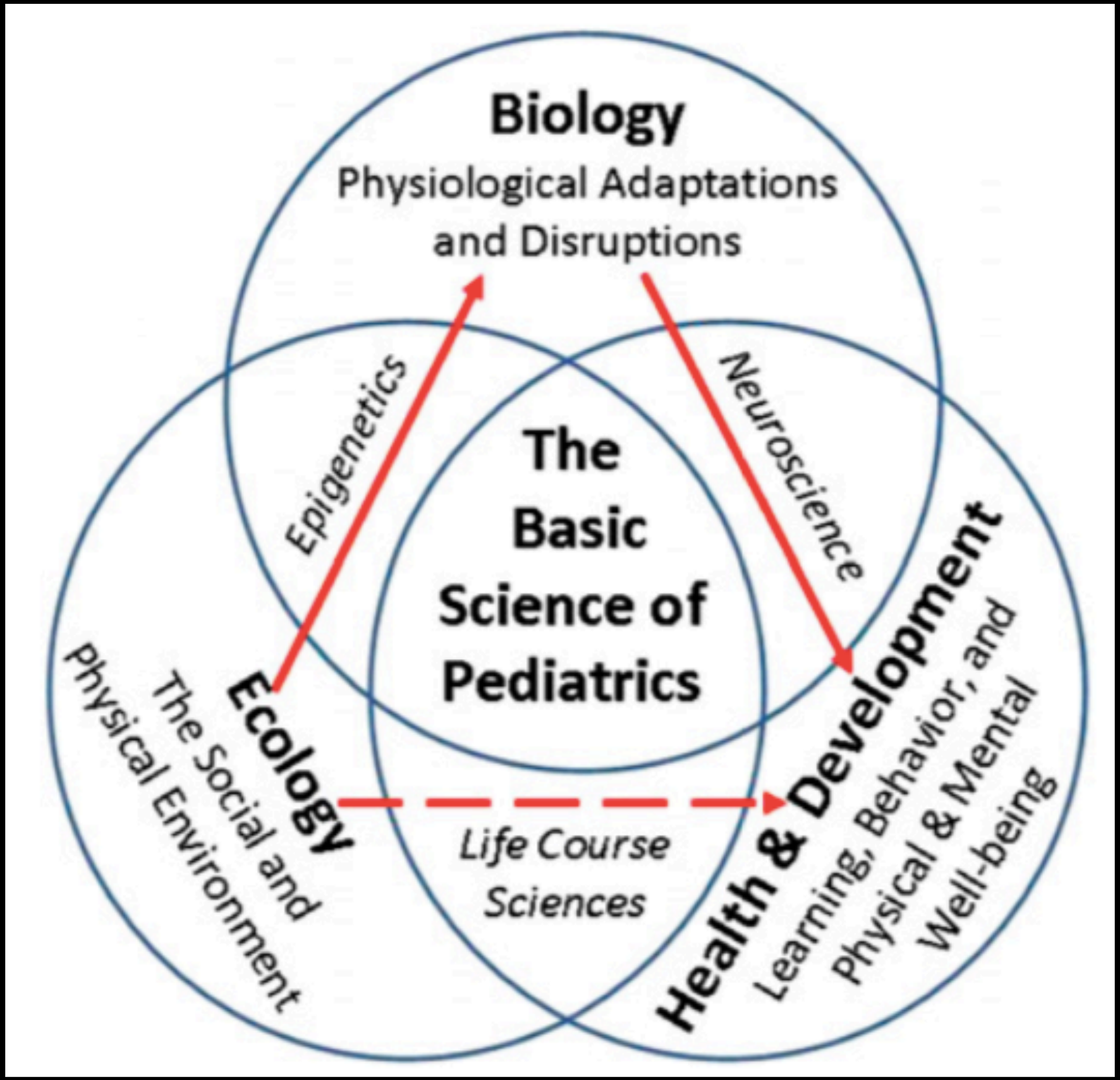
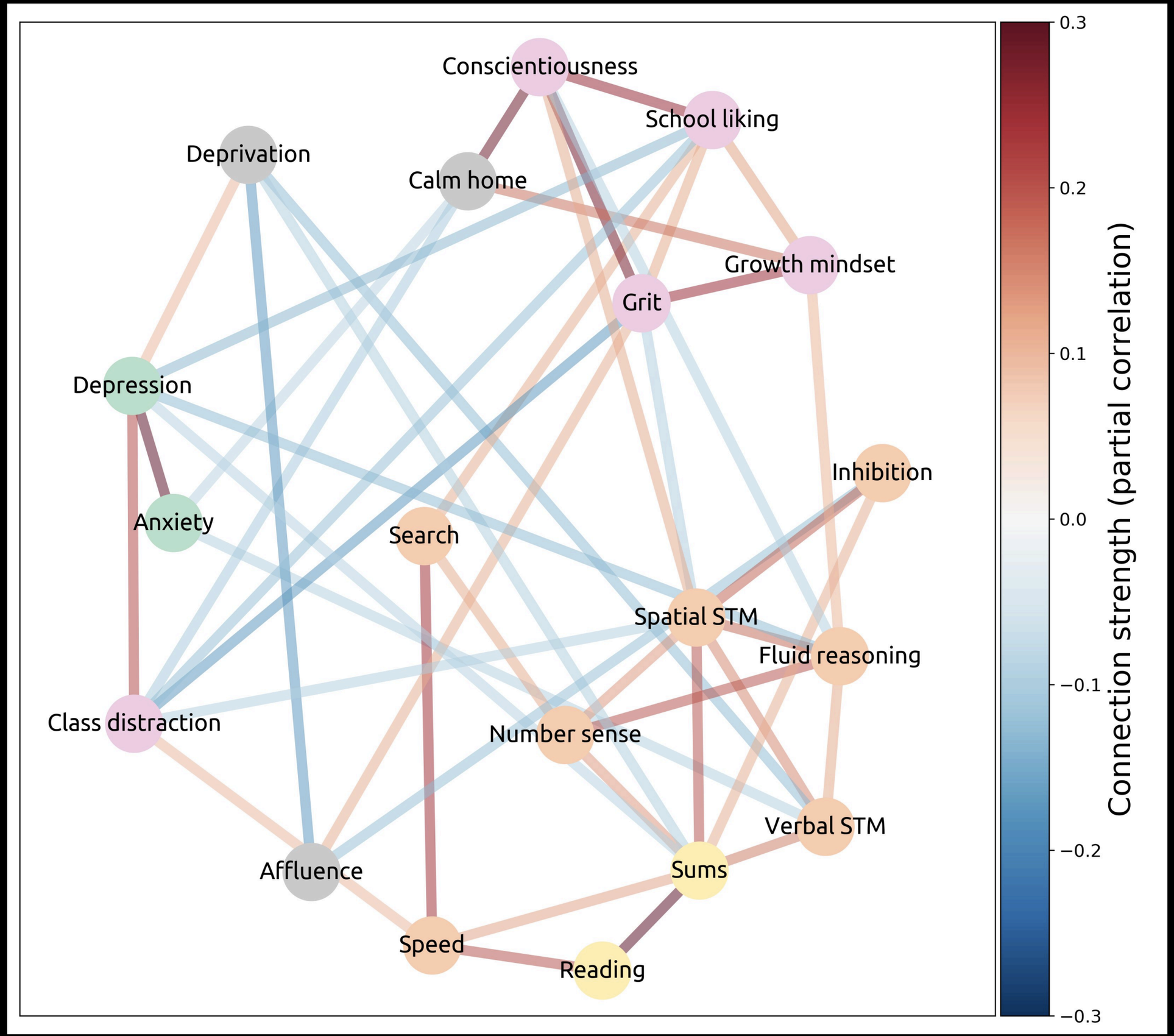
Promises & Pitfalls of Teaching the Science of Early Childhood Adversity

Ryan Giuliano

University of Manitoba
Psychology Department
Teaching Award Colloquium
February 8, 2020



Shonkoff (2012). *Pediatrics*.



Dalmaijer et al. (2019). https://psyarxiv.com/yfn56

Overview

- My teaching approach
- Overview of the science of early adversity
- Promises (*the optimist*)
- Pitfalls (*the pessimist*)
- Suggestions moving forward (*the pragmatist*)

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PSYC 2290:
Child Development

- A01: 190 students; A02: 83 students
- Large lecture format

Hugely indebted to the contributions from my wise & knowledgeable colleagues:

Elif Isbell
U of California Merced

Mandy Hampton-Wray
Pitt

Shannon Peak
Oregon

PSYC 4540/7310: Neuropsychology of Inequality

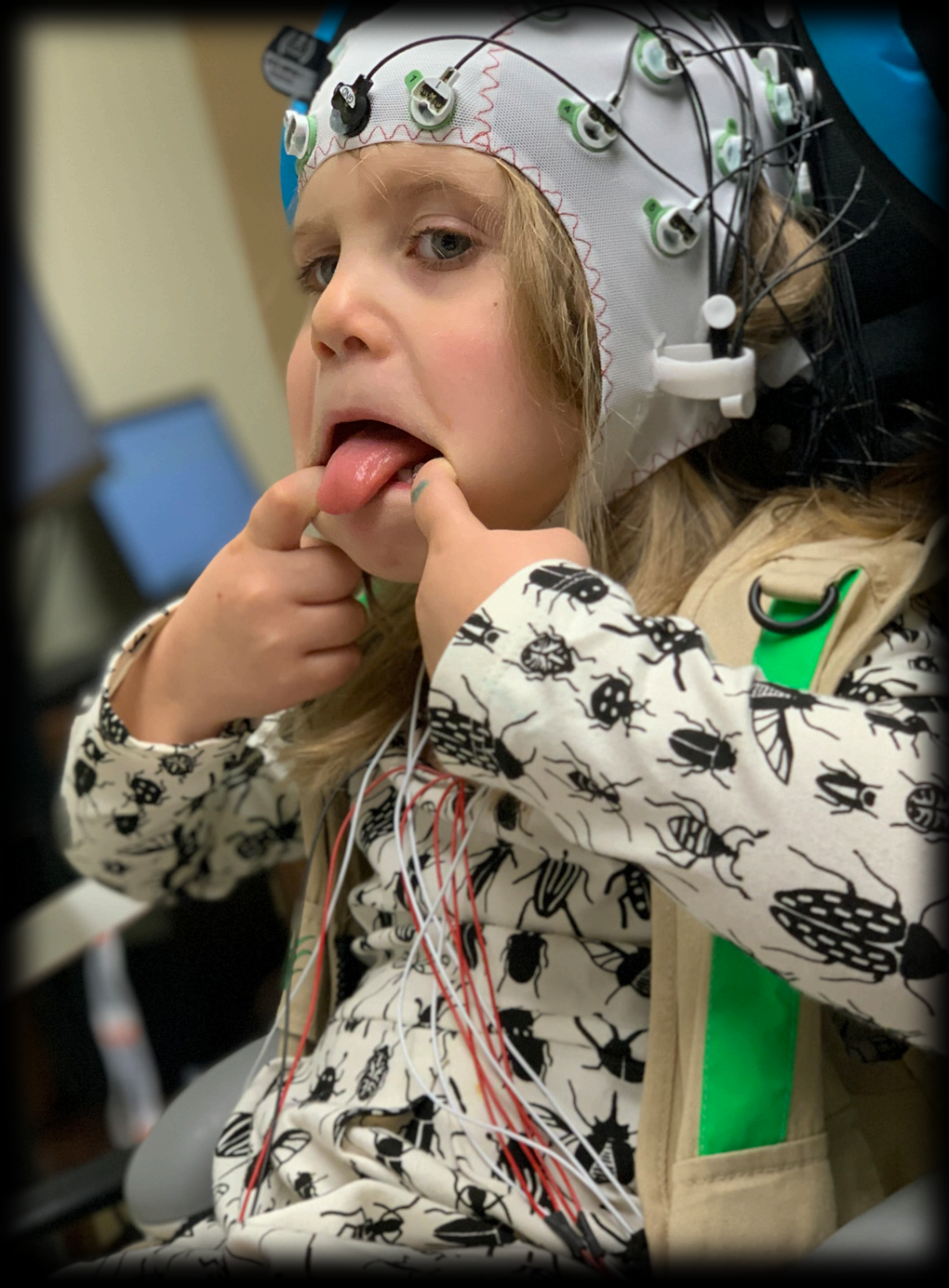
- ~15 students
- Undergrad/grad seminar

Hugely indebted to the contributions & inspirations from my colleagues/mentors:

Helen Neville
Oregon
(1946-2018)

Eric Pakulak
Stockholm U

Phil Fisher
Oregon



My Background

- Co-director of the *Hearts & Minds Lab*
- Neurobiological mechanisms of stress reactivity and recovery in young children
- Individual differences in parent & child cognition

Gameifying the Classroom

- iClicker promotes student engagement and participation in large lecture classes:
    1. Testing 'threat' keeps students on their toes
    2. Every single time you come to lecture, you will personally engage in an assignment
    3. '*Gotcha*' questions gives me feedback about how many students were 'checked out'
    4. Targeted questions allow me to focus students' studying to specific concepts
- Students encouraged to study iClicker questions as the basis for more complex exam questions
- Don't need a remote; free use at U of M via app

Mini-quiz time...

[4 questions]

1. On average, infants start crawling at:

a.) 6 months b.) 10 months c.) 18 months

2. In the video, what was used to study crawling?

a.) Mountain b.) Tower c.) Cliff

3. An example of a conditioned response is:

a.) Rooting towards something on your cheek.

b.) Getting hungry upon seeing a food you like.

c.) Grasping something placed into your hand.

