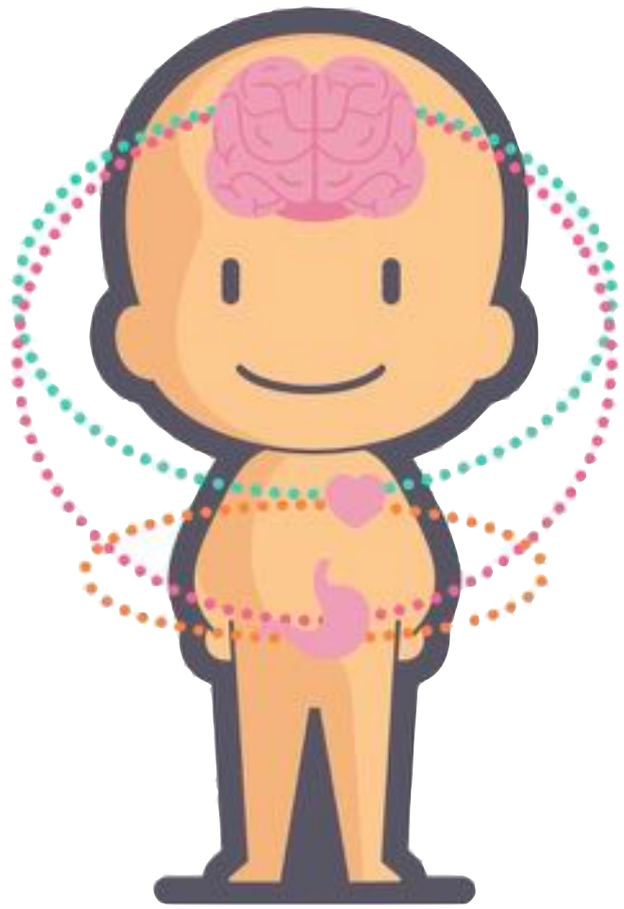
DEVELOPMENTAL PLASTICITY



How do our early experiences shape brain development, emotional & physical health?

Dr. Bridget Callaghan
Department of Psychology, University of California, Los Angeles
Director of the Brain and Body Lab at UCLA

What is developmental plasticity?

BRAIN &BODY LAB

At UCLA

We aim to do good science that makes a difference to people's lives, today and tomorrow.

Disseminate Knowledge

Engage the Community

Create Meaningful Knowledge

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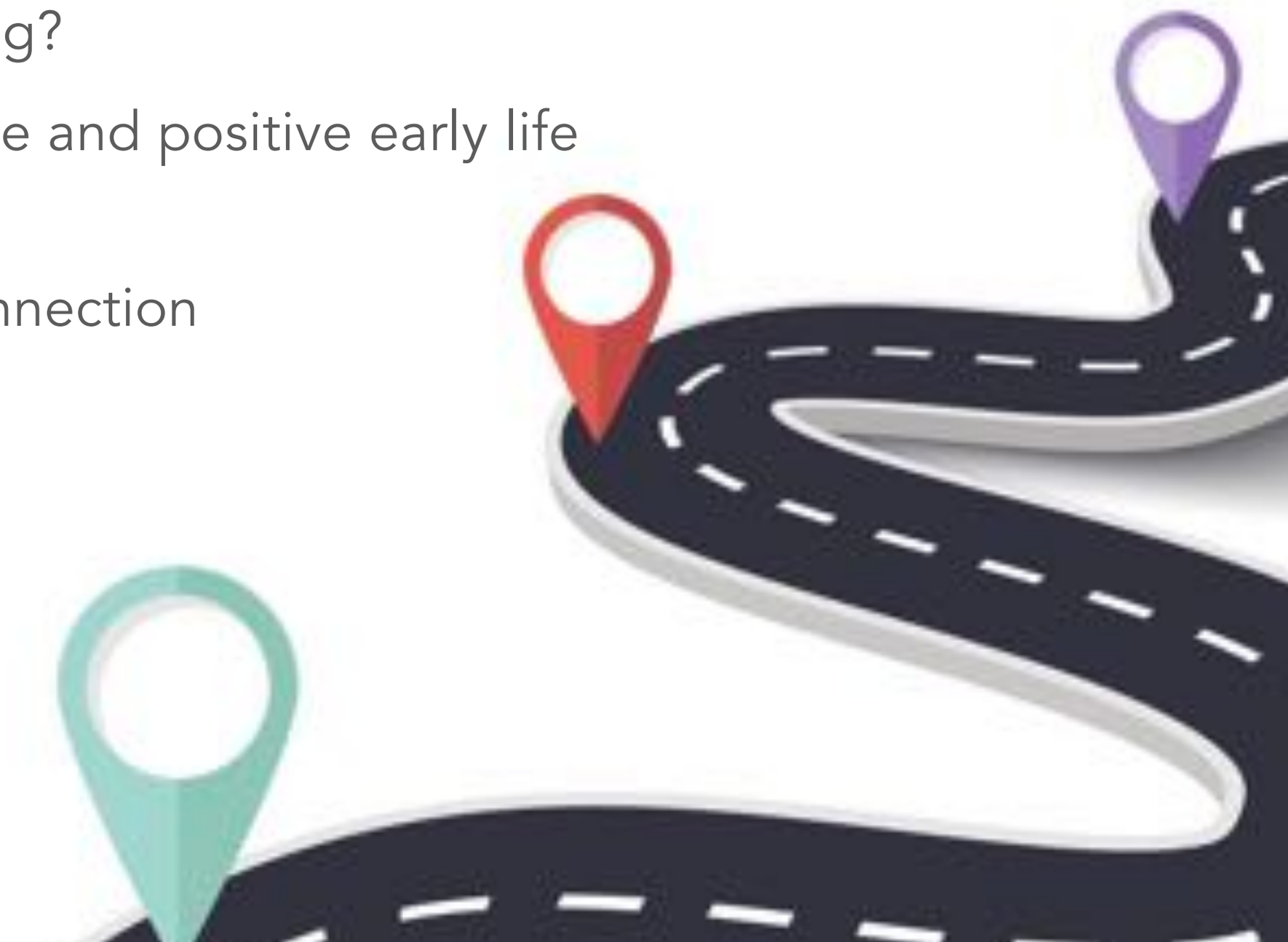
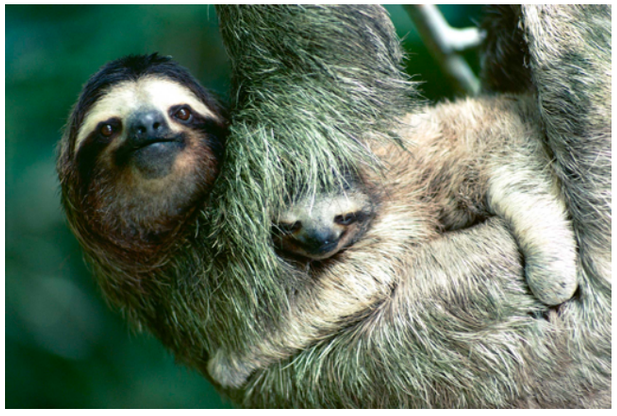
https://brainandbodylab.psych.ucla.edu/

ROADMAP FOR TODAY'S WORKSHOP

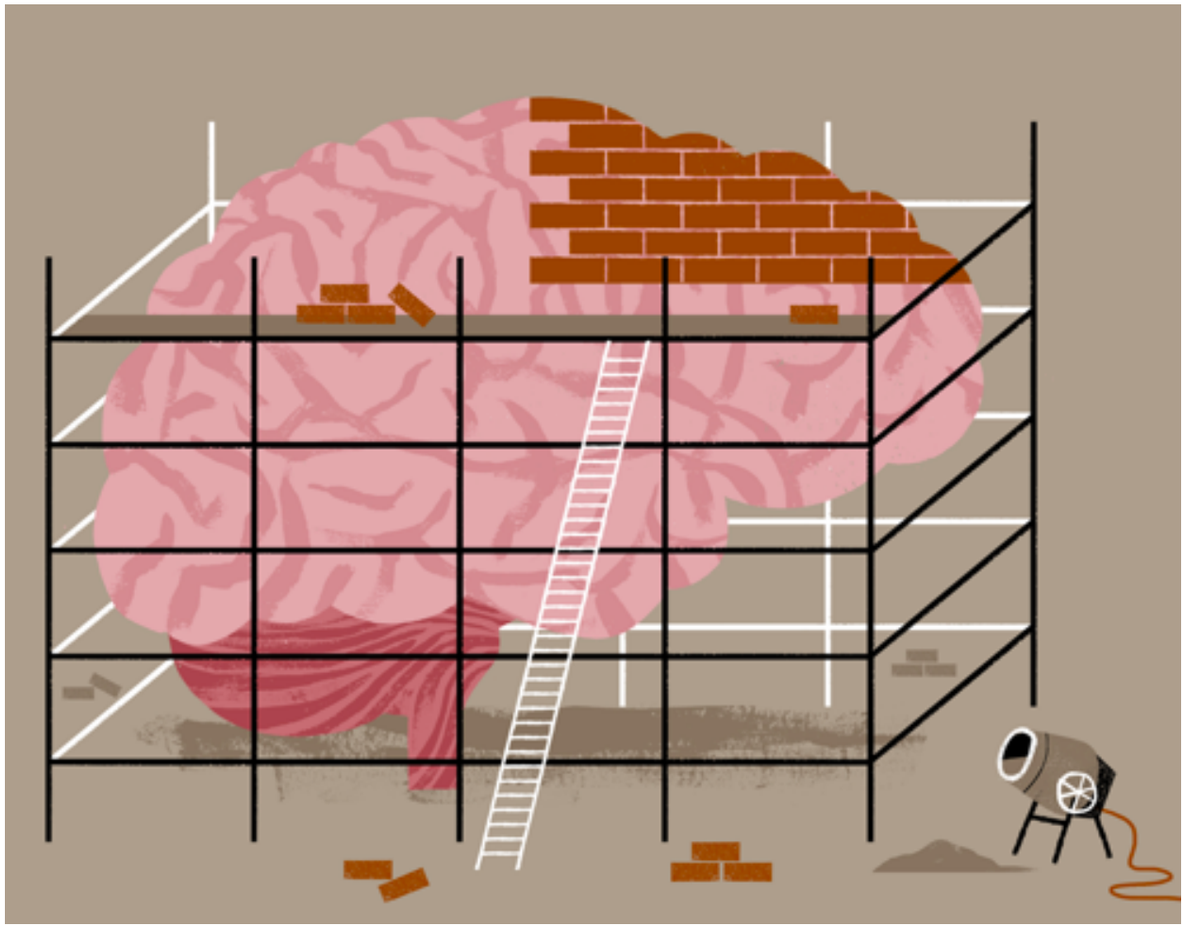
1) How do caregivers shape emotional development?
2) What can happen to emotional development after disrupted caregiving?
3) A word on resilience and positive early life experiences
4) The brain-body connection



How do caregivers shape emotional development?

