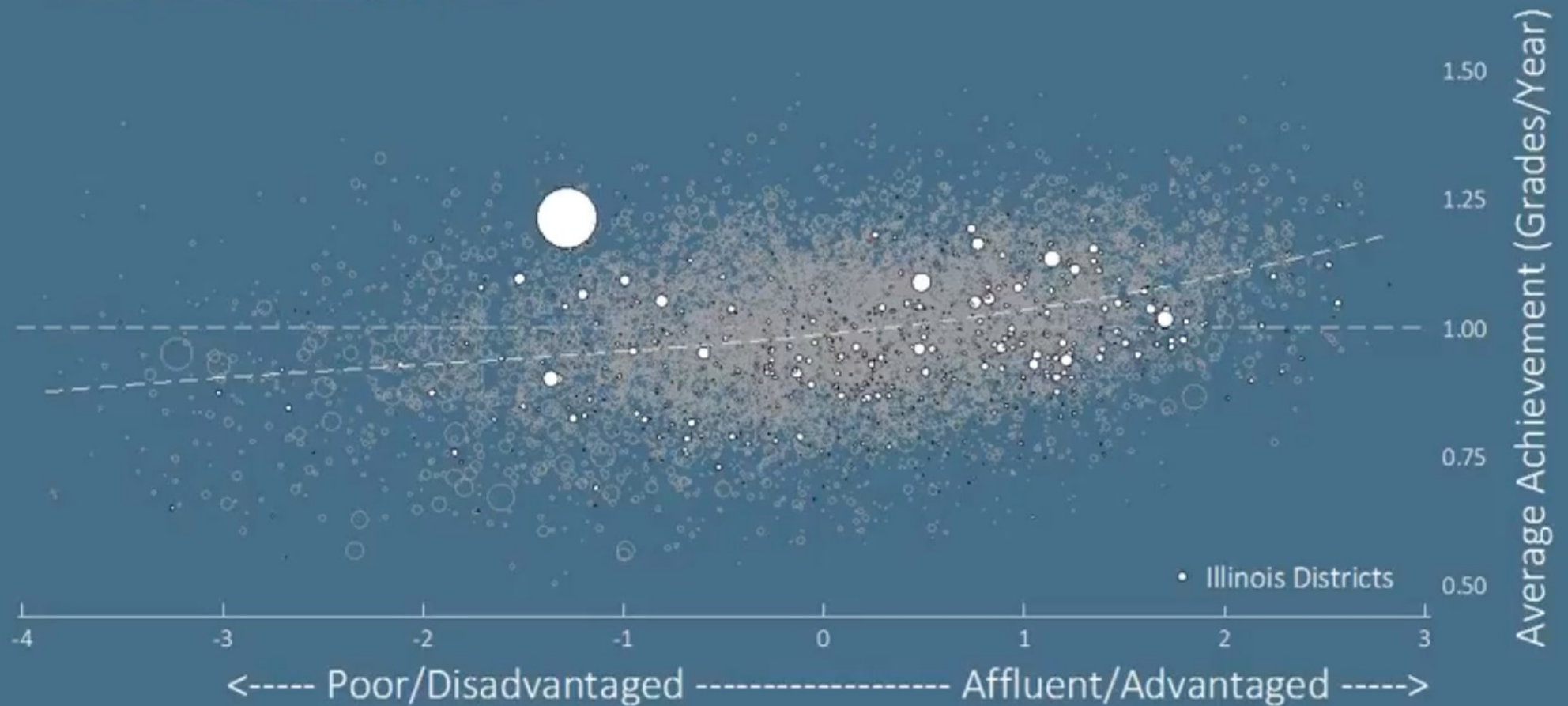
Achievement Growth and Socioeconomic Status