4. ___ learning is a process by which children learn probabilities of events.

a.) Observational b.) Instrumental c.) Statistical

My Approach

- Empowering students of child development to utilize/seek knowledge on promoting well-being
- Connecting students w/ resources to affect change
- “Outreach” projects

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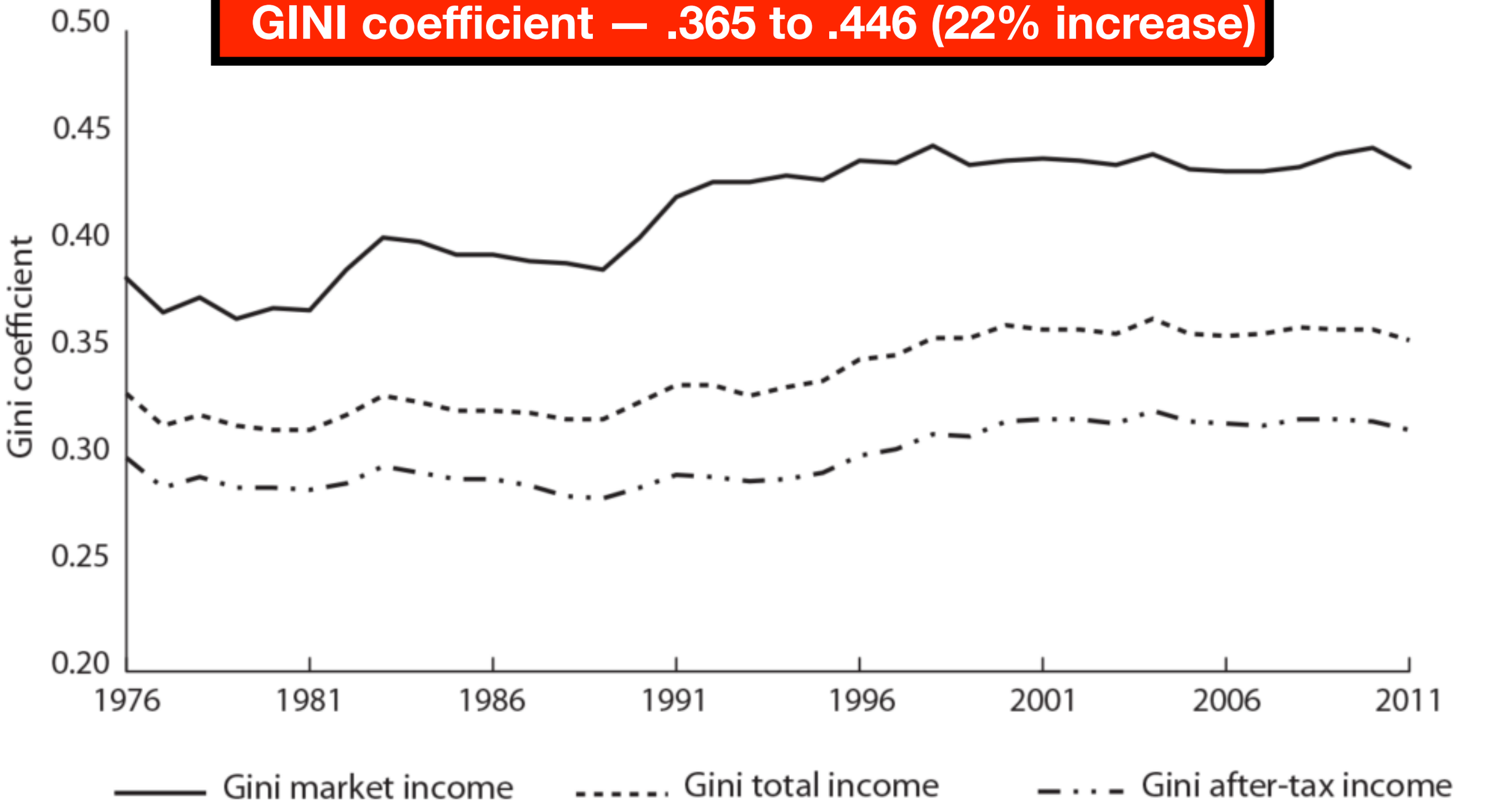
Wilkinson & Pickett. *The Spirit Level*.

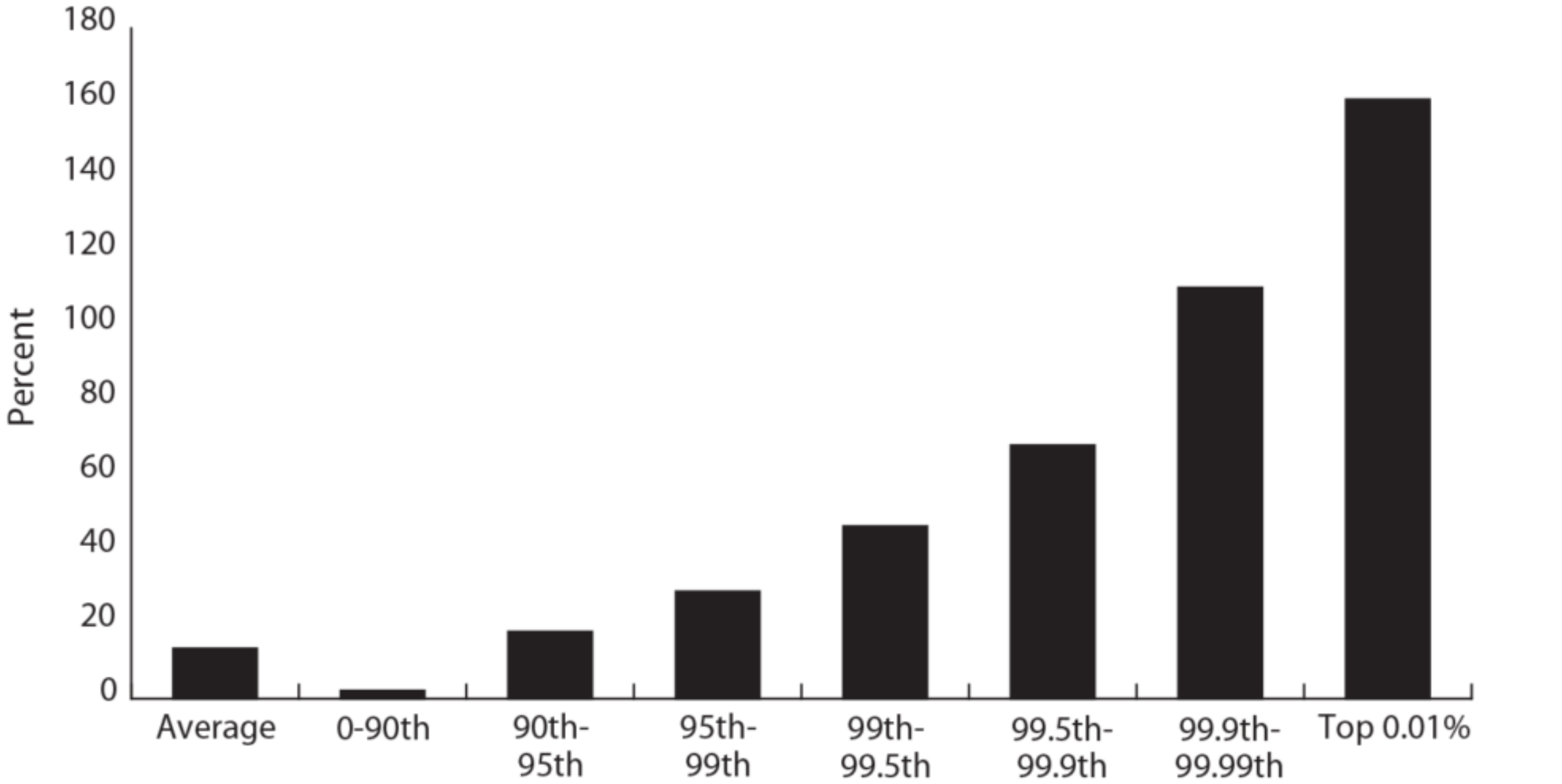
Increasing inequality in Family Market Income
GINI coefficient — .365 to .446 (22% increase)



Source: Statistics Canada, CANSIM table 202-0709.
Note: This is figure 3 in Heisz and Murphy (in this volume).

Figure 2

Total income[1] growth by fractile, Canada, 1982-2010 (percent)



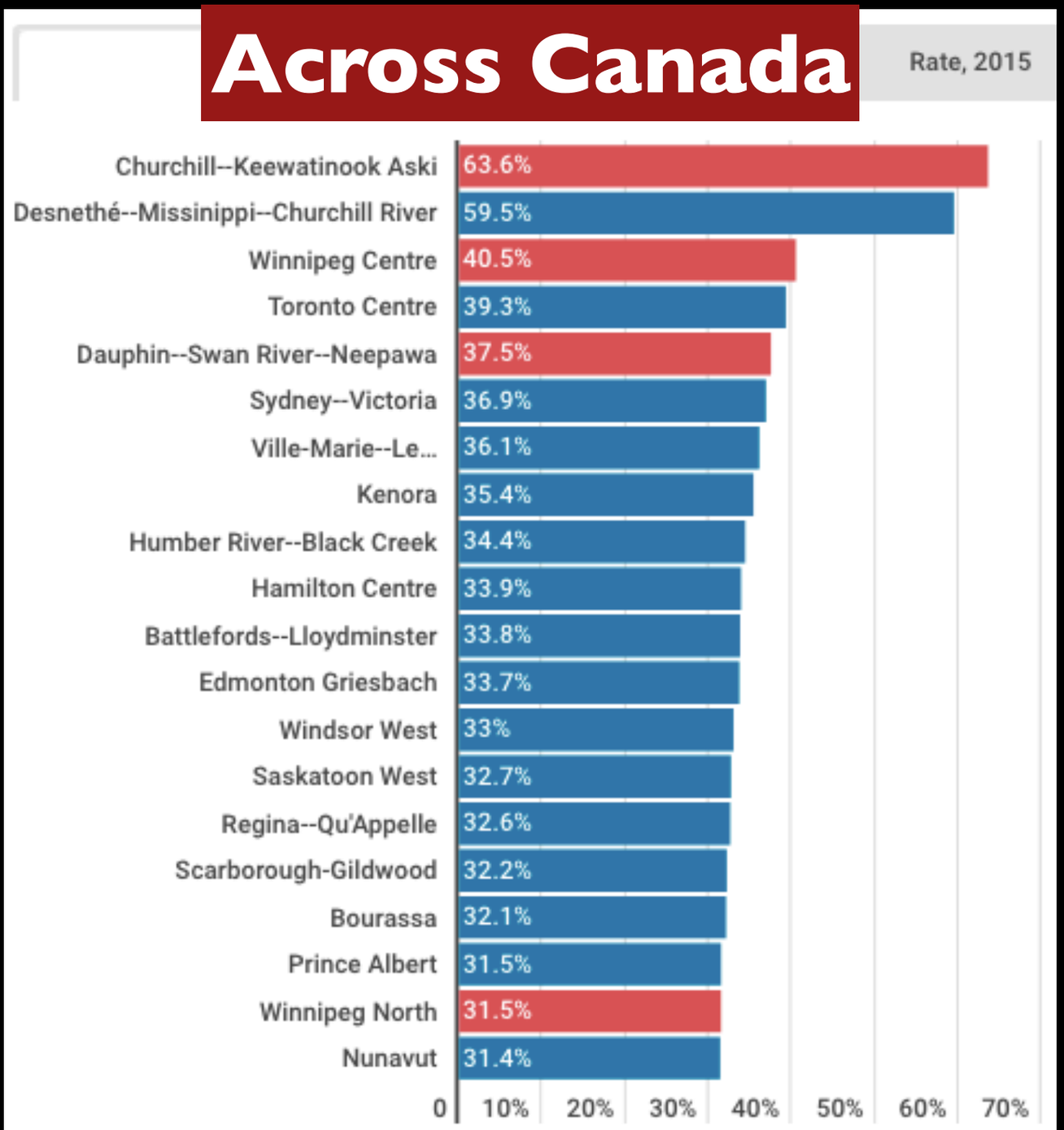
Source: Authors' calculations based on F. Alvaredo, T. Atkinson, T. Piketty and E. Saez, World Top Incomes Database (http://topincomes.parisschoolofeconomics.eu/).

Note: This is figure 2 in Lemieux and Riddell (in this volume).