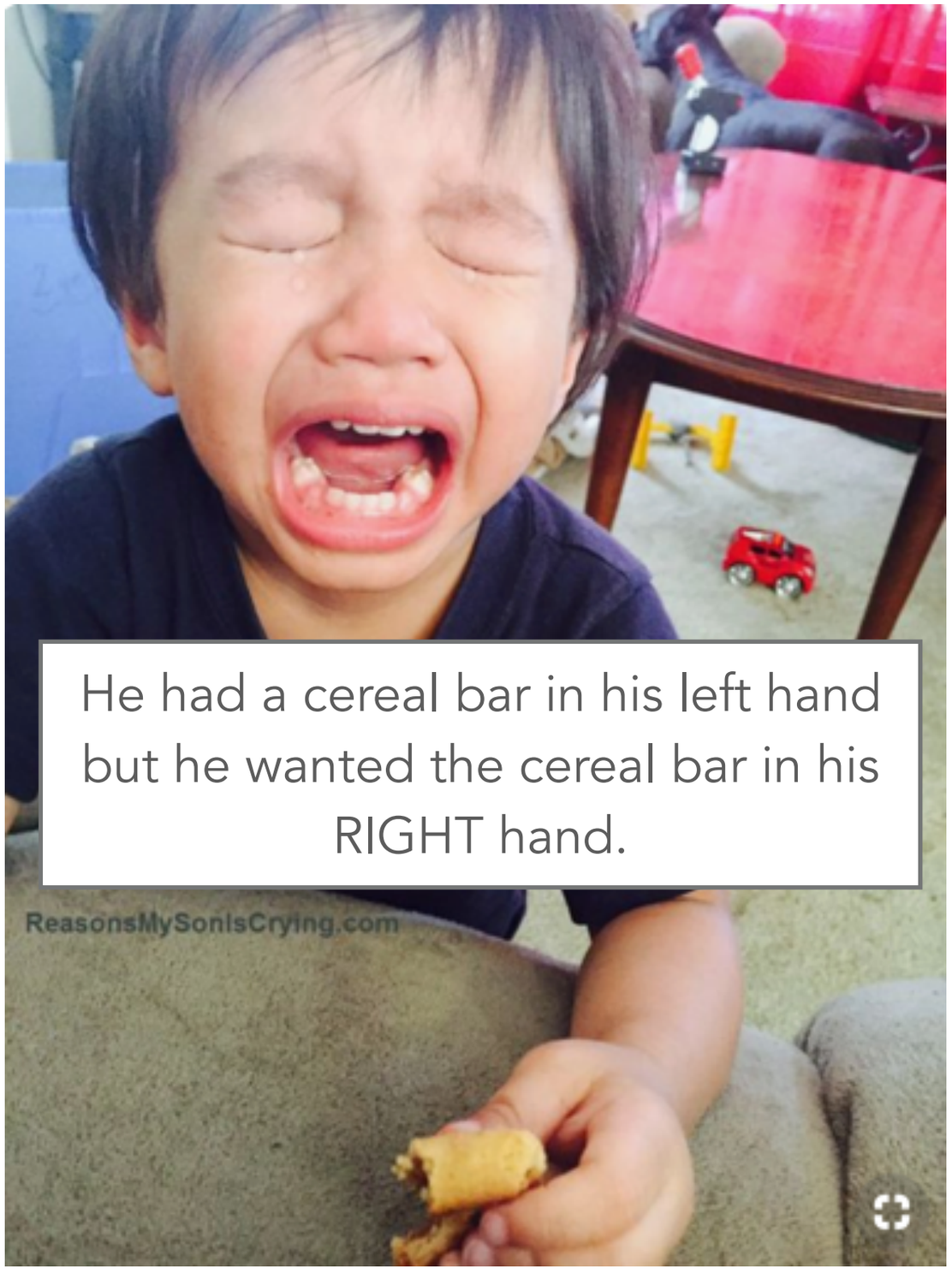


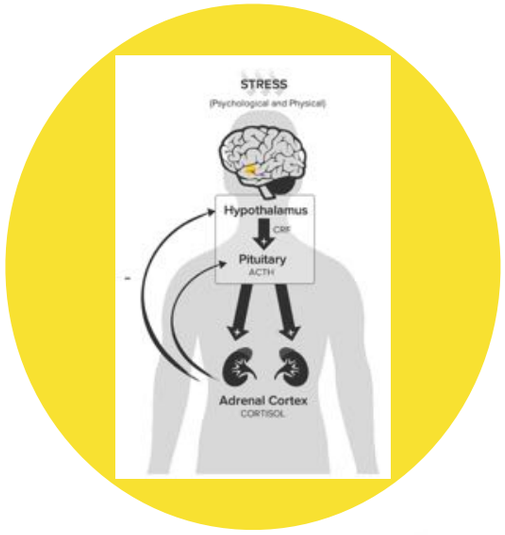
WHAT IS THE PURPOSE OF AN EXTENDED CHILDHOOD?



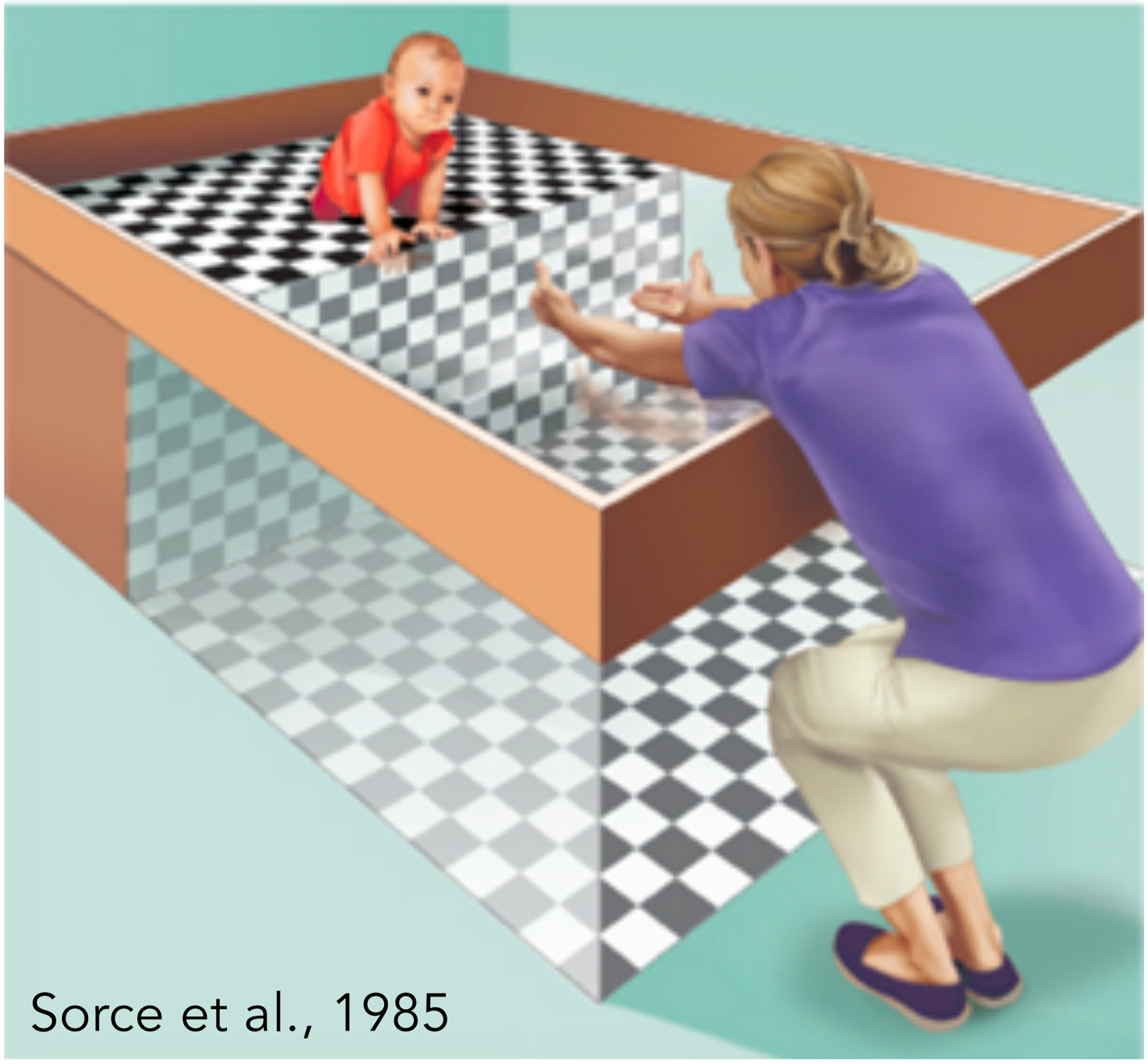
Tradeoff between exploration and exploitation

THE REGULATORS



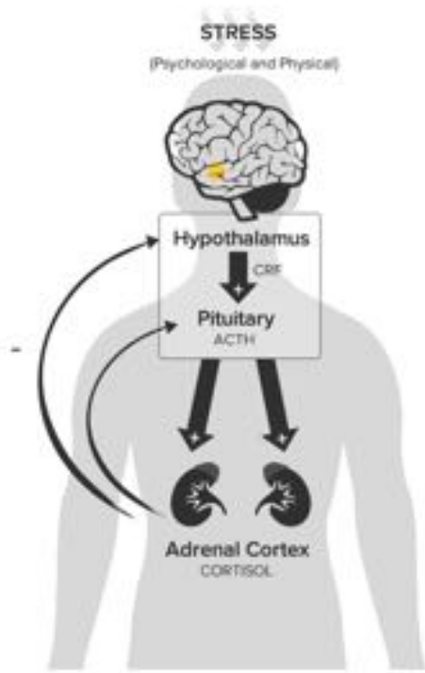


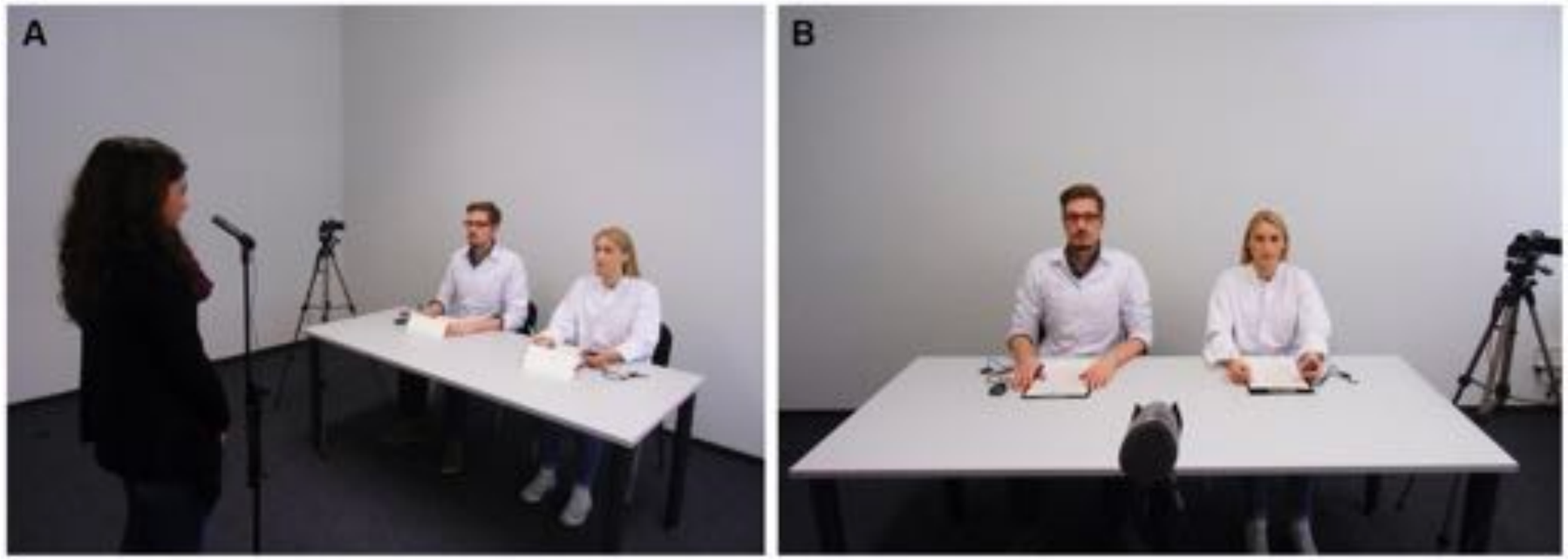
Children take their cues from their parents