All US School Districts, 2009-2013



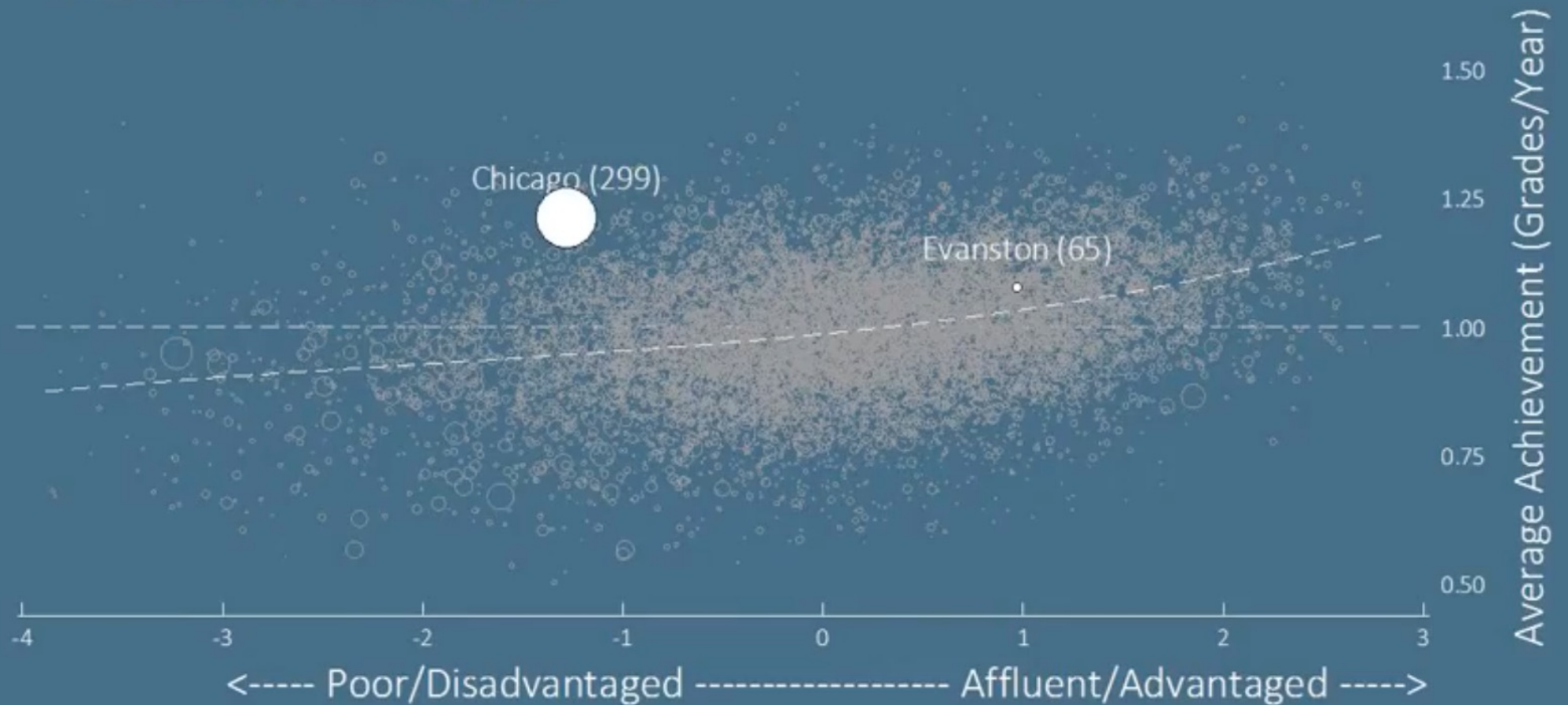
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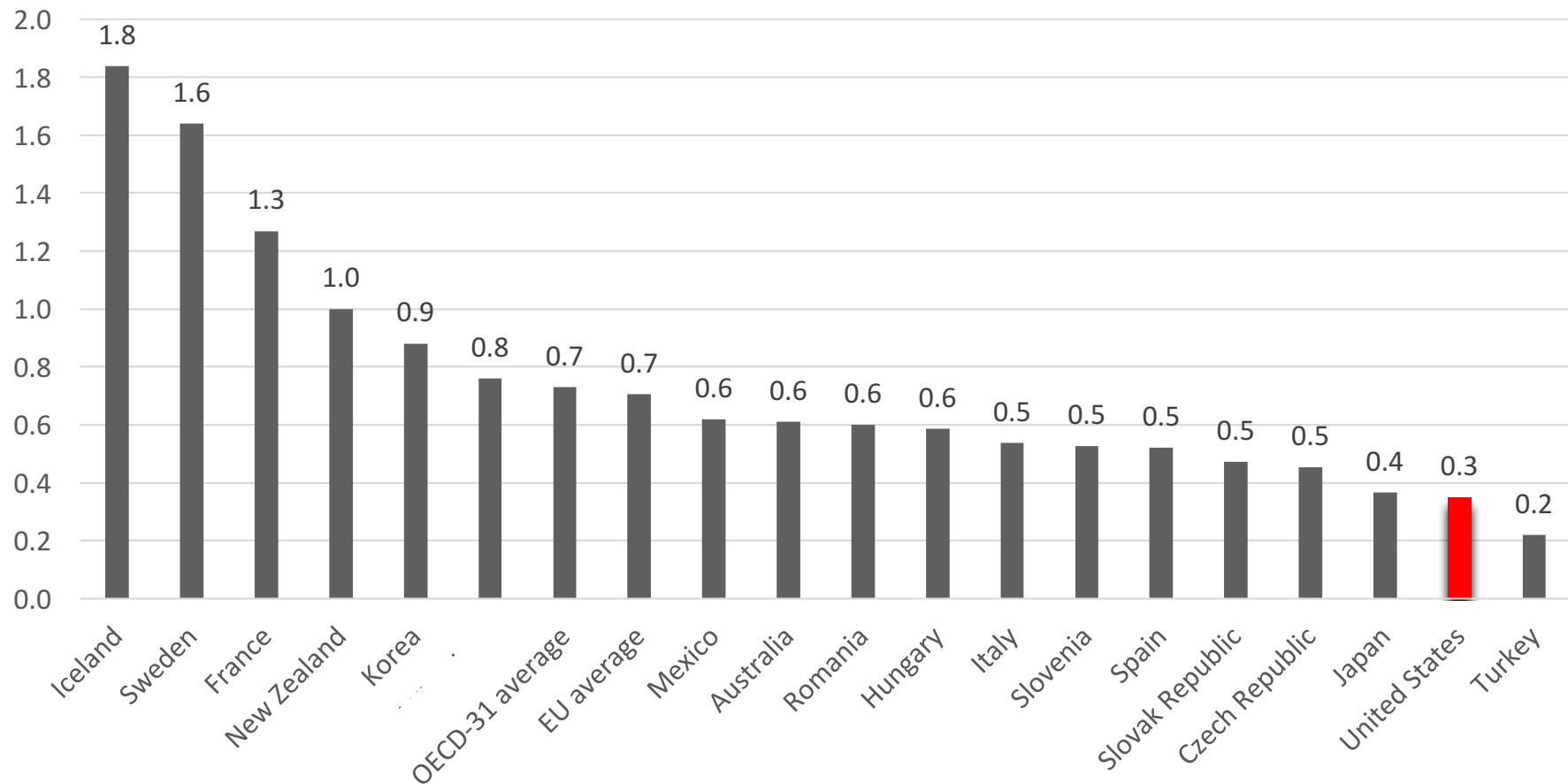
We Can't Afford It



We Can Afford It

- Wisconsin and Foxconn: Price per job
 - \$3,000,000,000
 - 13,000 jobs
 - = \$230,769 per job

Public Expenditures on ECE (GDP)



OECD, 2016

Closing Thoughts



The Importance of Early Childhood Education



The Importance of Early Learning



The Importance of Early Childhood Development



The Importance of Early Experience



Relationships are the "Active Ingredients" of Early Experience



Relationship



Relationship



Relationship



Closing Thoughts

- Focus on early childhood experiences, not just education
 - Risk stays with you your entire life
- “As goes relationships, so goes the child”
 - Relationships-Relationships-Relationships
 - Impact of secure relationships is not just emotional or psychological – It is biochemical
 - Kids don’t become resilient alone

Closing Thoughts

- Schools are doing exactly what they are designed to do:
 - Gap in performance when kids ARRIVE at school
 - Is the school doing more than expected (i.e., closing that gap), even if the school as a whole is “under-performing”

1,100 Days



Thank you



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