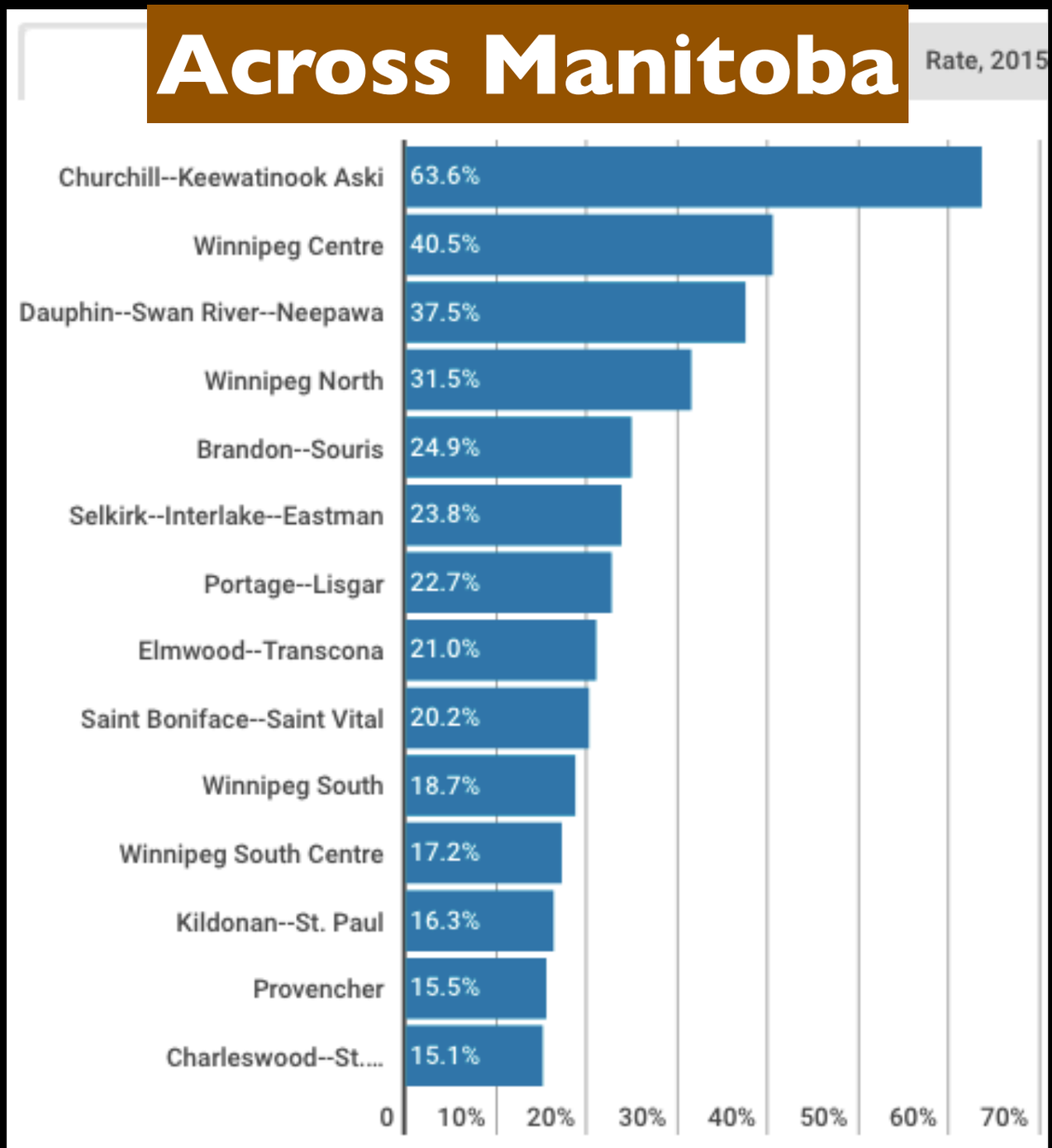
[1] Based on market income, which includes all income except government transfers and capital gains. The data are based on all taxfilers, including those with zero income.

Manitoba: home to 3 of 5 ridings with highest child poverty rates

Across Canada



Across Manitoba



Manitoba: 19 of 20 pediatric health outcomes show inequality gradients

Pediatric RESEARCH

www.nature.com/pr

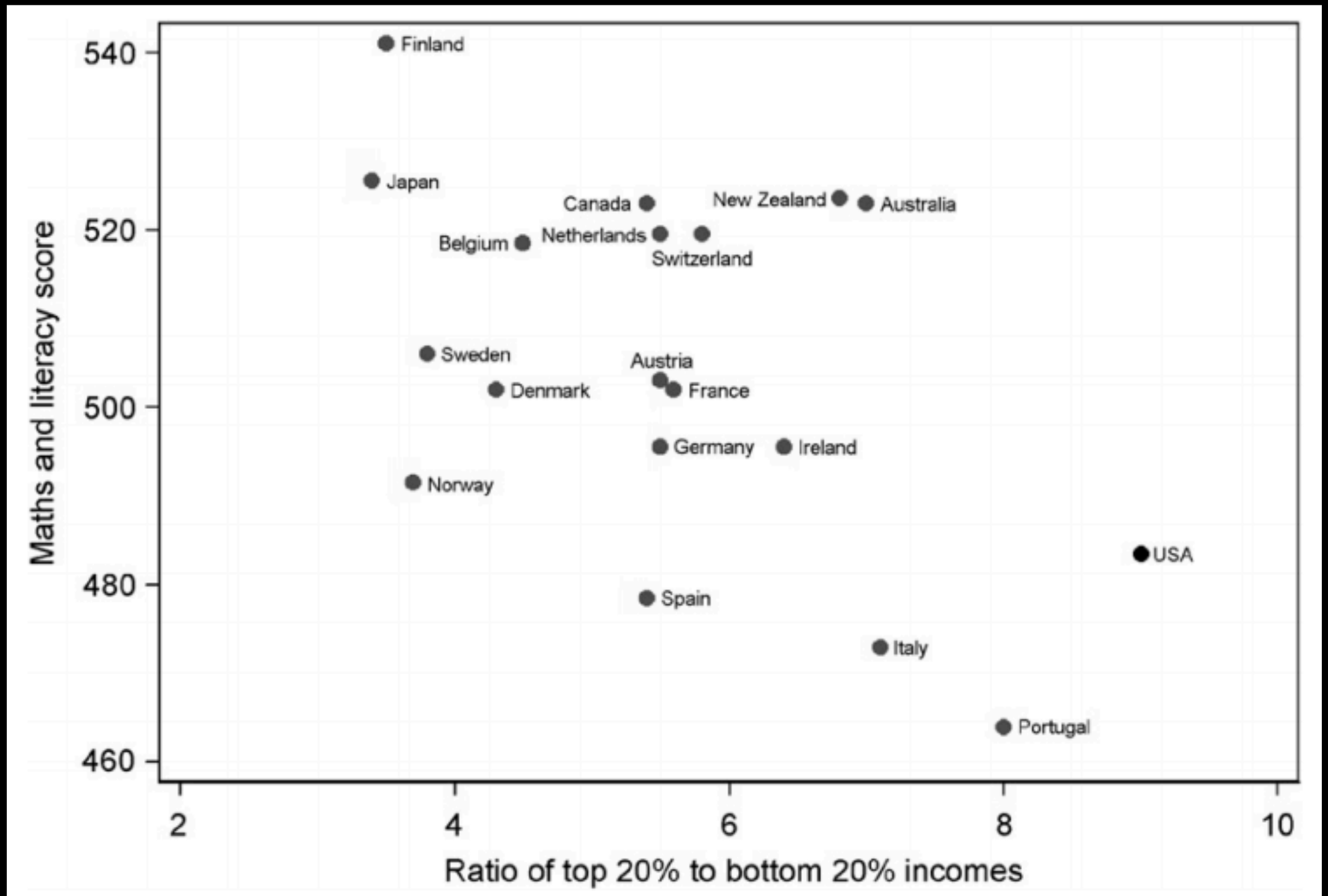
POPULATION STUDY ARTICLE

Assessing childhood health outcome inequalities with area-based socioeconomic measures: a retrospective cross-sectional study using Manitoba population data

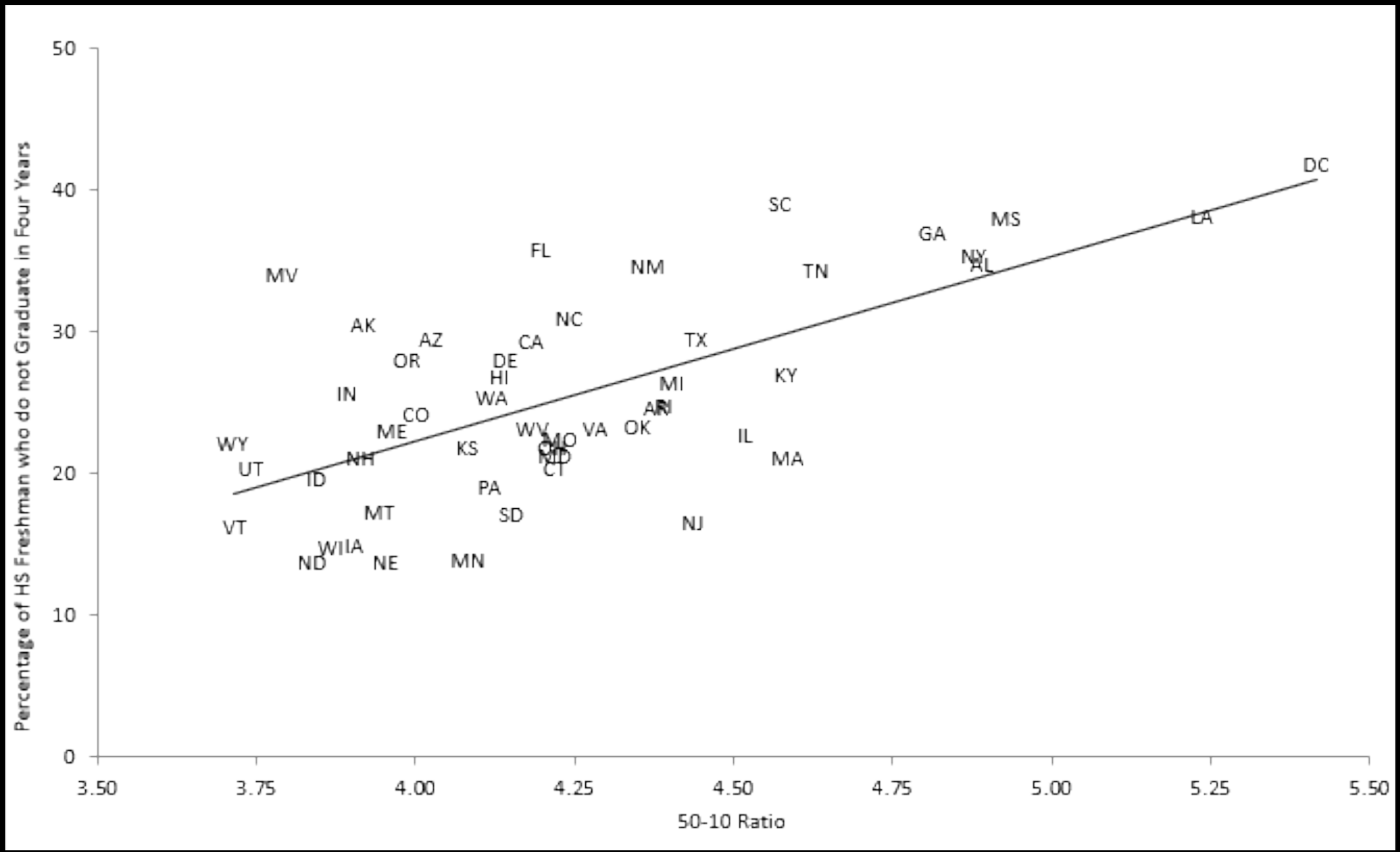
Atul K. Sharma[1], Kristine Kroeker[2], Dan Chateau[3], Marni Brownell[3] and Celia J. Rodd[1]

16 of those 19 predicted solely by income quartile.

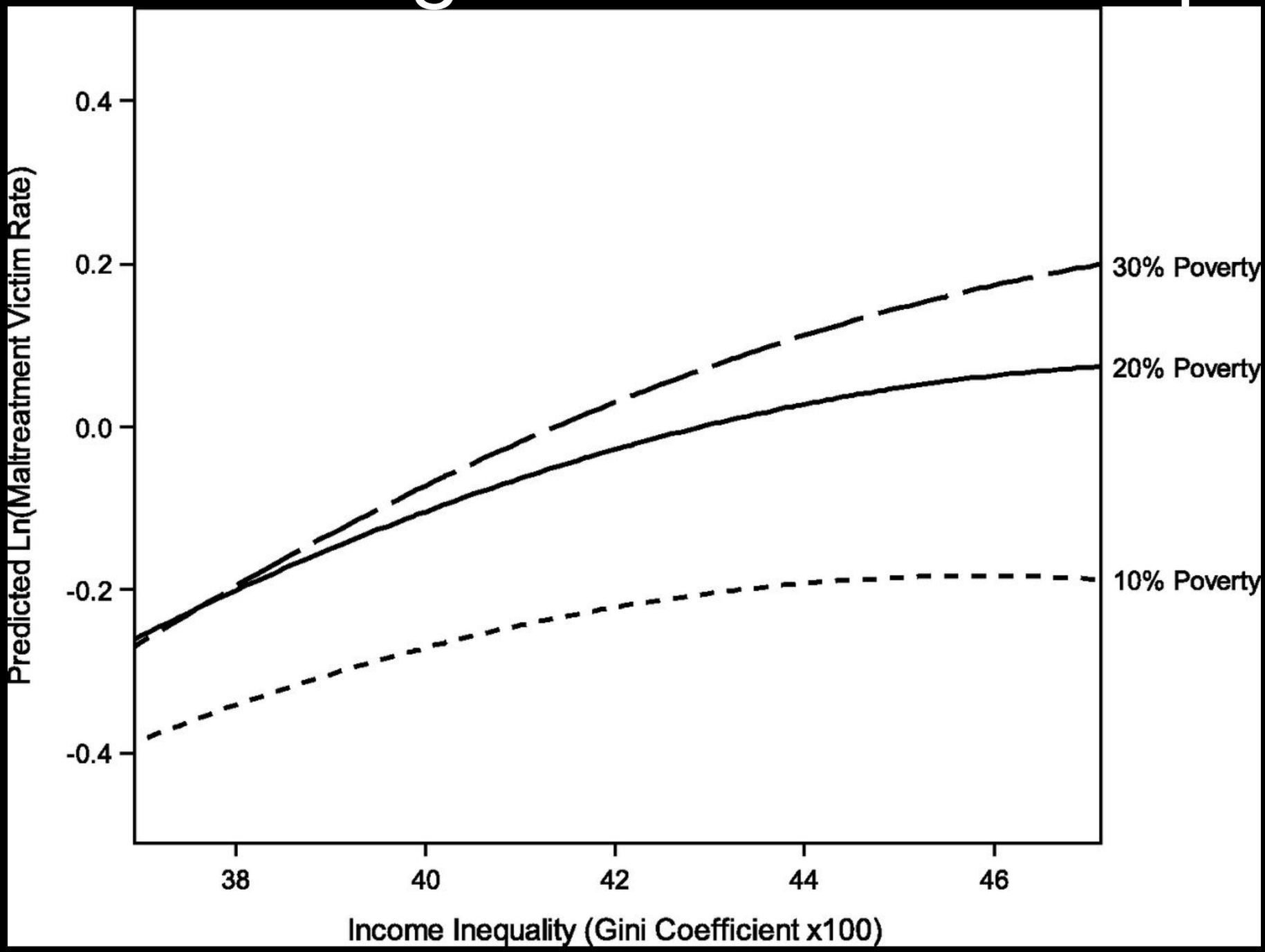
Math & literacy scores are lower in more unequal countries.