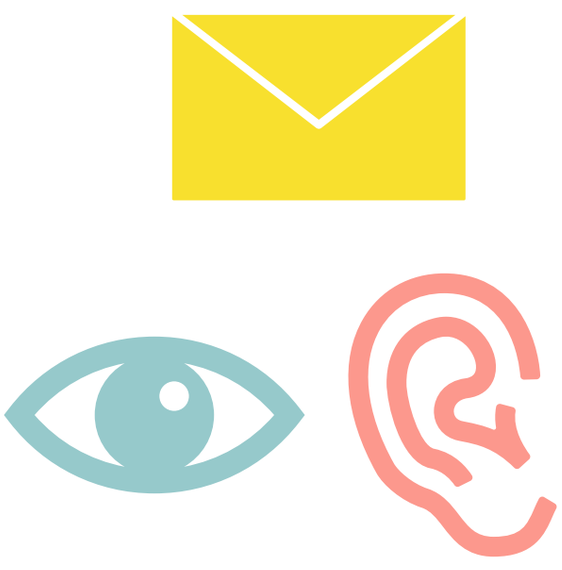


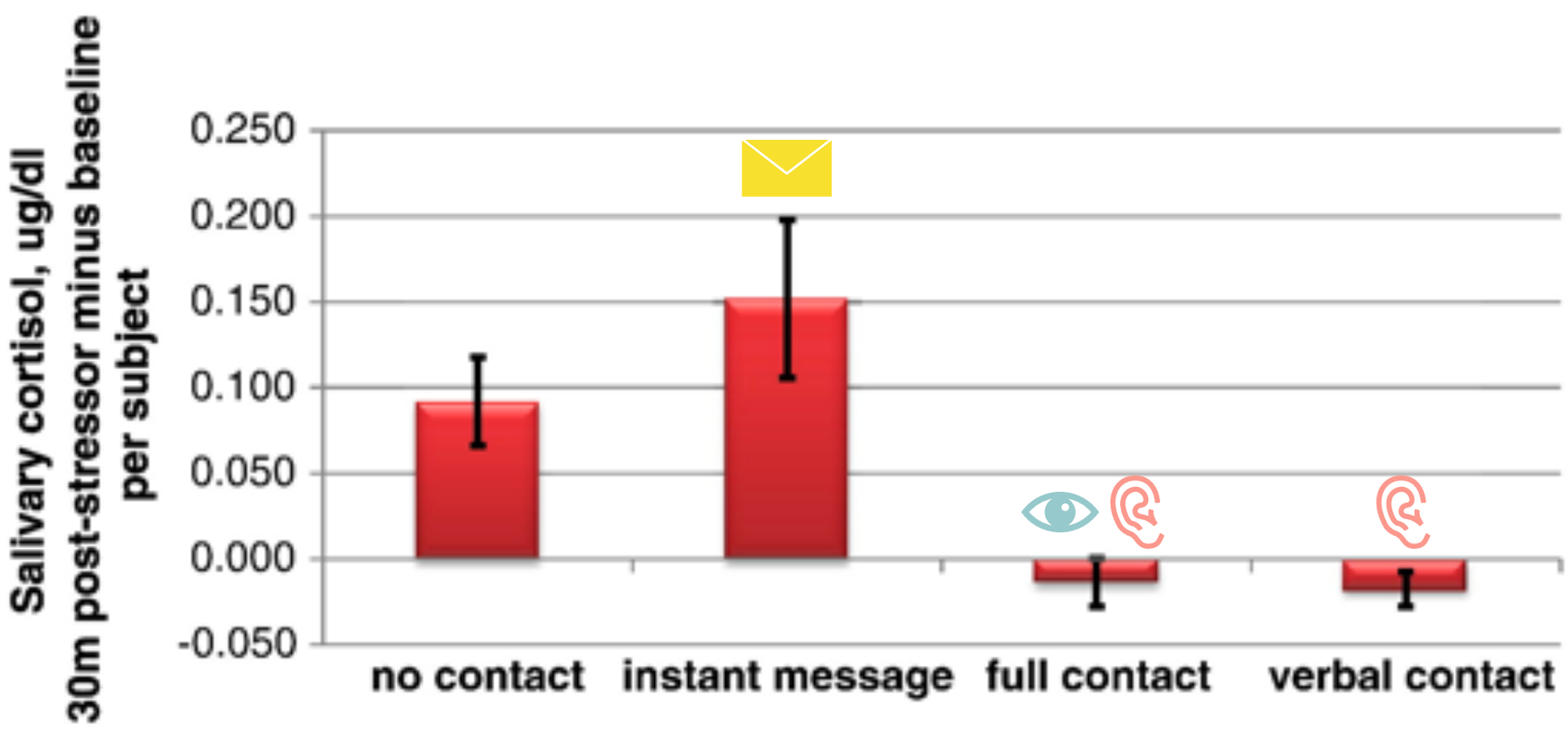
Sorce et al., 1985

Parental contact can reduce (buffer) children's stress reactivity



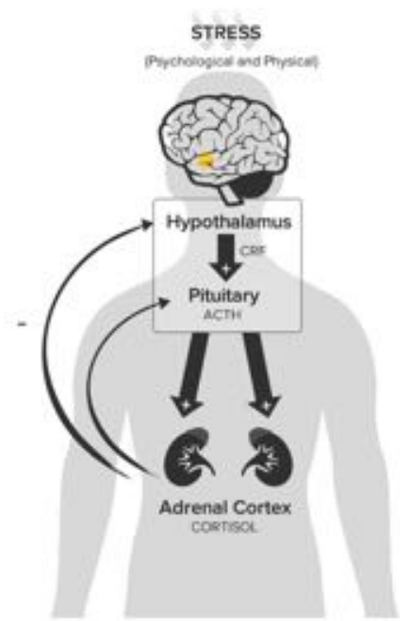






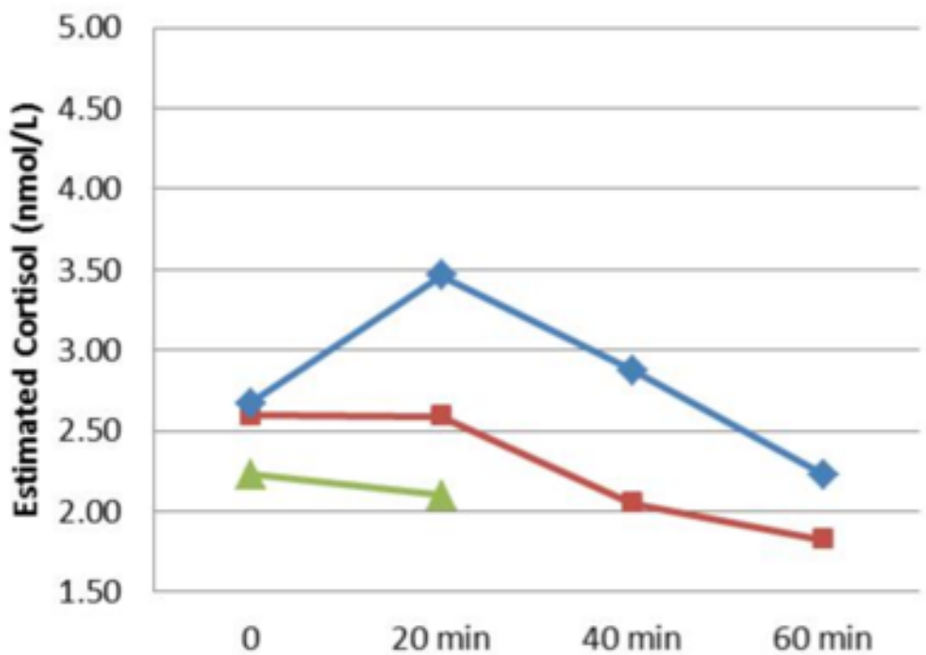
Seltzer et al., 2012

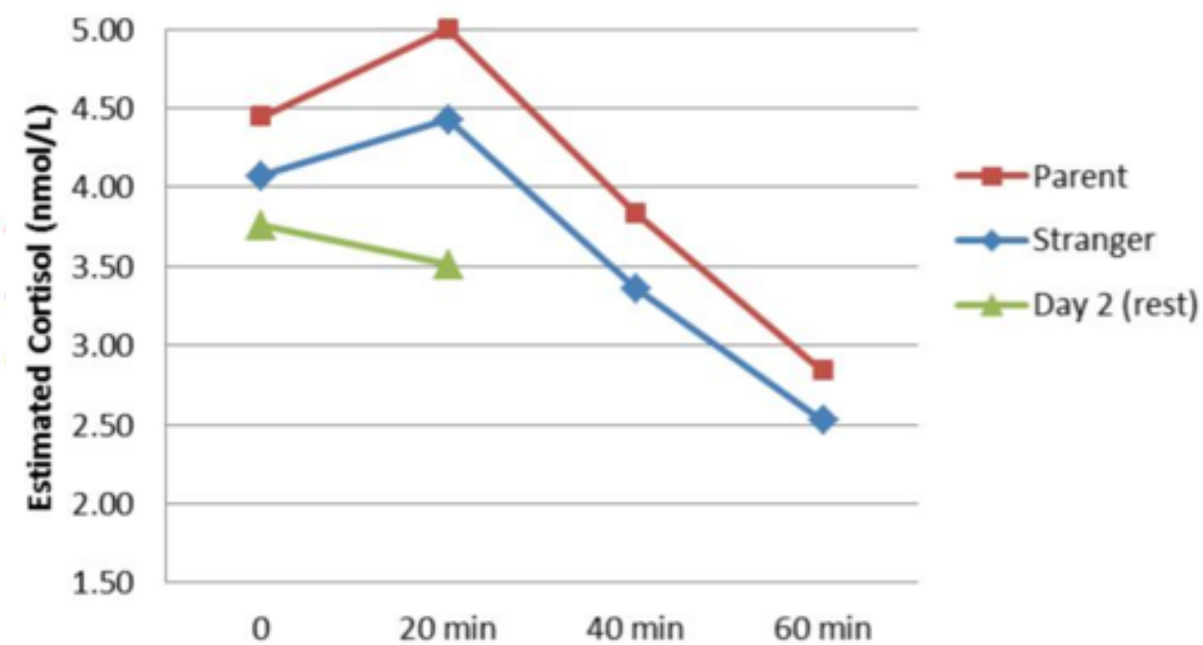
Parental contact can reduce (buffer) children's stress reactivity