High school drop out rate higher in more unequal states (USA).

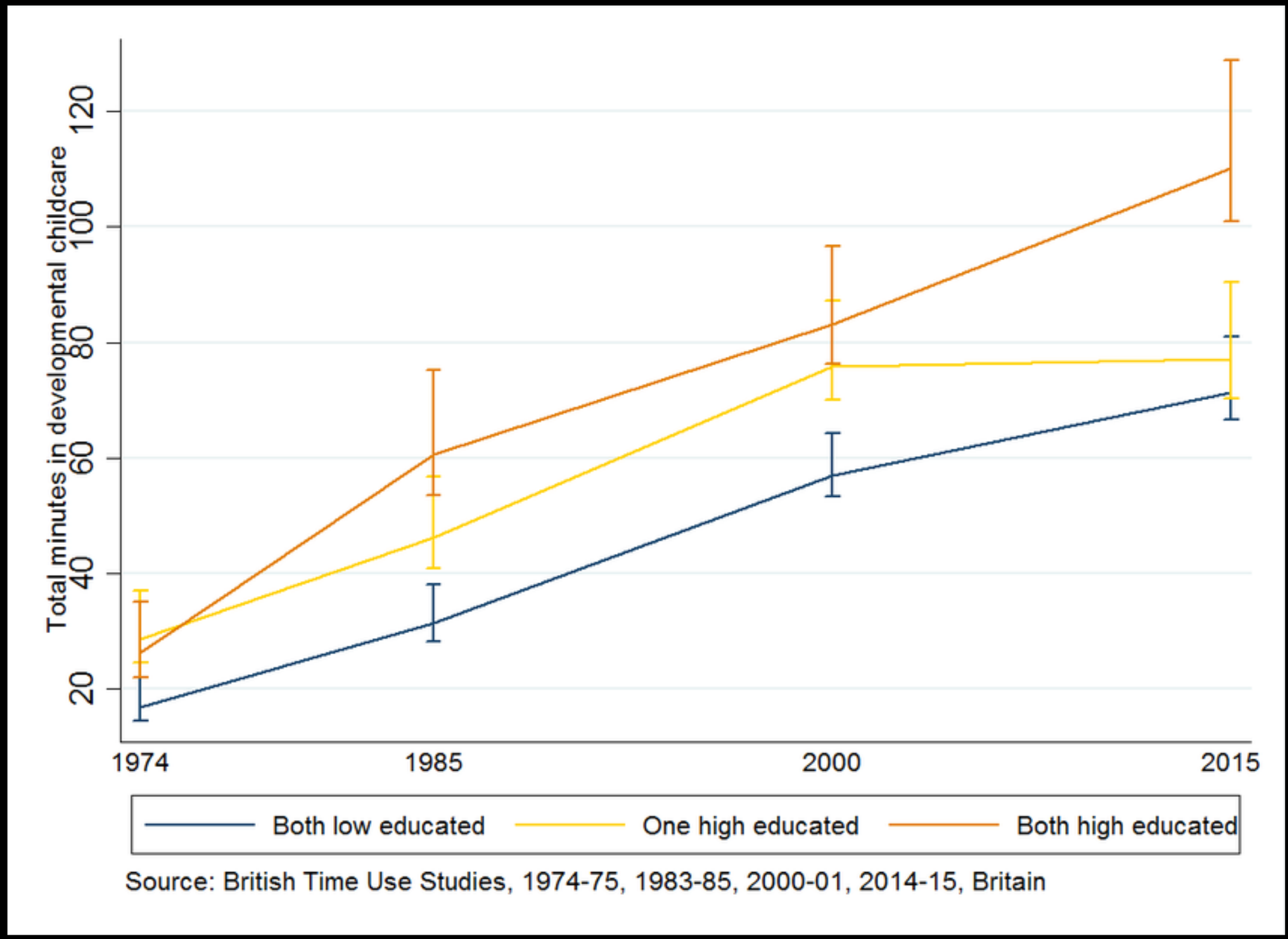


Child maltreatment more likely in more unequal countries — even more so for countries with higher levels of child poverty.



Eckenrode, J., Smith, E. G., McCarthy, M. E., & Dineen, M. (2014). Income inequality and child maltreatment in the United States. *Pediatrics*, peds-2013.

Disparity in total minutes children spend in daycare as a function of parents' SES.

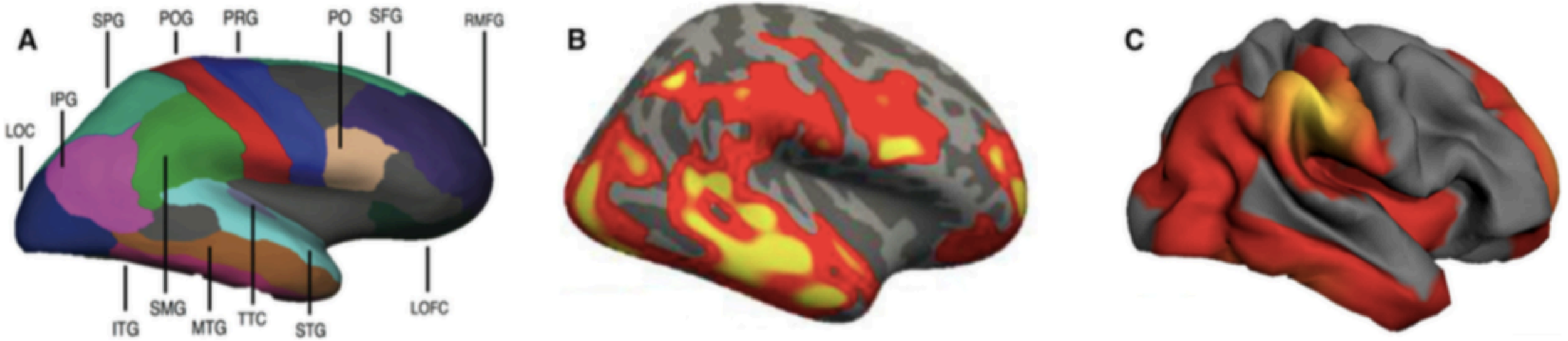


Richards, L., Garratt, E., Heath, A. F., Anderson, L., & Altintas, E. (2016). The childhood origins of social mobility: socio-economic inequalities and changing opportunities.

Neighbourhood SES (adults)

Household income (children)

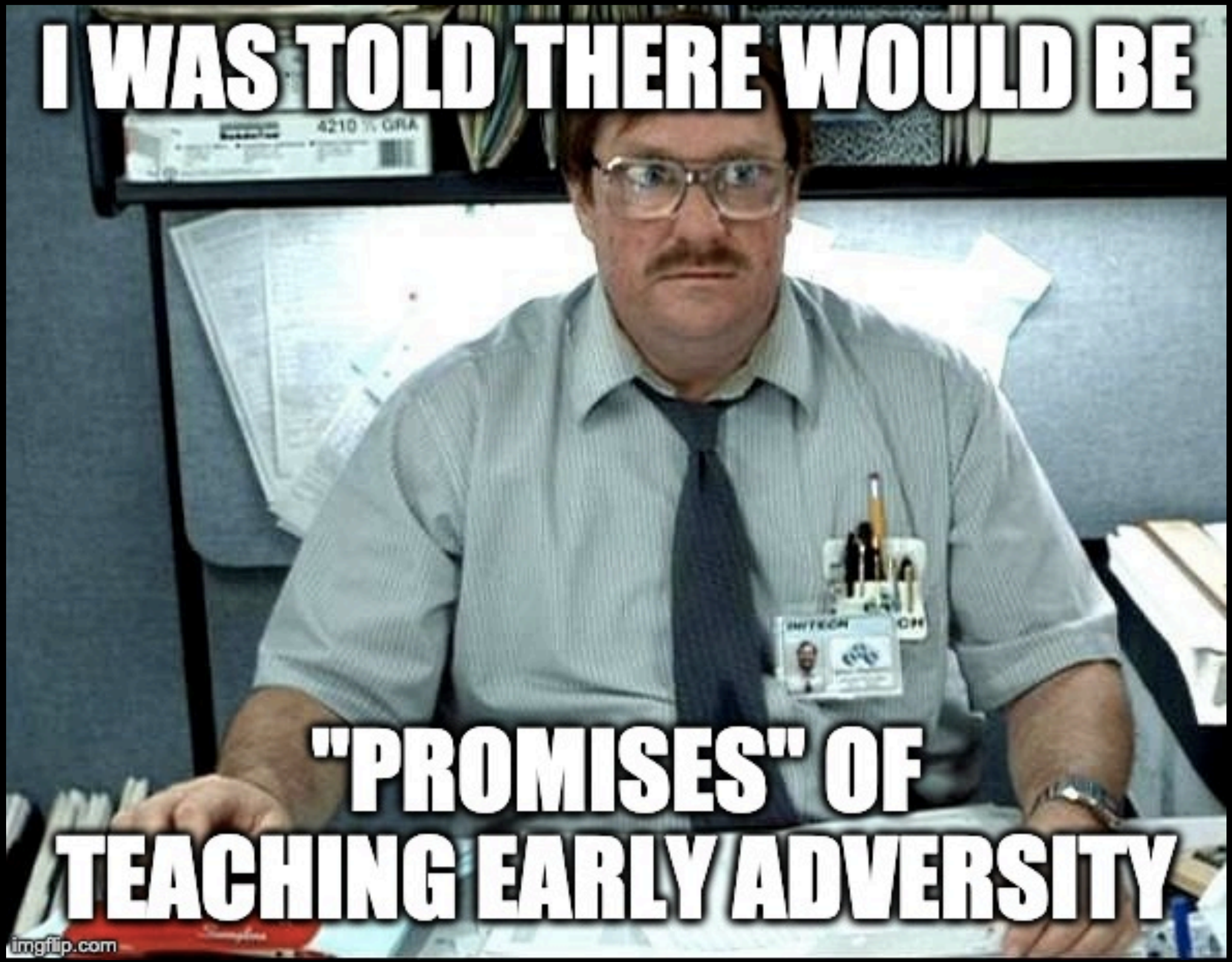
Parent education (children)



Impacted cognitive functions:

- Language
- Attention & Working Memory
- Declarative memory

Farah (2017). The Neuroscience of Socioeconomic Status. *Neuron*.


I WAS TOLD THERE WOULD BE
"PROMISES" OF
TEACHING EARLY ADVERSITY
imgflip.com

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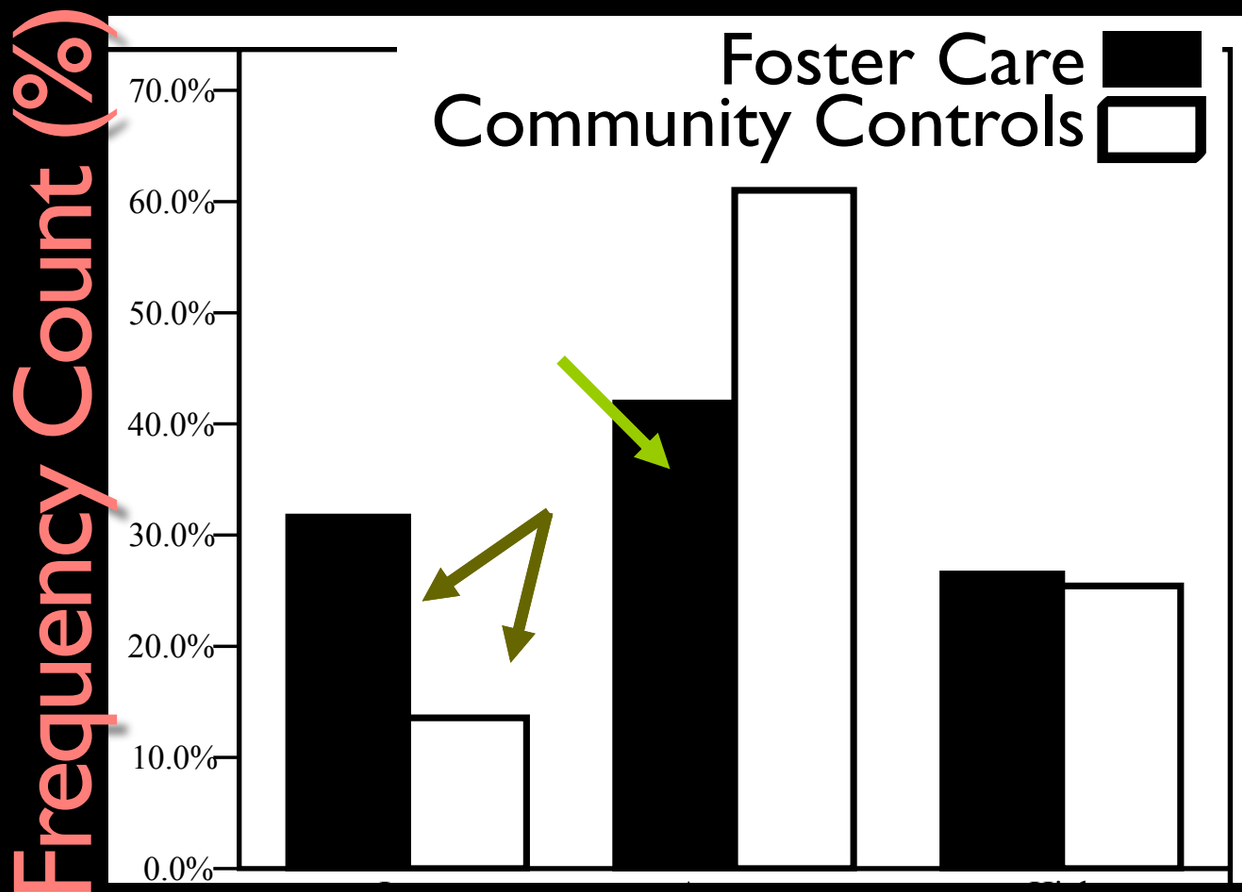
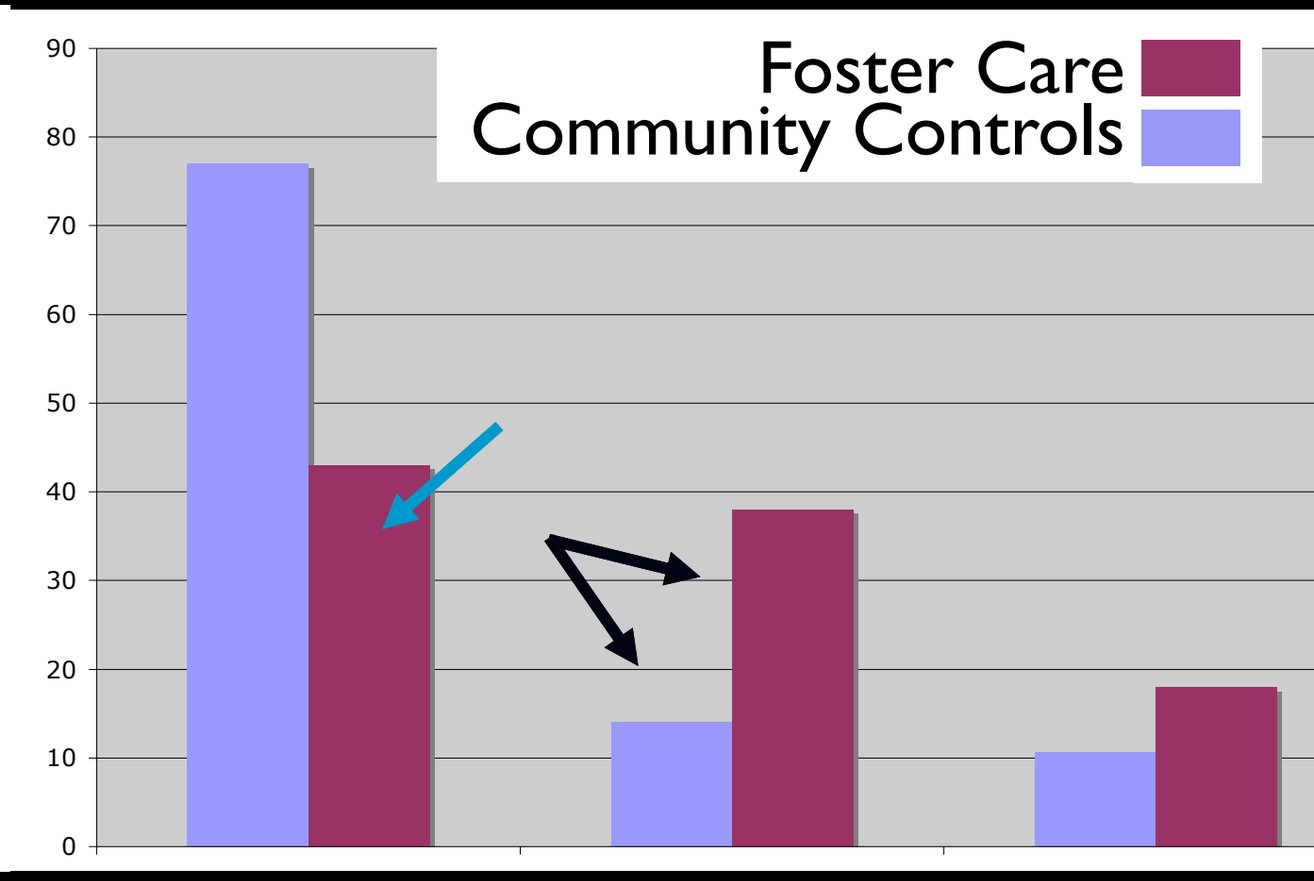
Promise 1: Experiences of adversity are not deterministic.

Cortisol awakening response blunted in ~30-40% of children in foster care.

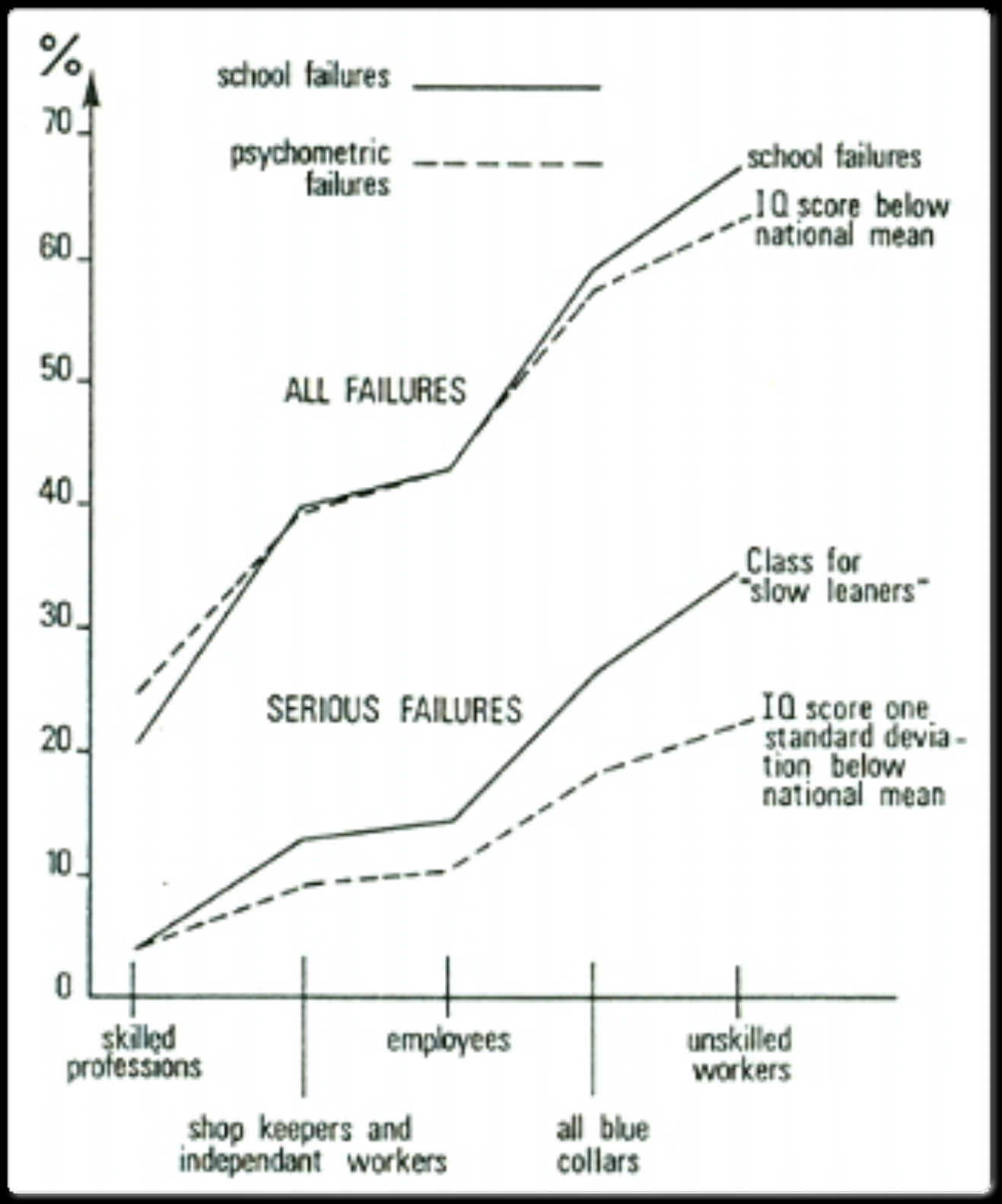


Bruce, Fisher, Pears, & Levine (2009)



Dozier et al. (2007)

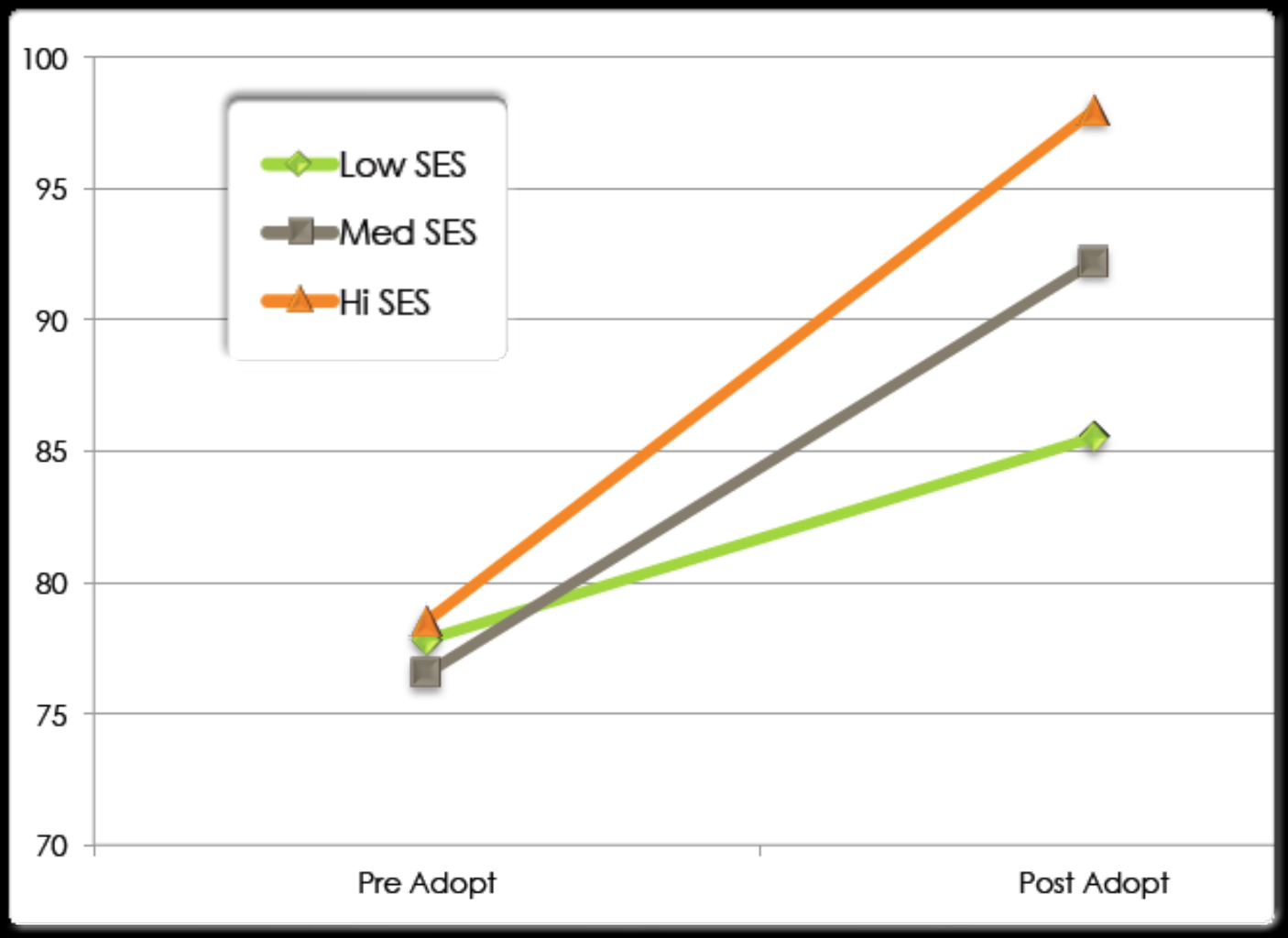
Promise 1: Experiences of adversity are not deterministic.



- IQ of children adopted at birth covaries with the adopting household's SES
- ~14 point increase in IQ relative to half sibling
- 4x decrease in likelihood of repeating a grade

Schiff et al. (1982)

Promise 1: Experiences of adversity are not deterministic.