CHILD

ADOLESCENT

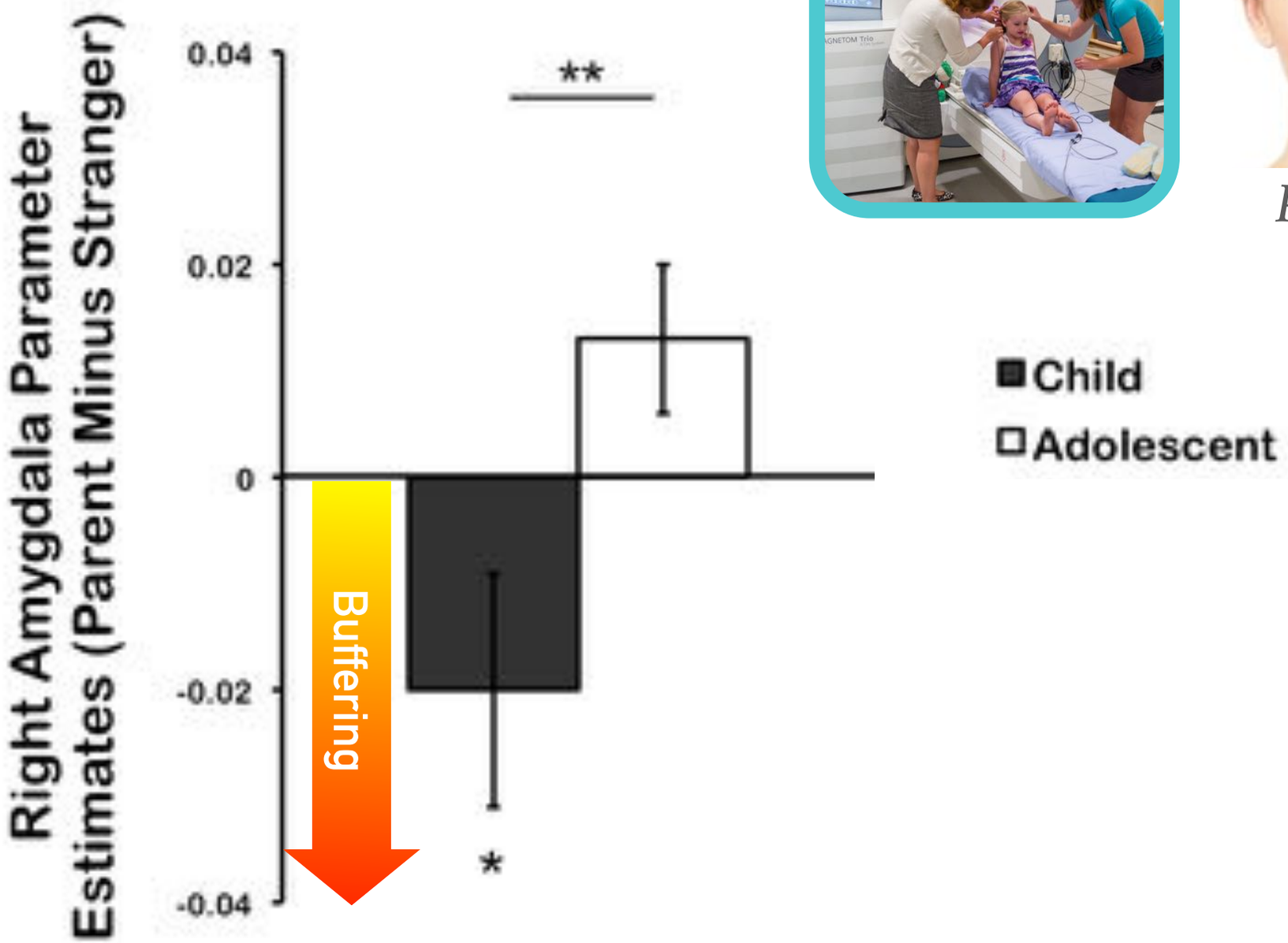




Hostinar et al., 2015

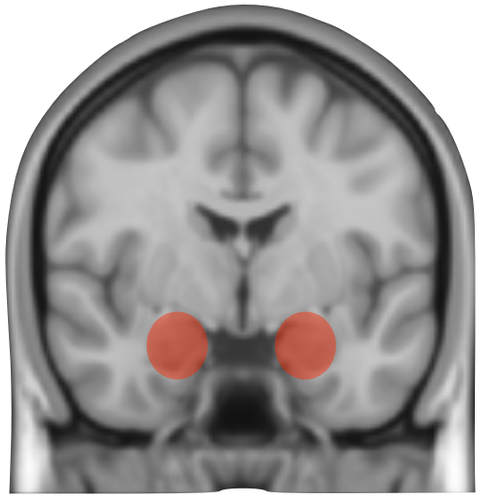
Parent stimuli can decrease amygdala reactivity

Parent stimuli can decrease amygdala reactivity



Parent

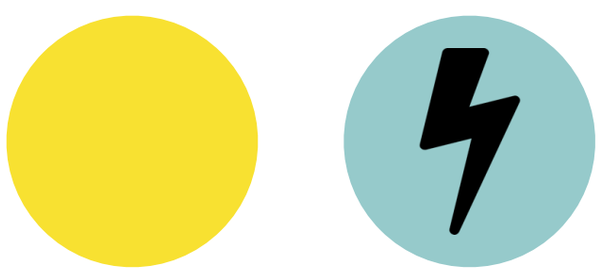
Stranger

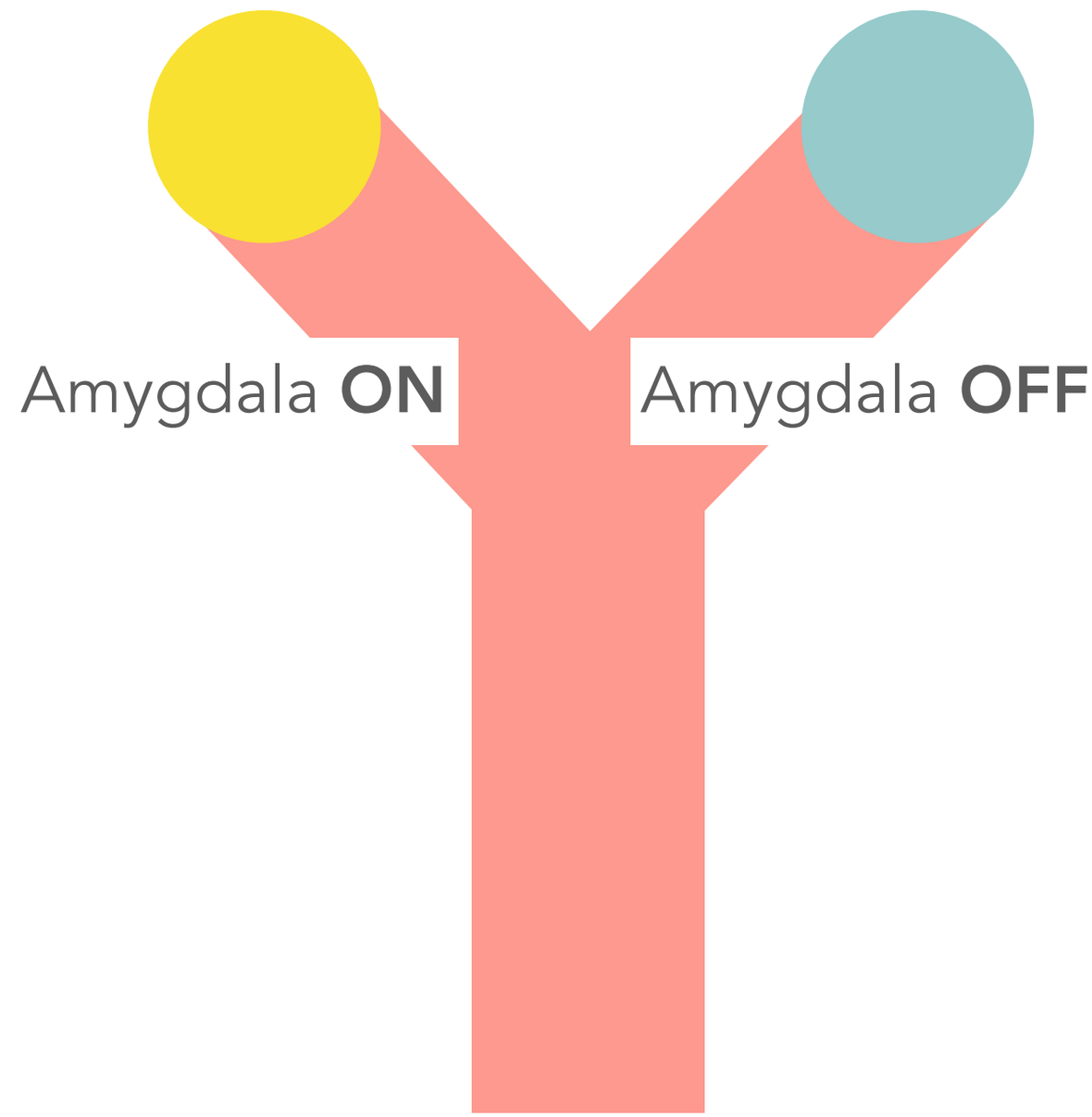


Gee, et al., 2014.

Parental buffering of the amygdala is associated with fear learning

Mom Present

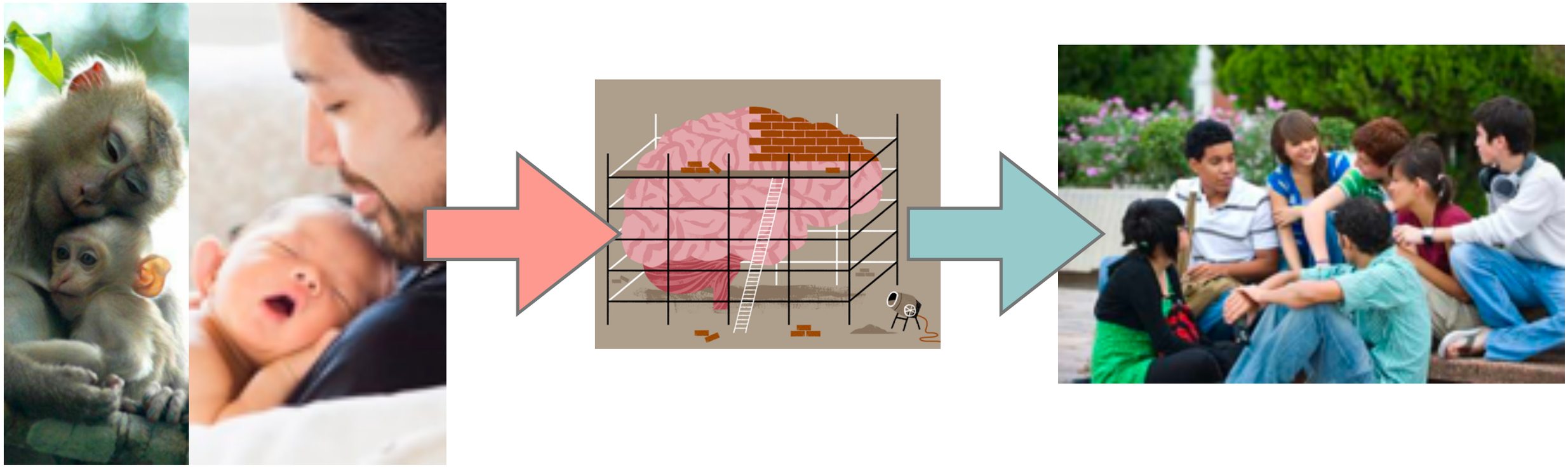




Moriceau & Sullivan, 2006

SUMMARY

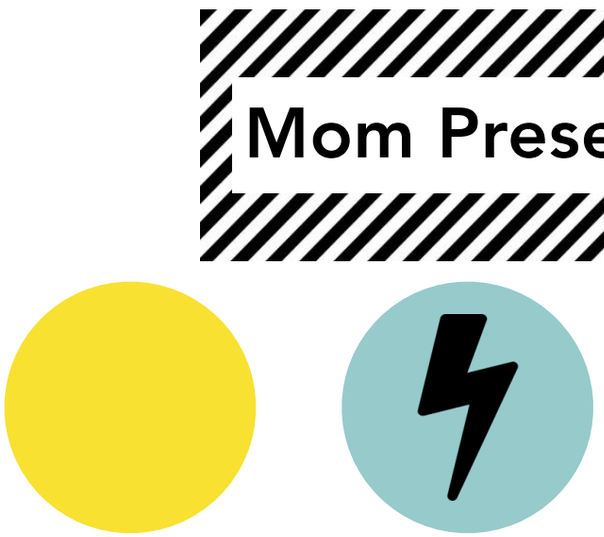
- Caregivers regulate child emotional output
- Caregivers regulate child stress hormone levels
- Caregivers reduce engagement of brain regions involved in emotional reactivity
- Perhaps a special period for these effects in childhood