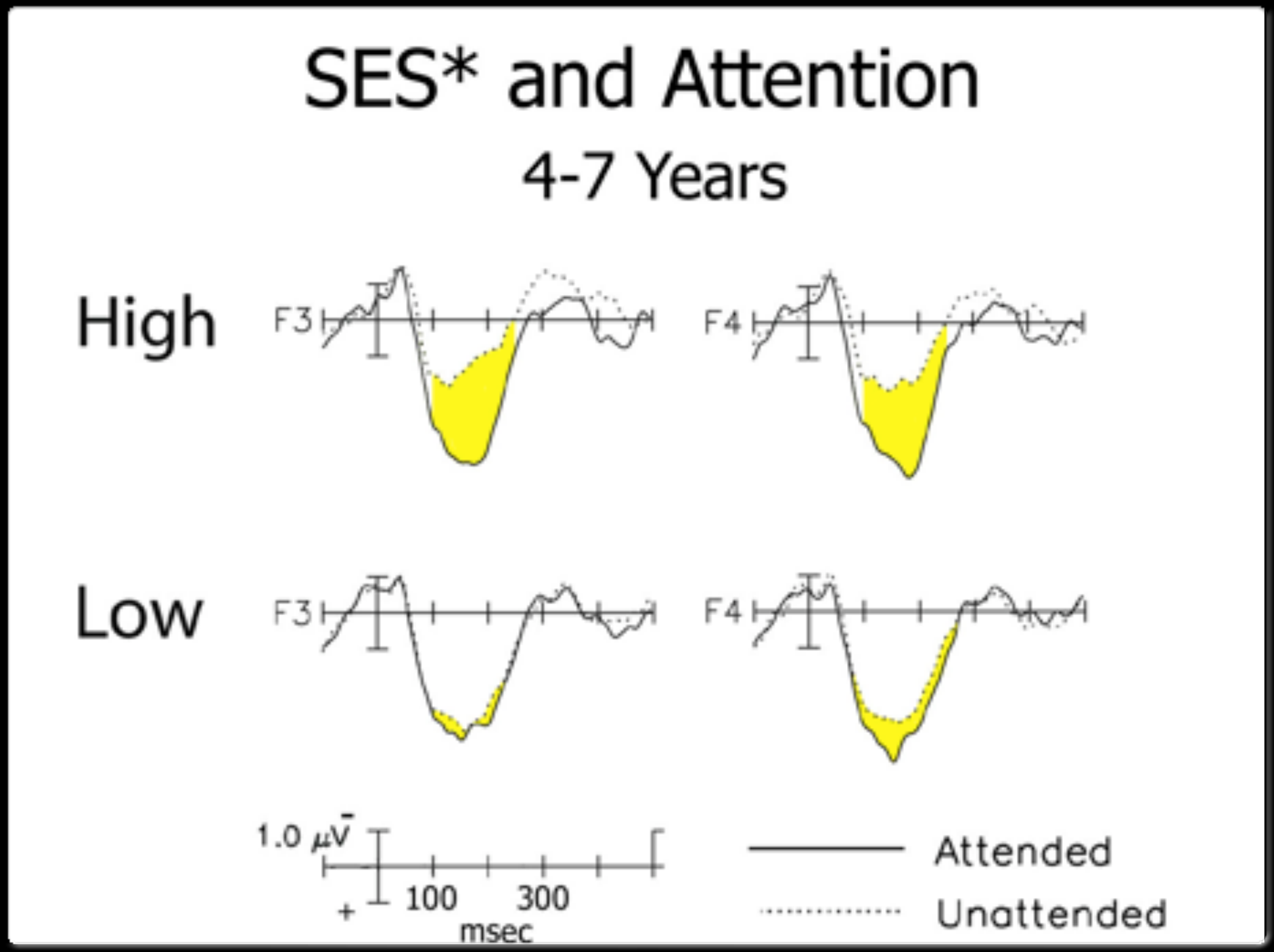


- Late adoptions (4-6 yrs)
- IQ covaries with SES of adopted household

Duyme et al. (1999)

Promise 2: Teaching group vs. individual differences.

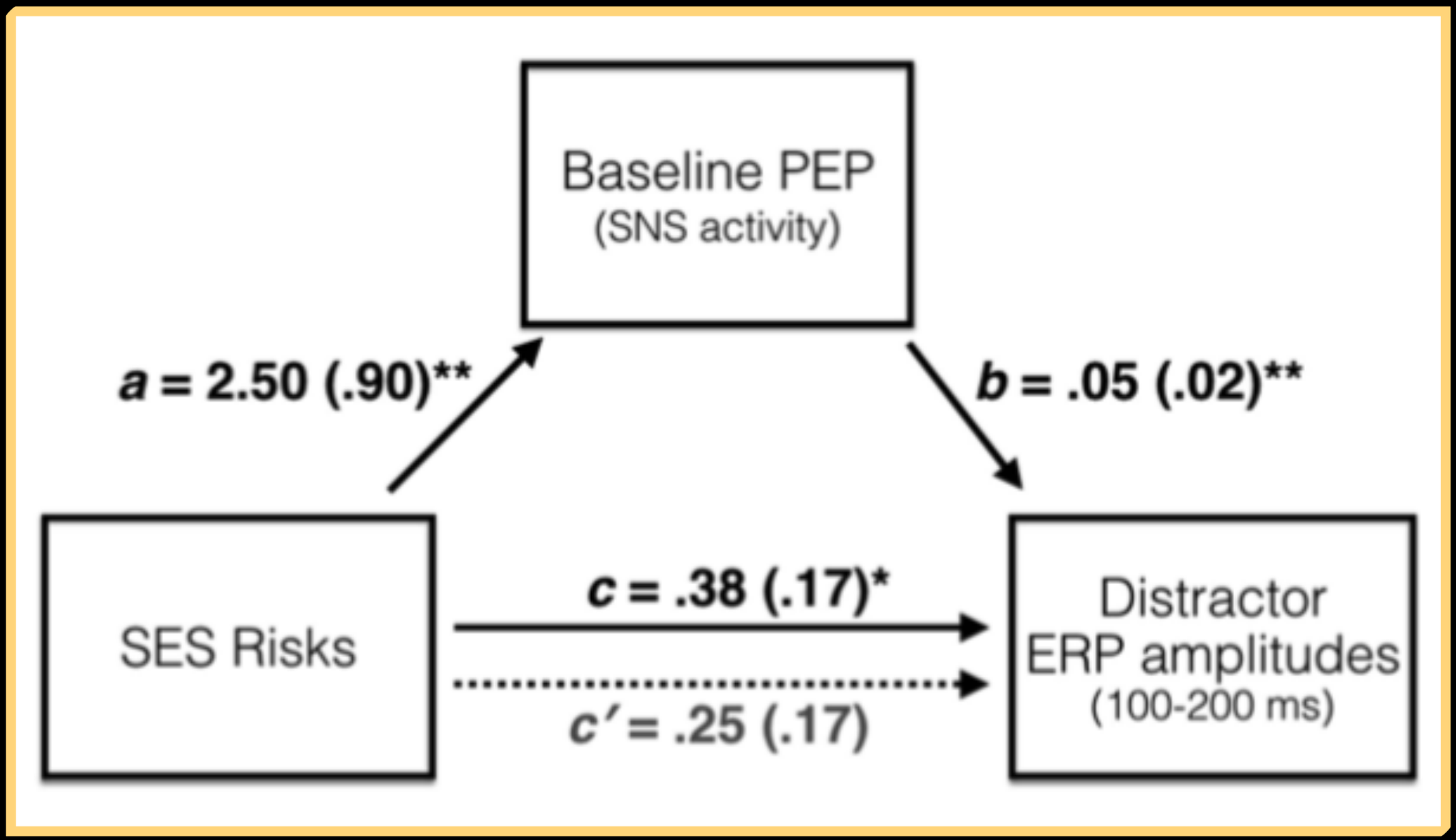
Low SES associated with reduction in distractor suppression



Stevens, Lauinger, & Neville (2009). *Developmental Science*.

Promise 2: Teaching group vs. individual differences.

Low SES associated with reduction in distractor suppression **for children with 'blunted' SNS levels.**

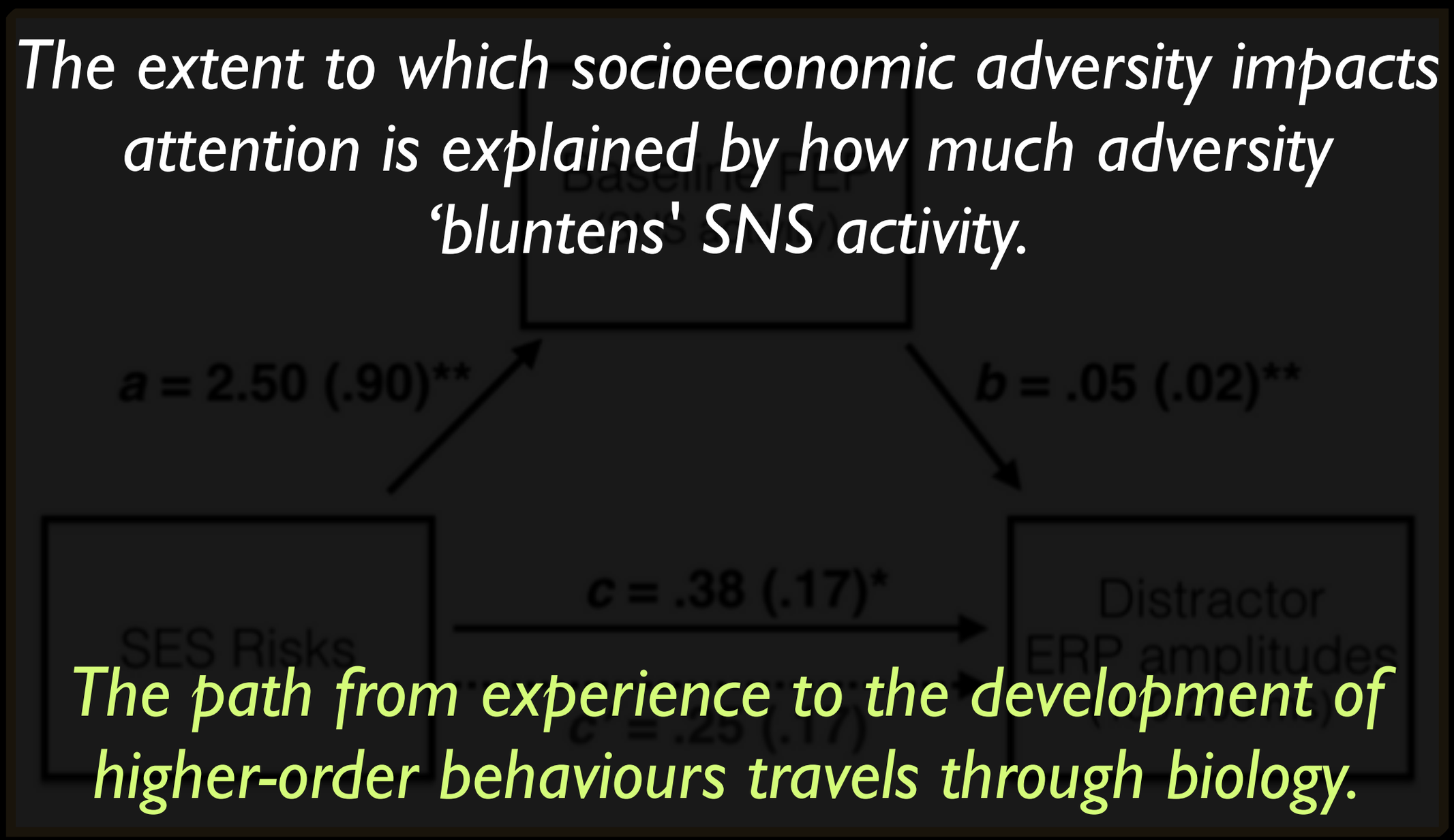


Giuliano et al. (2018). *Developmental Psychology.*

Promise 3: ~Intuitive examples of mediation/moderation.

Biology mediates impact of adversity on behaviour.

The extent to which socioeconomic adversity impacts attention is explained by how much adversity 'bluntens' SNS activity.



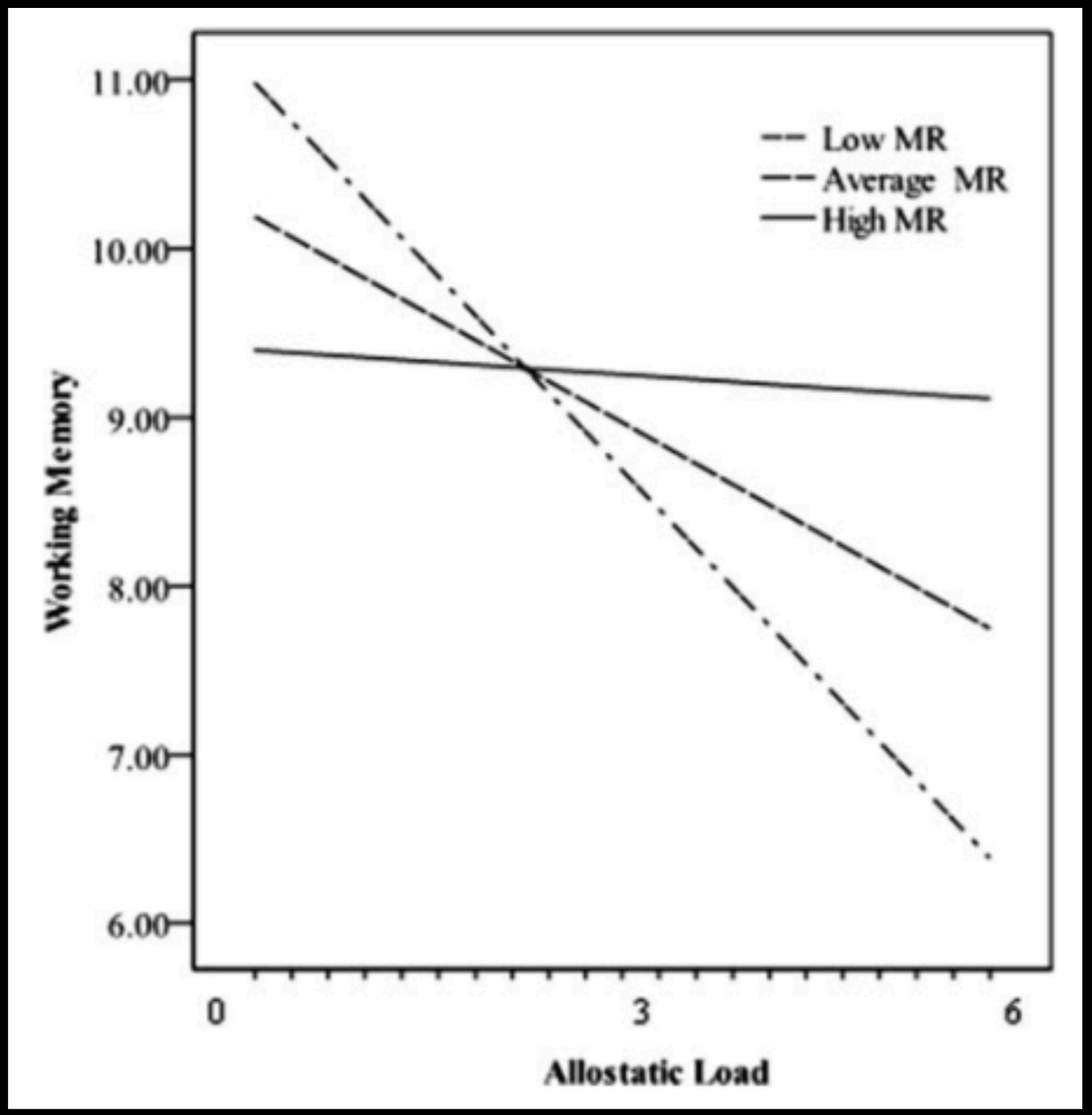
The path from experience to the development of higher-order behaviours travels through biology.