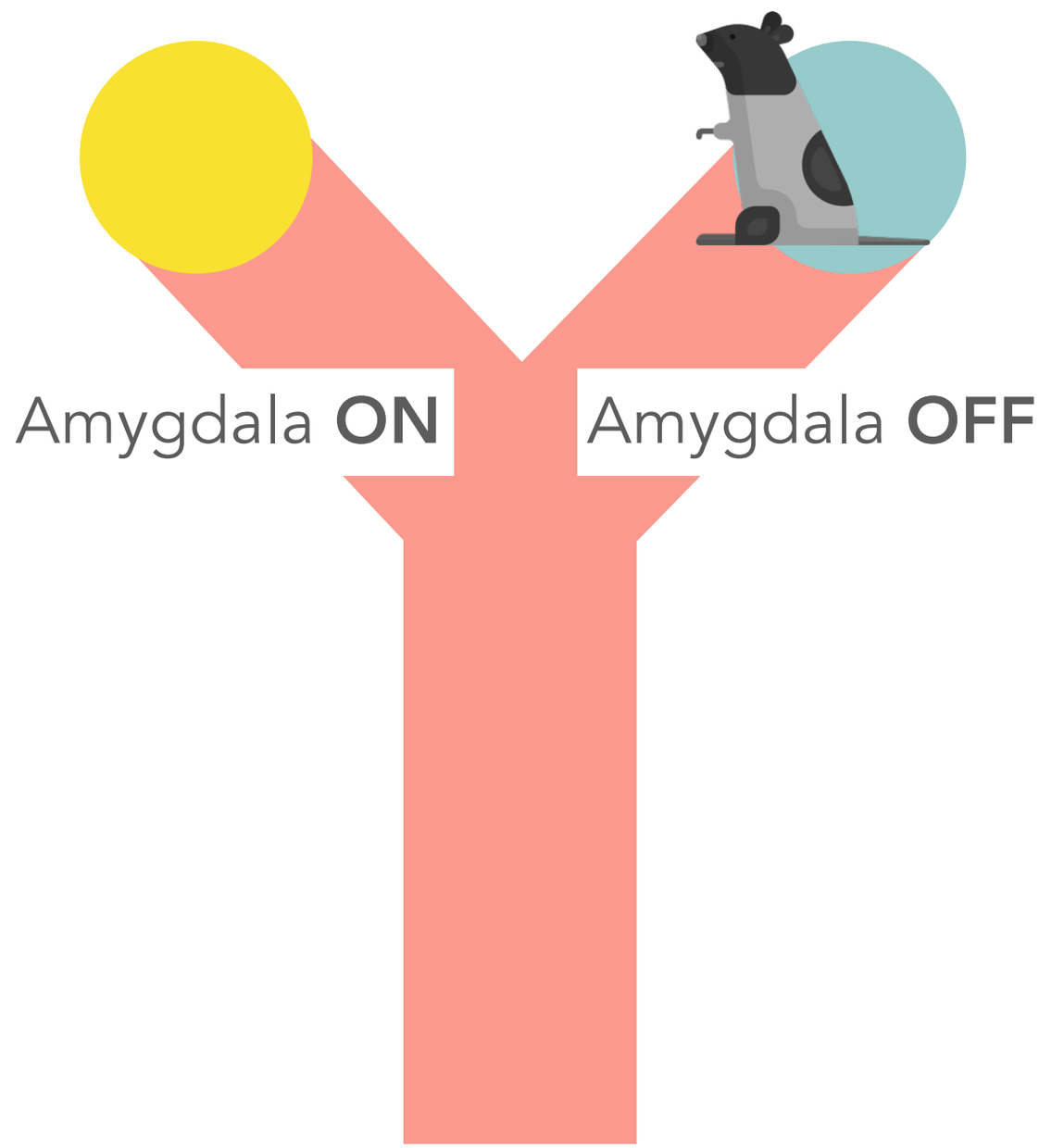


Disruption of the caregiving relationship

Consequences for emotional development

Chronically disrupted caregiving prevented parental buffering of the amygdala



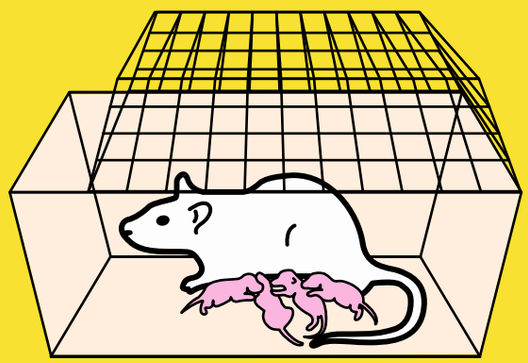


Moriceau & Sullivan, 2006

When parents are <u>not</u> consistently available for protection

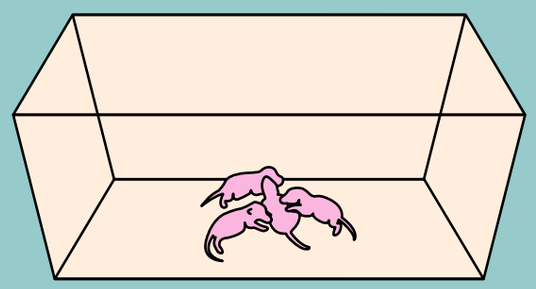
infant emotional development may be accelerated

Standard Rearing



Home Cage

Maternal Separation



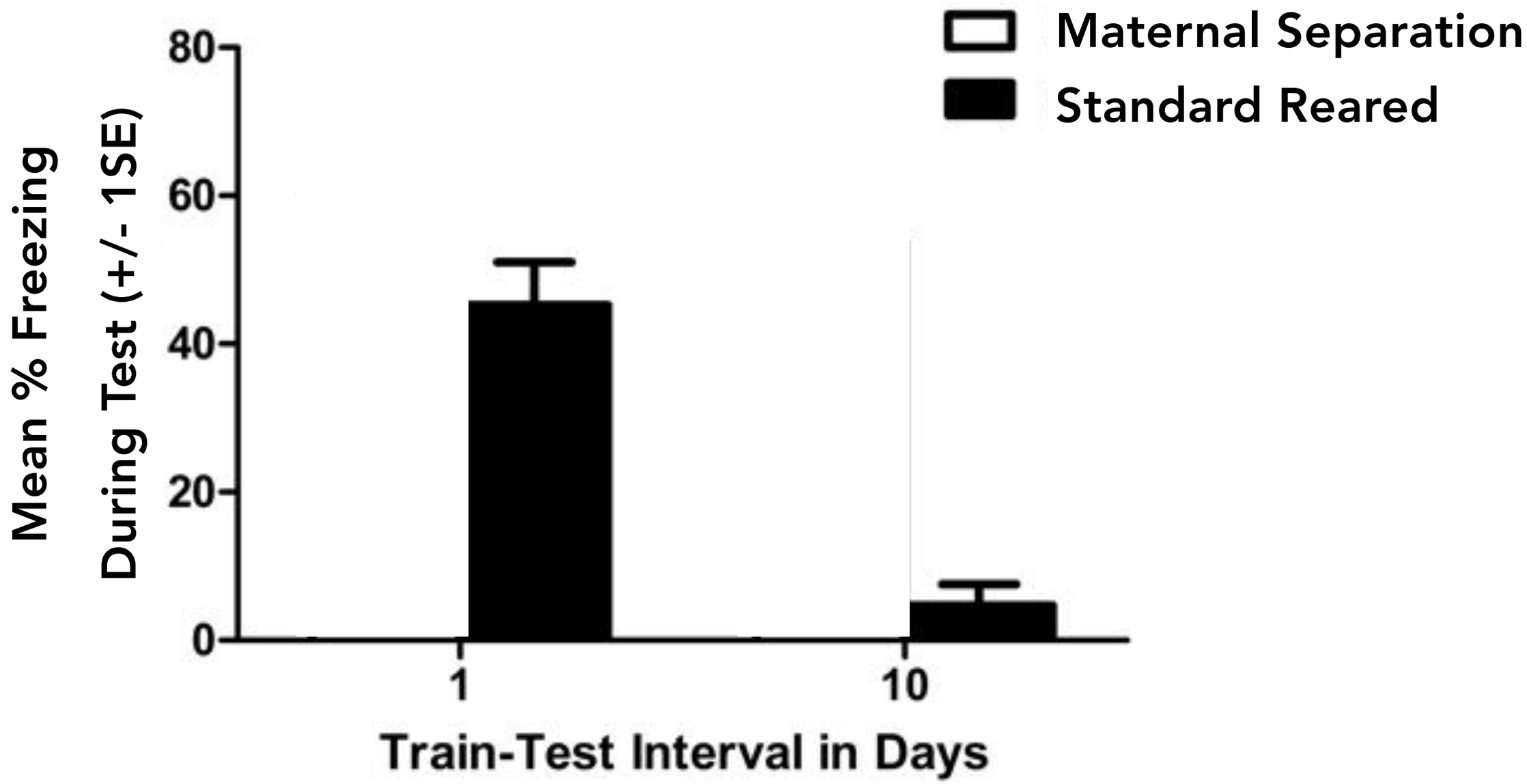
Incubator
(3h per day from P2-14)

Fear Training/Test

Immediate/
Delay

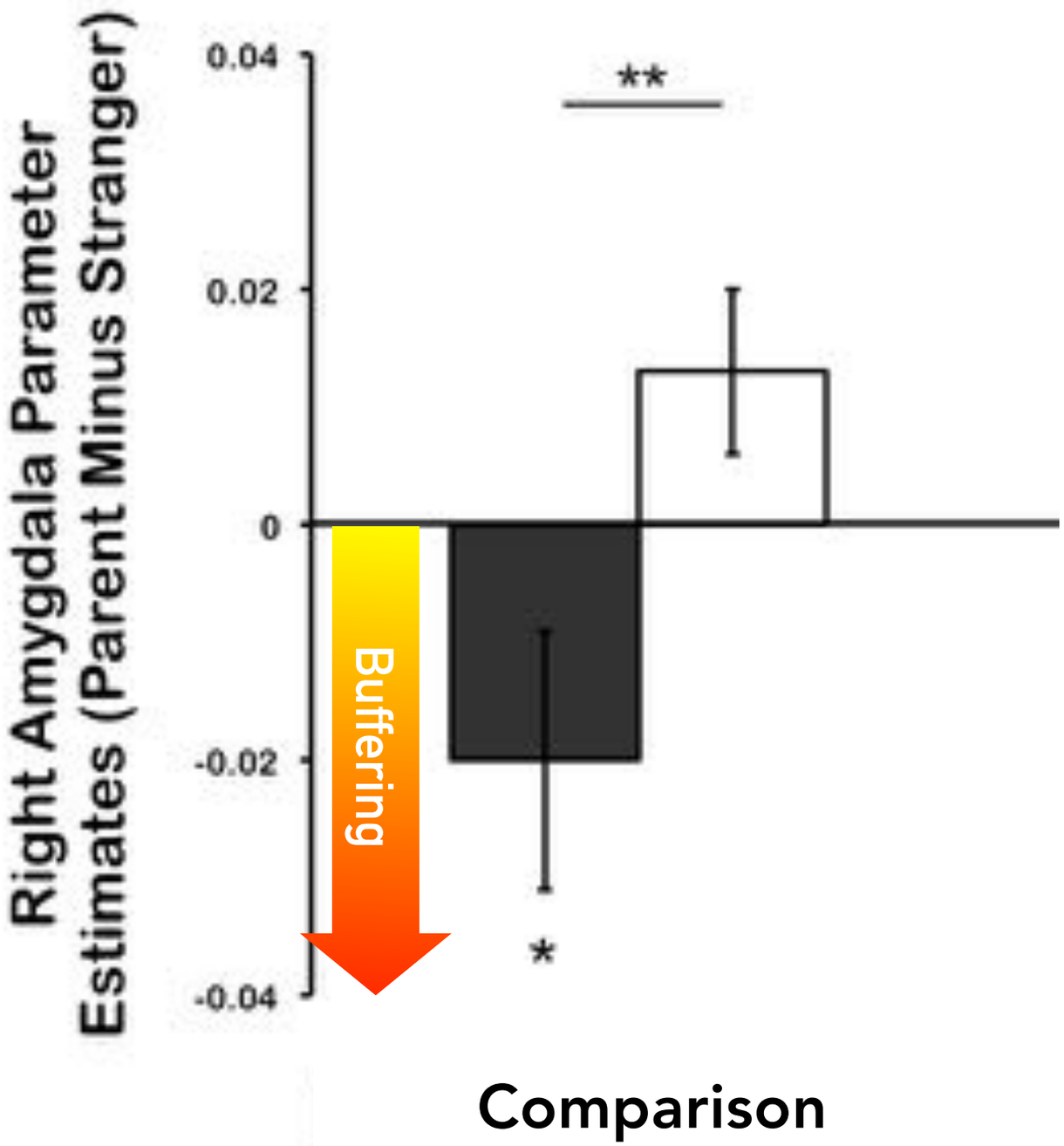
When parents are <u>not</u> consistently available for protection

infants emotional development may be accelerated



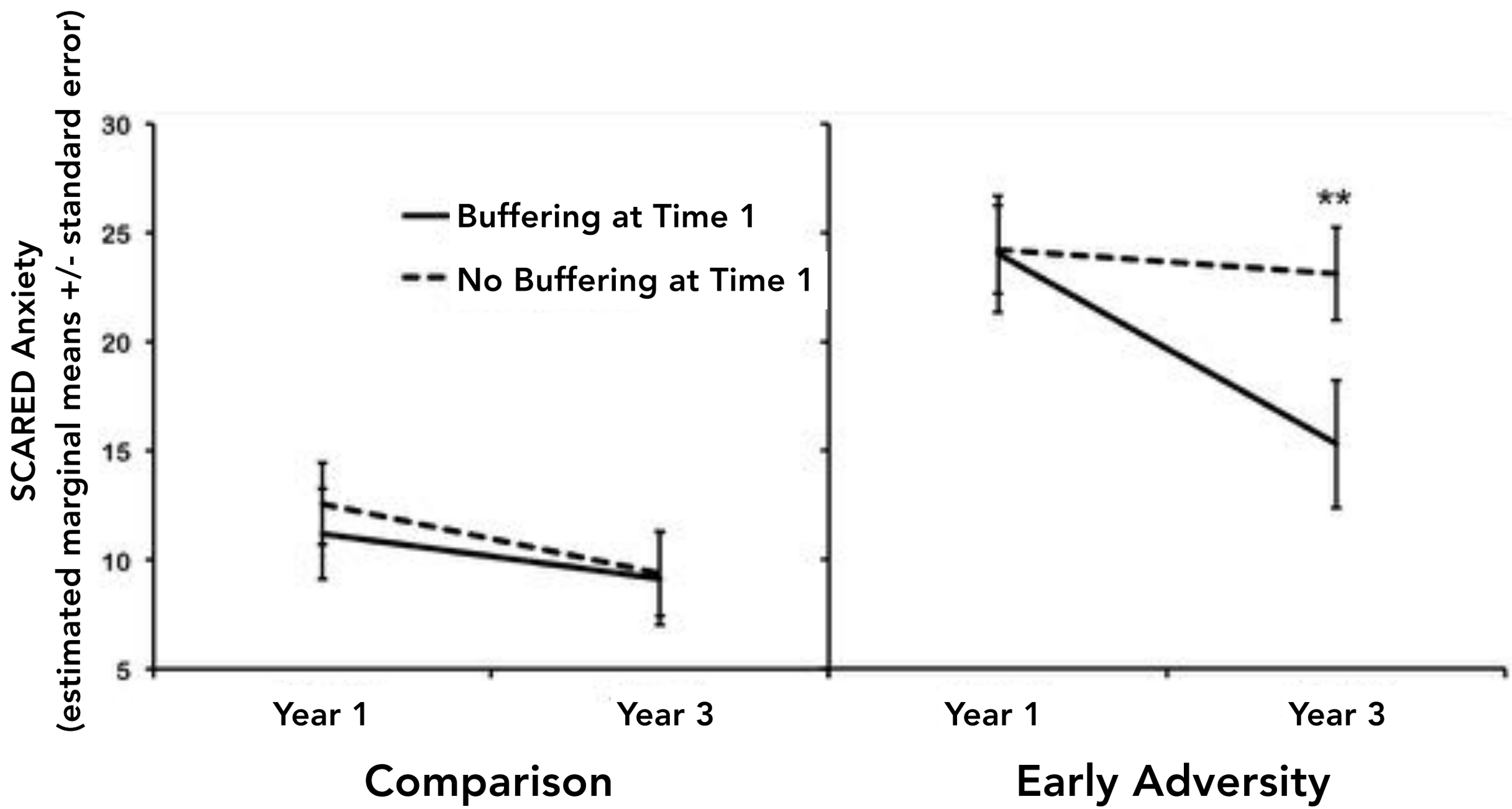
Callaghan & Richardson, 2012

Early caregiving adversity may be associated with altered amygdala development



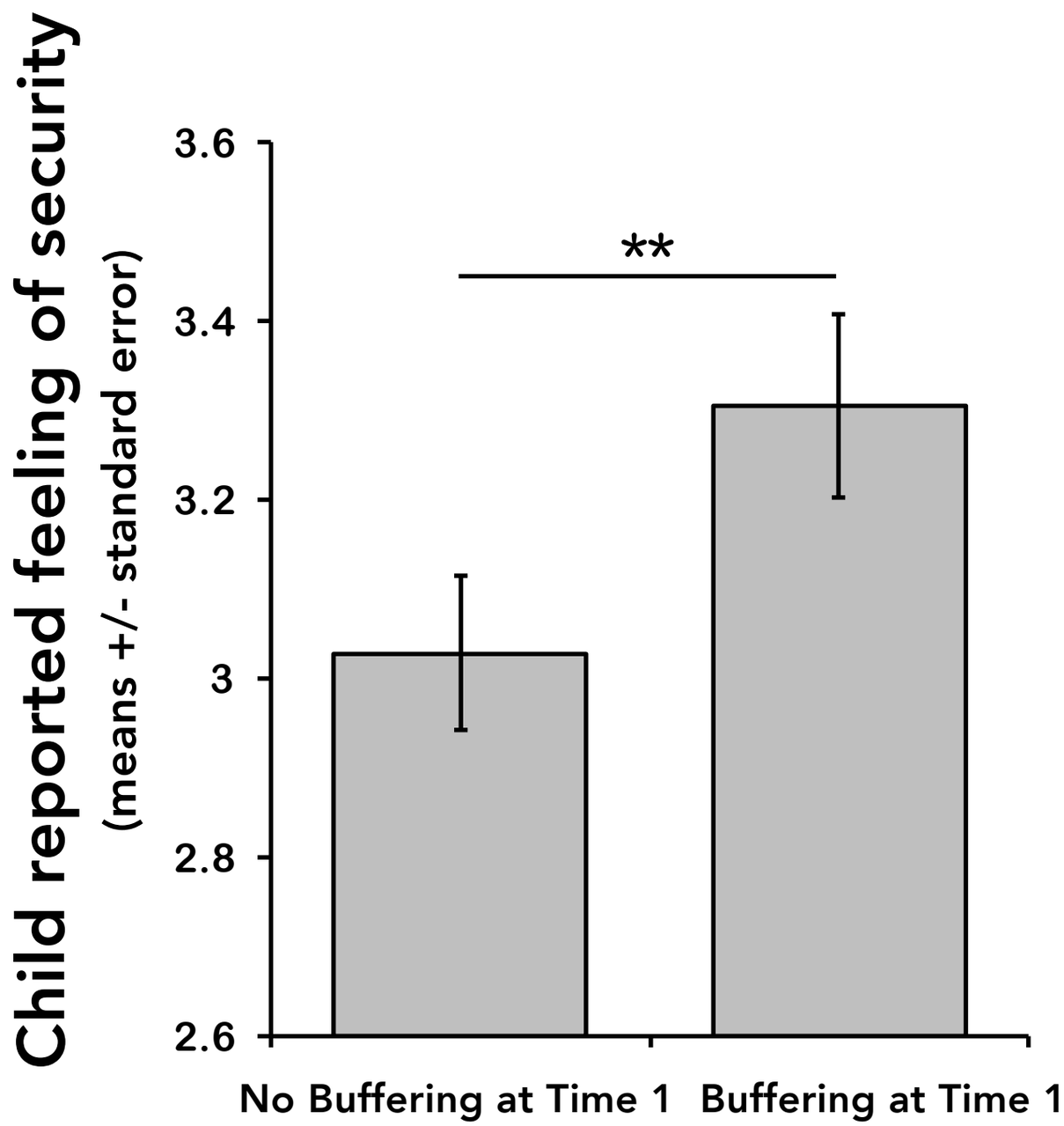
Callaghan et al., 2019

Individual differences in amygdala buffering to parent cues were associated with resilience, despite exposure to early adversity



Callaghan et al., 2019

Amygdala buffering was associated with higher child reported feelings of security in the adversity exposed group