Giuliano et al. (2018). *Developmental Psychology.*

Promise 3: ~Intuitive examples of mediation/moderation.

Biology mediates impact of adversity on behaviour.

Parenting moderates link between adversity & outcomes.



Maternal responsiveness moderates impact of allostatic load on child's working memory.

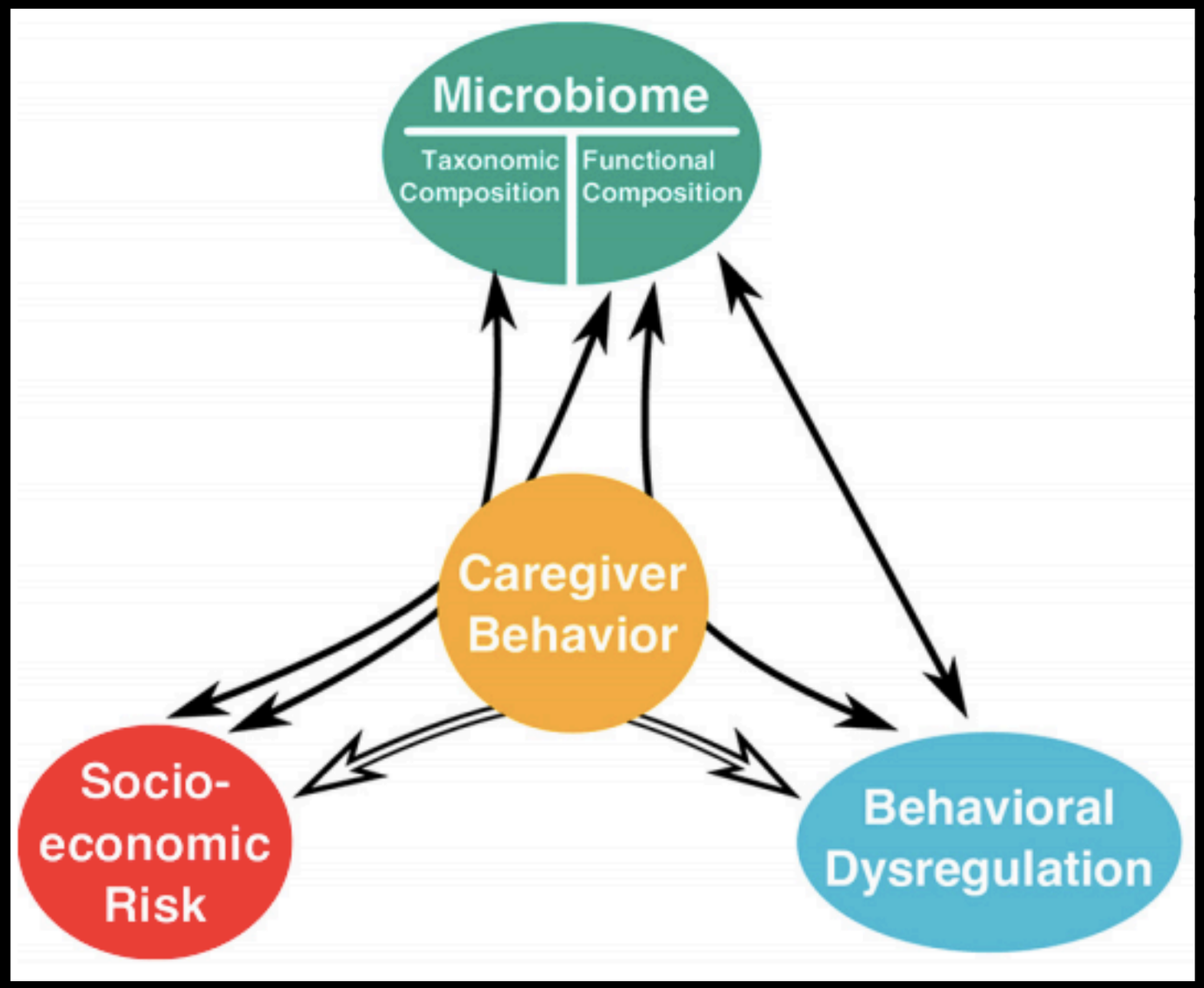
Chronic health burden is less associated with working memory for children with more responsive mothers.

Doan & Evans (2011)

Promise 3: ~Intuitive examples of mediation/moderation.

Biology mediates impact of adversity on behaviour.

Parenting moderates link between adversity & outcomes.



Caregivers' stress moderates association between gut microbiome, SES, & behavioural dysregulation.

Reduced taxonomic & functional diversity with increasing SES risk and dysregulation — effect sizes reduced in families of low parent-child dysfunction.

Flannery, Stagaman, Burns, Hickey, Roos, Giuliano, Fisher, Sharpton (2020). *mBio.*

Promise 3: ~Intuitive examples of mediation/moderation.

Biology mediates impact of adversity on behaviour.

Parenting moderates link between adversity & outcomes.

The path from experience to the development of higher-order behaviours has many opportunities to be influenced by the impact of our caregivers.

Flannery, Stagaman, Burns, Hickey, Roos, Giuliano, Fisher, Sharpton (2020). *mBio.*

Promise 4: Applications for brain, biology, & behaviour

Early risk factors associated with:

- MRI-based measures of brain volume
- event-related potentials measures of attention
- ‘blunted' autonomic activity
- blunted cortisol levels upon waking
- reduced diversity of gut-microbiota

Farah (2017); Propper & Holochwost (2013); Stevens et al. (2009)

Promise 5: Increasing generalizability of psychology

The generalizability crisis

Tal Yarkoni[1*]

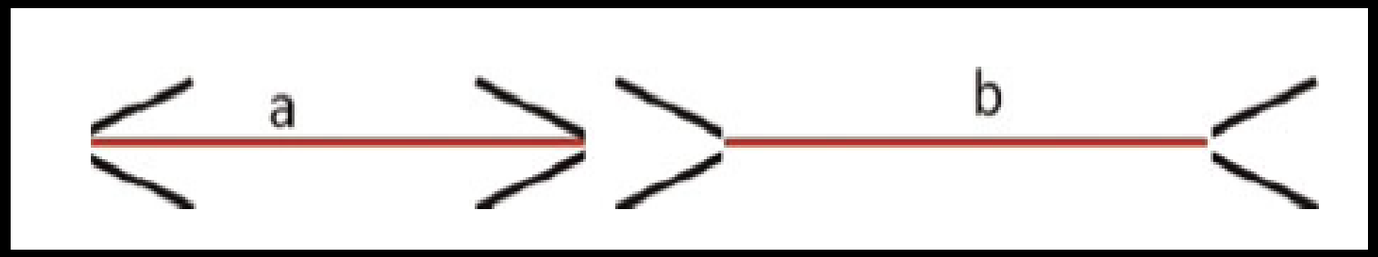
[1] Department of Psychology, University of Texas at Austin
[*] Email: tyarkoni@gmail.com

(Nov. 2019) — https://psyarxiv.com/jqw35

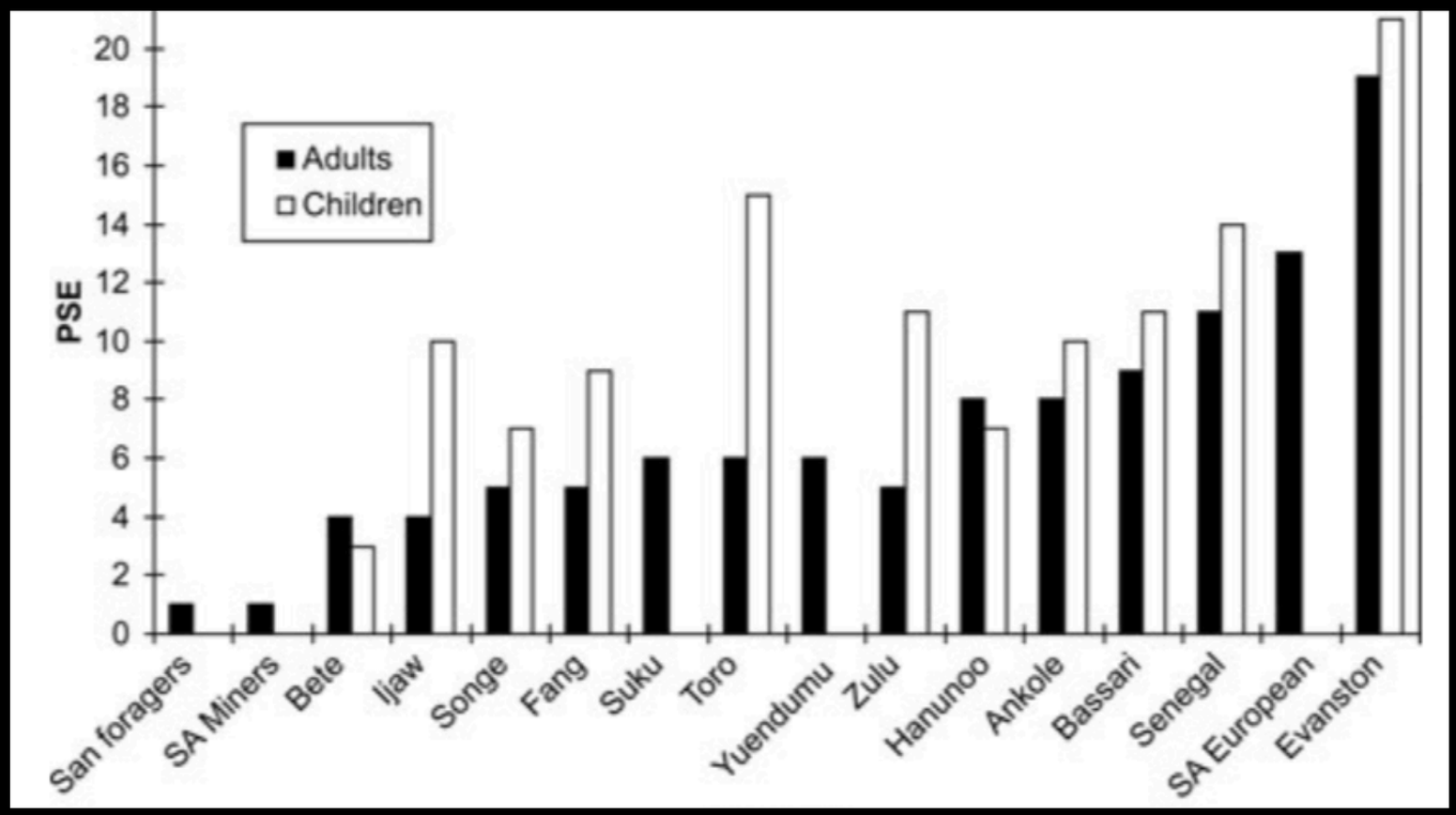
Promise 5: Increasing generalizability of psychology

Are you **WEIRD**?