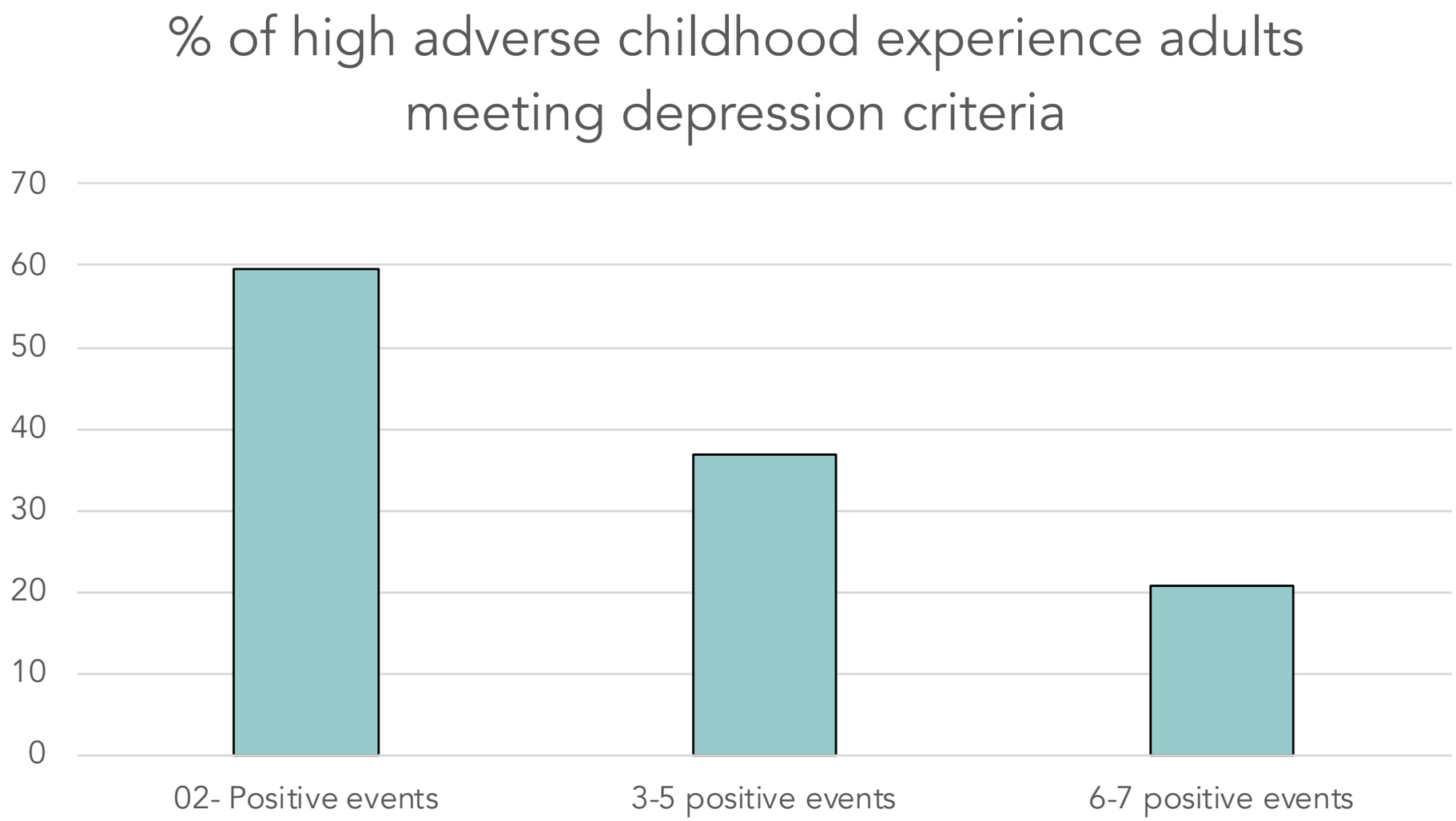
Callaghan et al., 2019

SUMMARY

- Adversity appears to accelerate emotional development and associated neurobiology in rats and humans.
- Tremendous variability in outcomes, which appear to be related to long term mental health.
- Strong child-caregiver relationships are associated with more positive mental health outcomes for youth

A word on positive experiences

Positive childhood experiences can buffer against the negative mental health outcomes of adverse childhood experiences



Bethell et al., 2019

Positive childhood experiences can buffer against the negative mental health outcomes of adverse childhood experiences

Able to talk to family about feelings

Felt family stood by them during difficult times

Felt safe and protected by an adult in their home

Had at least two non-parent adults who took a genuine interest

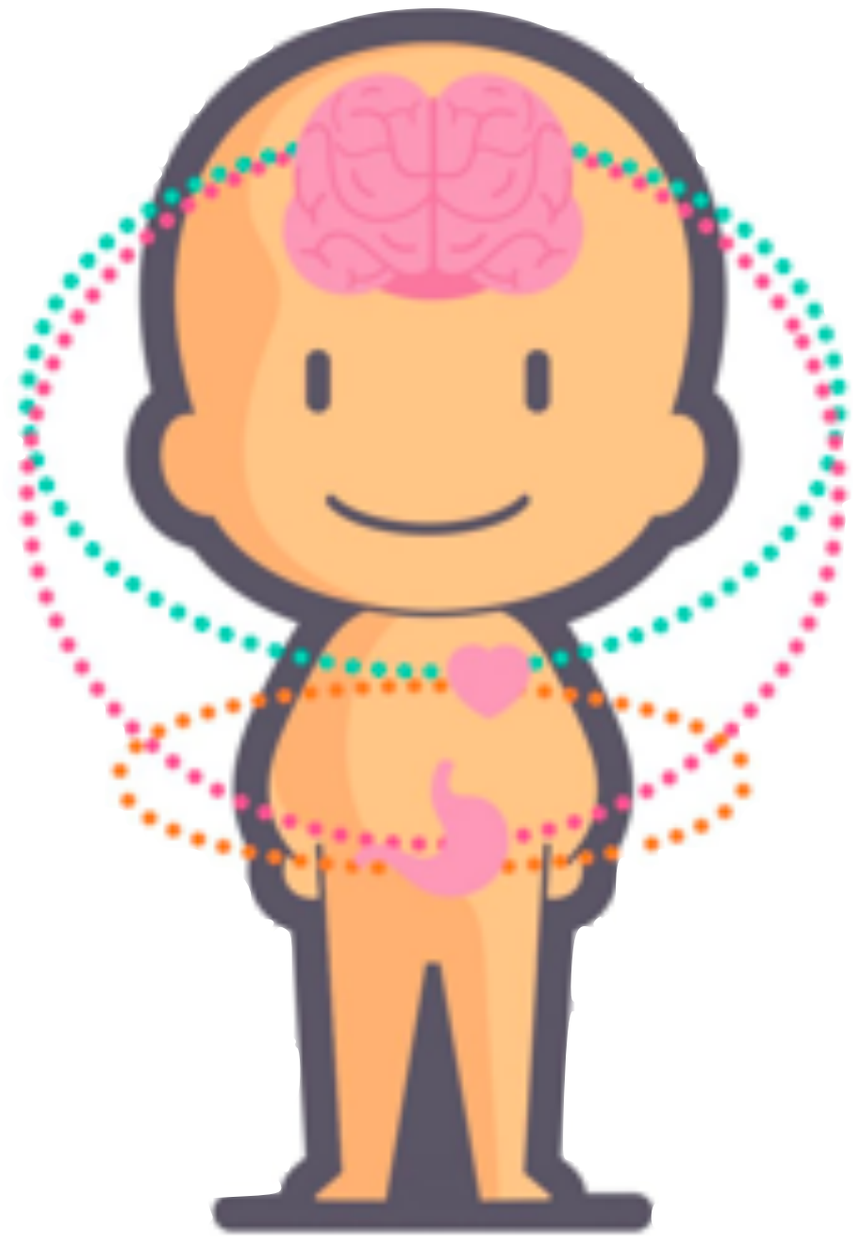
Felt supported by friends

Felt a sense of belonging at high school

Enjoyed participating in community traditions

Bethell et al., 2019

The brain-body connection



Adverse childhood experiences (ACEs) increase physical health risk

37

Studies on adverse childhood experiences looking at health outcomes

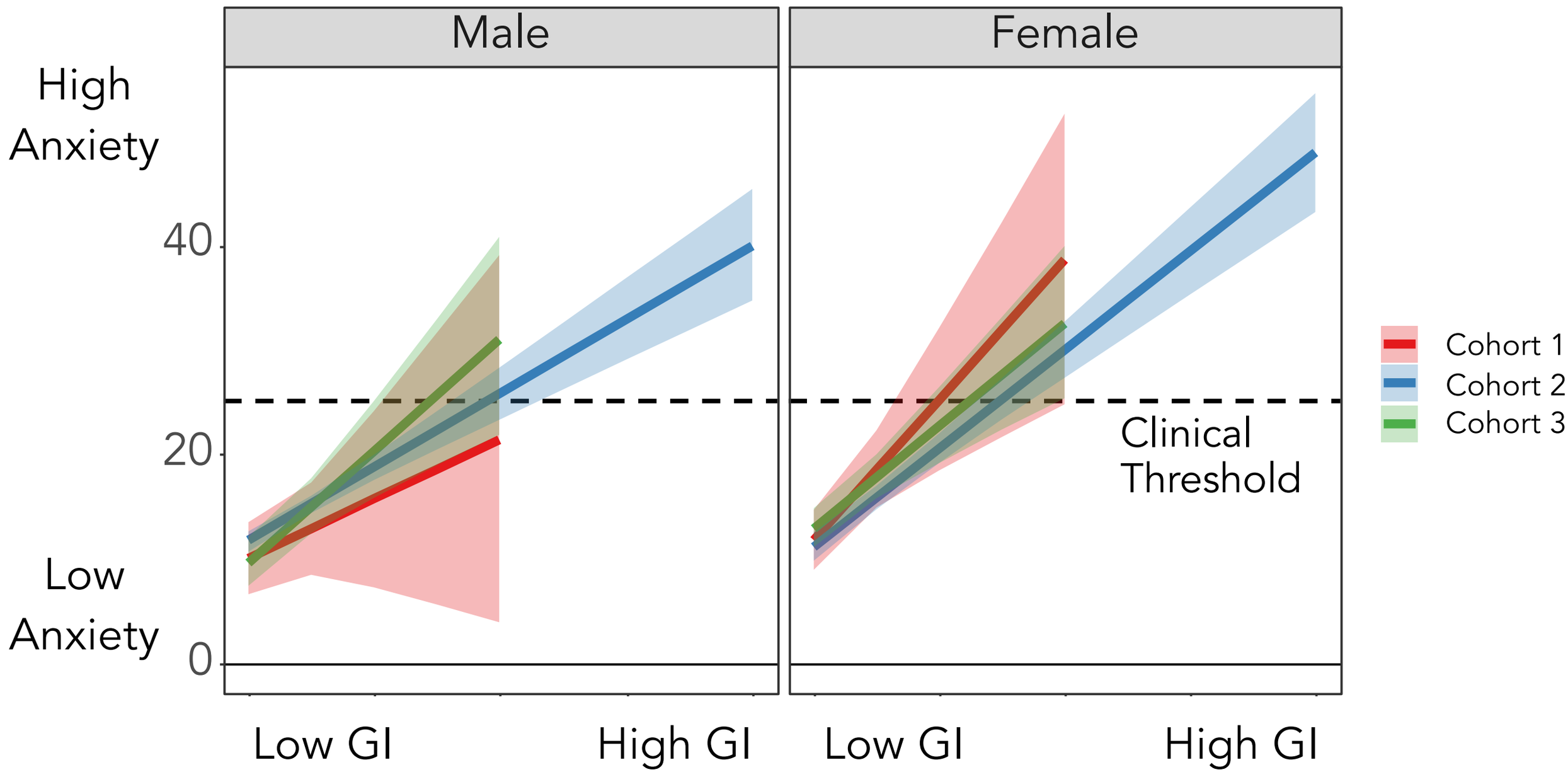
4+

ACES were at increased risk of all examined outcomes (including heart and respiratory disease, drug use, obesity)