- Western
- Educated
- Industrialized
- Rich
- Democratic



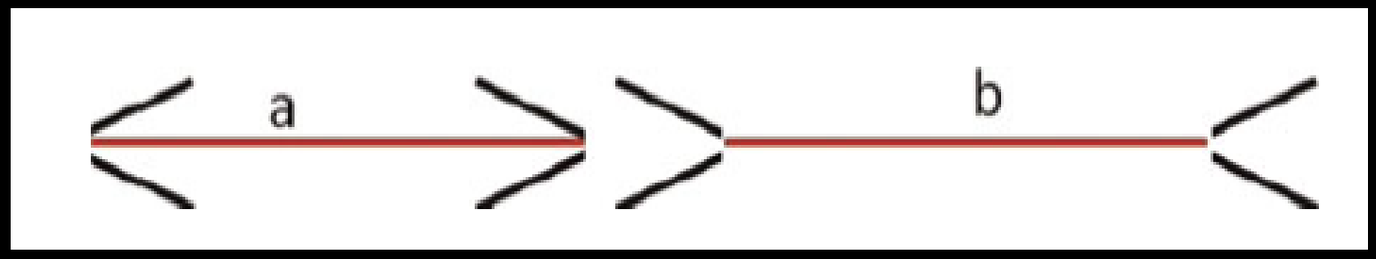
Müller-Lyer illusion



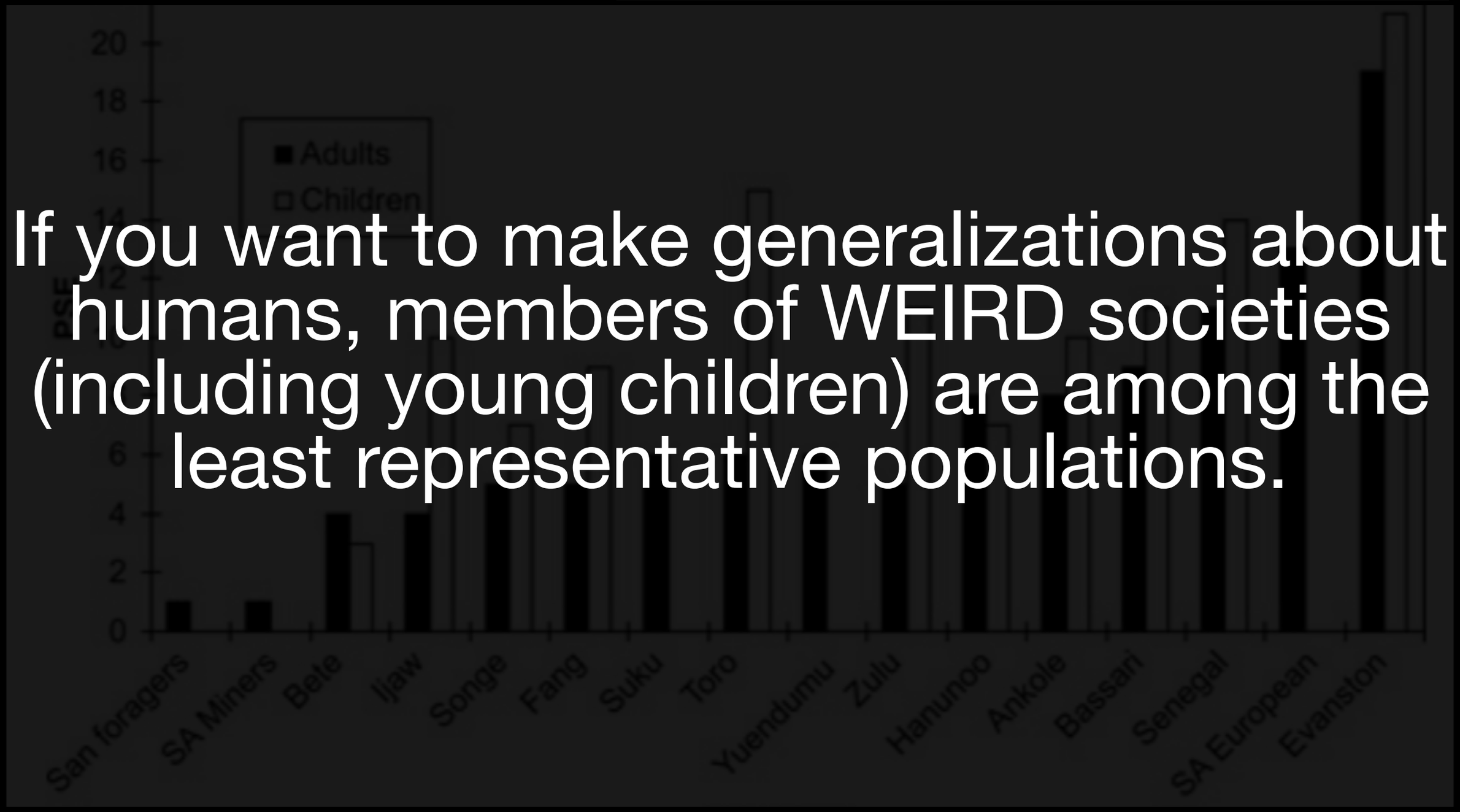
Henrich et al. (2010)

Promise 5: Increasing generalizability of psychology

Are you **WEIRD**?



If you want to make generalizations about humans, members of WEIRD societies (including young children) are among the least representative populations.



Henrich et al. (2010)

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Pitfall 1: Judgements of groups of people writ large.
Pitfall 2: Tip-toeing around environmental determinism.

"People who are low SES have altered biology."
Humans are not an income level or SES.

"Children in poverty have poor cognitive control…"

"...if they were adopted into a high SES family,
they would have better outcomes."

Pitfall 1: Judgements of groups of people writ large.
Pitfall 2: Tip-toeing around environmental determinism.

"People who are low SES have altered biology."

"Children in poverty have poor cognitive control…"

"On average, being raised in poverty puts a child at risk for alterations in cognitive control abilities."

"Some aspects of cognitive control mature earlier in children facing early environmental stressors."

"...if they were adopted into a high SES family, they would have better outcomes."

Pitfall 1: Judgements of groups of people writ large.
Pitfall 2: Tip-toeing around environmental determinism.

"People who are low SES have altered biology."

"Children in poverty have poor cognitive control…"

"...if they were adopted into a high SES family, they would have better outcomes."

Living in a "high SES" home doesn't solve all of one's problems. SES is a proxy for environmental factors (e.g., parenting stress, book ownership)

Pitfall 3: Correlation vs. causation fallacies

A vast majority of this literature is correlational

- *Parents under increasing financial strain spend less time engaged in child-directed speech.*
- *Child-directed speech decreases towards end of month as a function of strain (bills due)*

…but with notable exceptions.

- *Michael Meaney's research documenting epigenetic signalling of early caregiving.*
- *Perry Preschool & Abecedarian projects*

Ellwood-Lowe, Foushee, Srinivasan (2020)

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- Some individuals succumb to stress; others thrive
- Access to social support dampens stress reactivity and facilitates stress recovery
- Early social experiences critical for effective buffering

The flip side to the science of adversity is the science of resilience.

What factors predict how people cope with current stressors and recover from 'past' stressors?

Cam Hostinar
UC Davis

Darby Saxbe
USC

Pinned Tweet

Dr. Cam Hostinar
@CamHostinar

If one of your New Year's resolutions is to reduce your #stress levels in 2020, here are 10 evidence-based strategies to try. There are other great ones, but these can be accessed at no cost or low cost. They may not all be possible for everyone, but maybe one will help. (thread)

6:55 PM · Jan 1, 2020 · Twitter Web App

1.4K Retweets **3K** Likes

Dr. Cam Hostinar @CamHostinar · Jan 1

Replying to @CamHostinar

1. Social connection. Decades of research show that social support from close others is a powerful stress buffer: emotional support provided in person or by phone by a parent, friend or partner can lower physiological stress responses. Hugs help too (photo by Tristan Le @pexels)

3 19 188

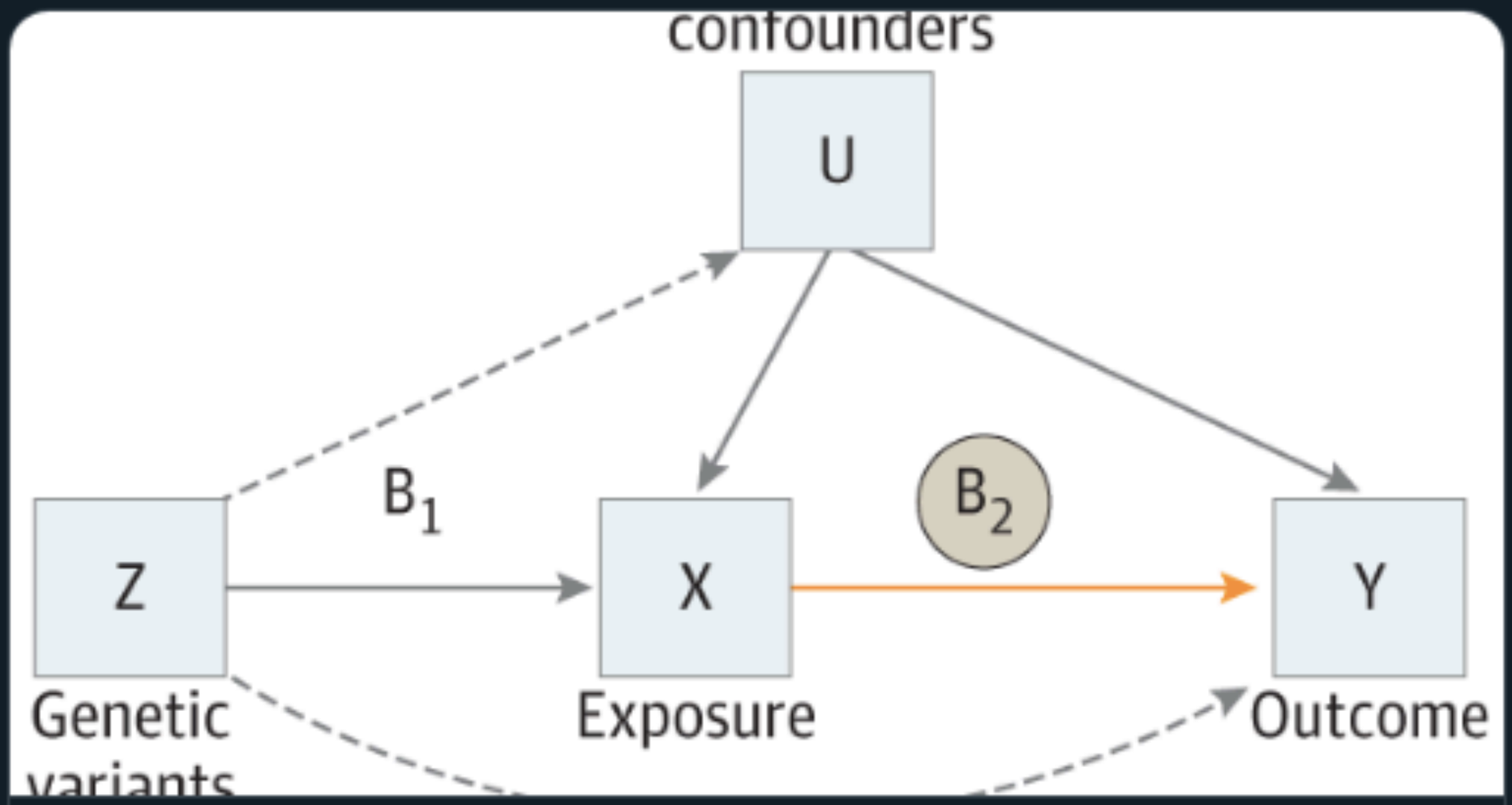
Dr. Cam Hostinar @CamHostinar · Jan 1

2. Sleep. #Sleep is critical for health and recovery from stress, but 7-19% of adults and ~50% of children do not get the recommended amount of sleep each night. NHLBI offers some solutions: nhlbi.nih.gov/health-topics/...

2 15 157

Dr. Cam Hostinar @CamHostinar · Jan 1

3. Exercise. Physical activity (walk, run etc.) reduces risk of stress-related disorders such as depression. A large genetically-informed 2019 study using objective measurements of physical activity showed that #exercise protects against #depression:



Assessment of Bidirectional Relationships Between Physical Activity ...

This 2-sample mendelian randomization study assesses bidirectional relationships between physical activity and depression among ...

jamanetwork.com

1 14 141

Dr. Cam Hostinar @CamHostinar · Jan 1

4. Progressive muscle relaxation. This involves series of tensing and relaxing muscles in the body. Here are some audio instructions from a 15-minute program by the Johns Hopkins All Children's Hospital @AllChildrens (appropriate for all ages):

Progressive Relaxation

Progressive Relaxation, Johns Hopkins All Children's Hospital

youtube.com

2 14 205

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5. Nature/green spaces. A large 2019 study from Denmark with ~1 million people linked access to green spaces like parks to better mental health, even after adjusting for socioeconomic factors: pnas.org/content/116/11...
(more experiments needed, but dose-response link is promising)

Residential green space in childhood is associated with lower risk of ...
Growing up in urban environments is associated with risk of developing psychiatric disorders, but the underlying mechanisms are unknown. ...
🔗 pnas.org

2 18 138

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6. Problem solving. This skill is included in some forms of therapy such as CBT. These 5 steps may help: identify problem, generate list of possible solutions, list pros & cons for each, choose solution, implement it & evaluate if problem is solved or new solution is needed.

1 18 150

Dr. Cam Hostinar @CamHostinar · Jan 1

7. Emotion-focused coping. For tragedies like natural disasters or mass shootings, emotion-focused coping may be more effective than problem solving. Here are some strategies from the American Psychological Association on emotional coping after tragedies:

Managing Your Distress in the Aftermath of a Shooting

You may be struggling to understand how a mass shooting could take place in a community, even a workplace or military base, and why suc...

apa.org

2 9 110

Dr. Cam Hostinar @CamHostinar · Jan 1

8. Time management. Time pressure, deadlines, and unrealistic expectations about what we can accomplish in a set amount of time are sources of stress for many of us. Fortunately, some strategies can help us manage time better:

Six easy ways to manage your time better

The amount and quality of what you achieve are crucially dependent on how effectively you manage your time. Andrew C. Johnson and ...

nature.com

3 23 157

Dr. Cam Hostinar @CamHostinar · Jan 1

9. Comedy. Watching 30 min of a comedic movie was associated with better vascular function immediately afterwards in one study: pubmed.ncbi.nlm.nih.gov/20816128/ (but more and larger studies are needed). Here is also comedy and coping advice from Jerry Seinfeld:

Seinfeld -Sucks And Great

Seinfeld -Sucks And Great

youtube.com

3 16 145

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10. Helping others. Giving support to others can lower sympathetic-related stress responses: pubmed.ncbi.nlm.nih.gov/26575283. Helping others can improve our mood, distract from our own problems, and build social connection (see no. 1 above).

Wishing you a low-stress 2020! (the end)

PubMed.gov

Giving Support to Others Reduces Sympathetic Ne...

Social support is a major contributor to the link between social ties and beneficial health outcomes...

pubmed.ncbi.nlm.nih.gov

4 25 178