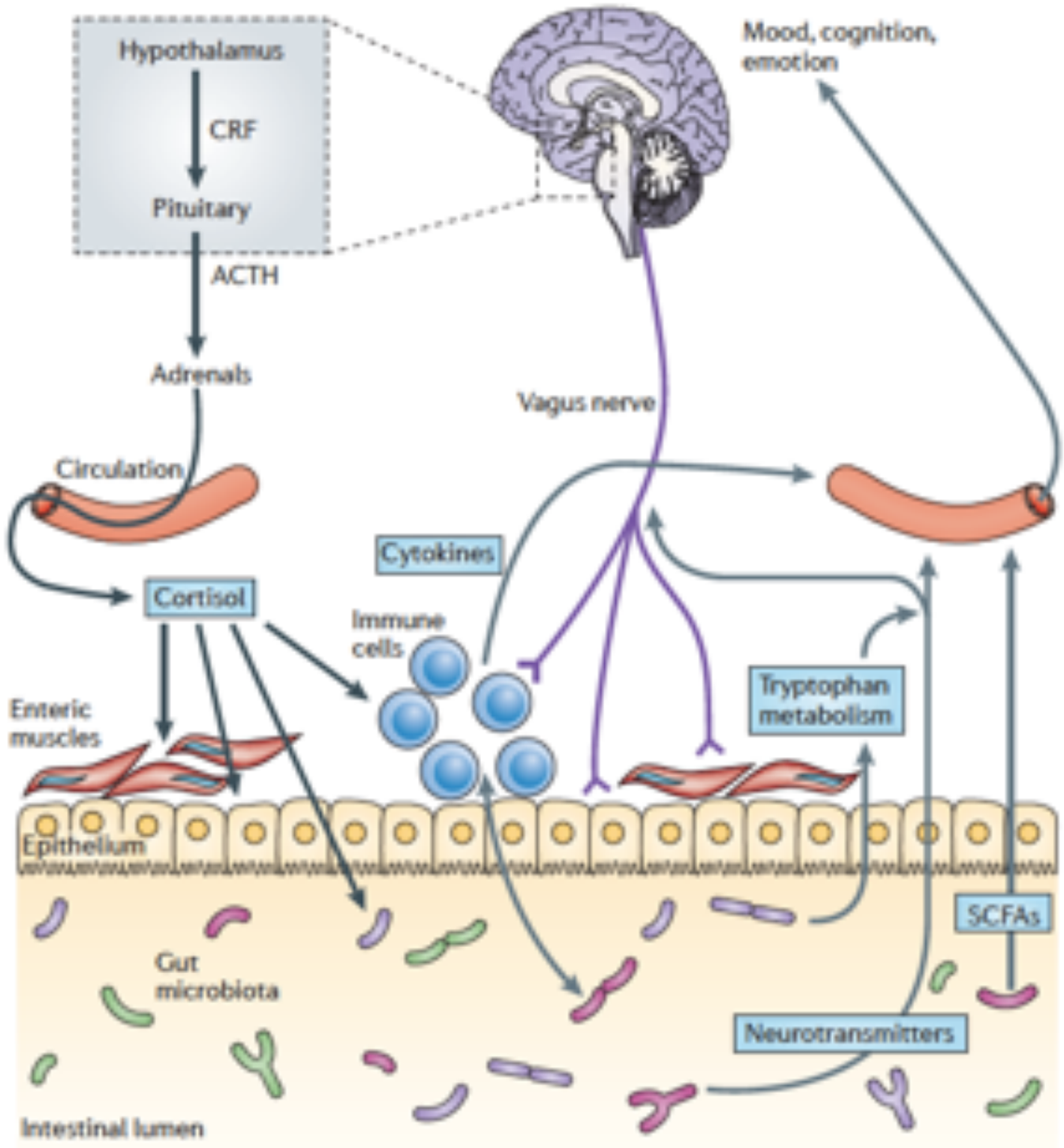
Hughes et al., 2017

Adverse childhood experiences (ACEs) affect gastrointestinal health

	Adversity is associated with GI symptoms	GI symptoms are associated with anxiety
ADULTS	Adult women with IBS reported a higher prevalence of general childhood trauma than control women (Bradford et al., 2012)	"I have butterflies in my stomach" "My stomach dropped in fear"
CHILDREN	Maternal separation in rats is associated with IBS-like symptoms (e.g., Holschneider et al., 2016; Vannucchi & Evangelista, 2018)	Mental health and gastrointestinal complaints are comorbid in children (Campo et al, 2004)

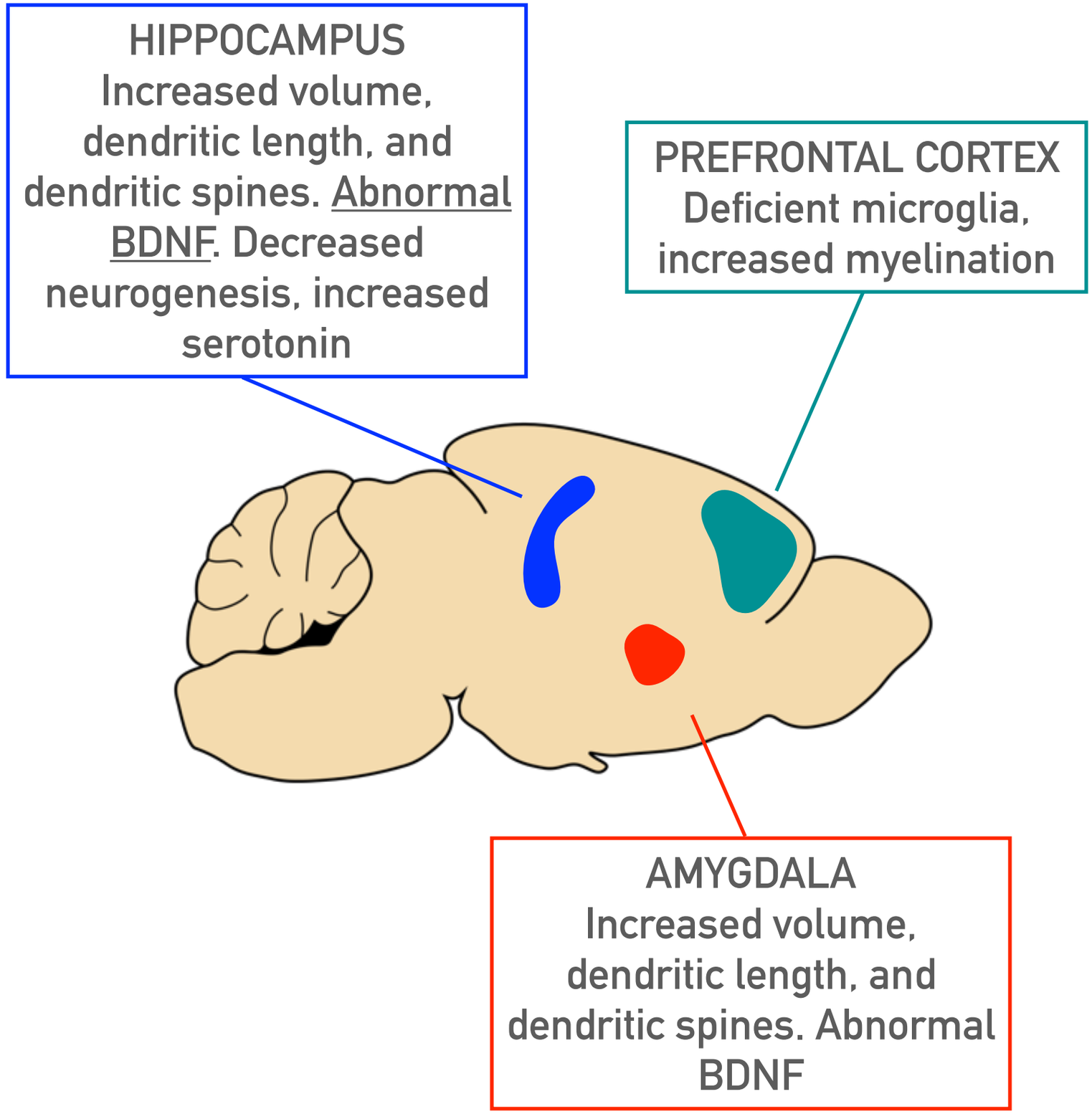


Callaghan et al., 2019; Bloom … Callaghan., 2021



BRAIN GUT Microbiome *Axis*

Cryan & Dinan, 2012

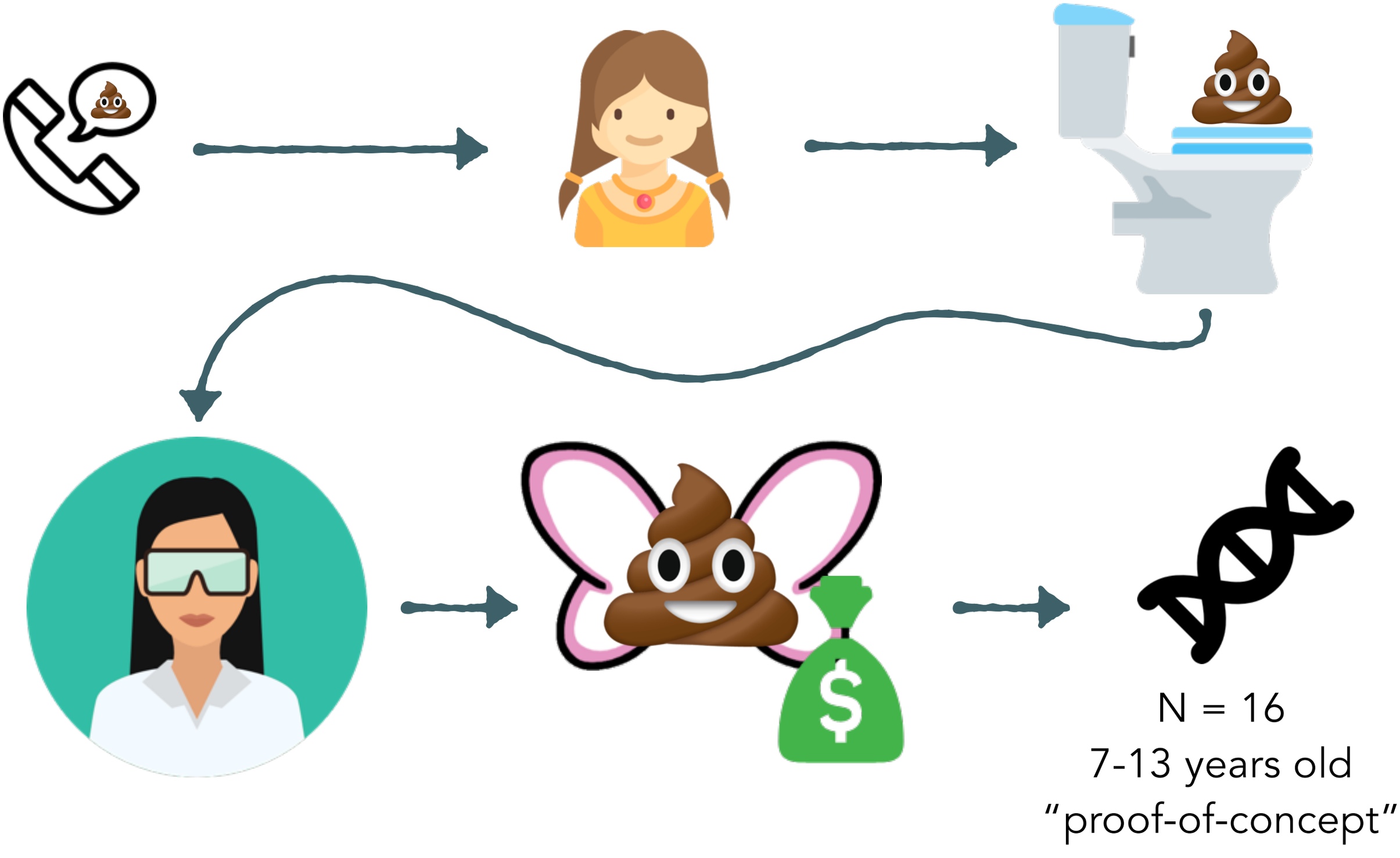


Adapted from Vuong et al., 2017

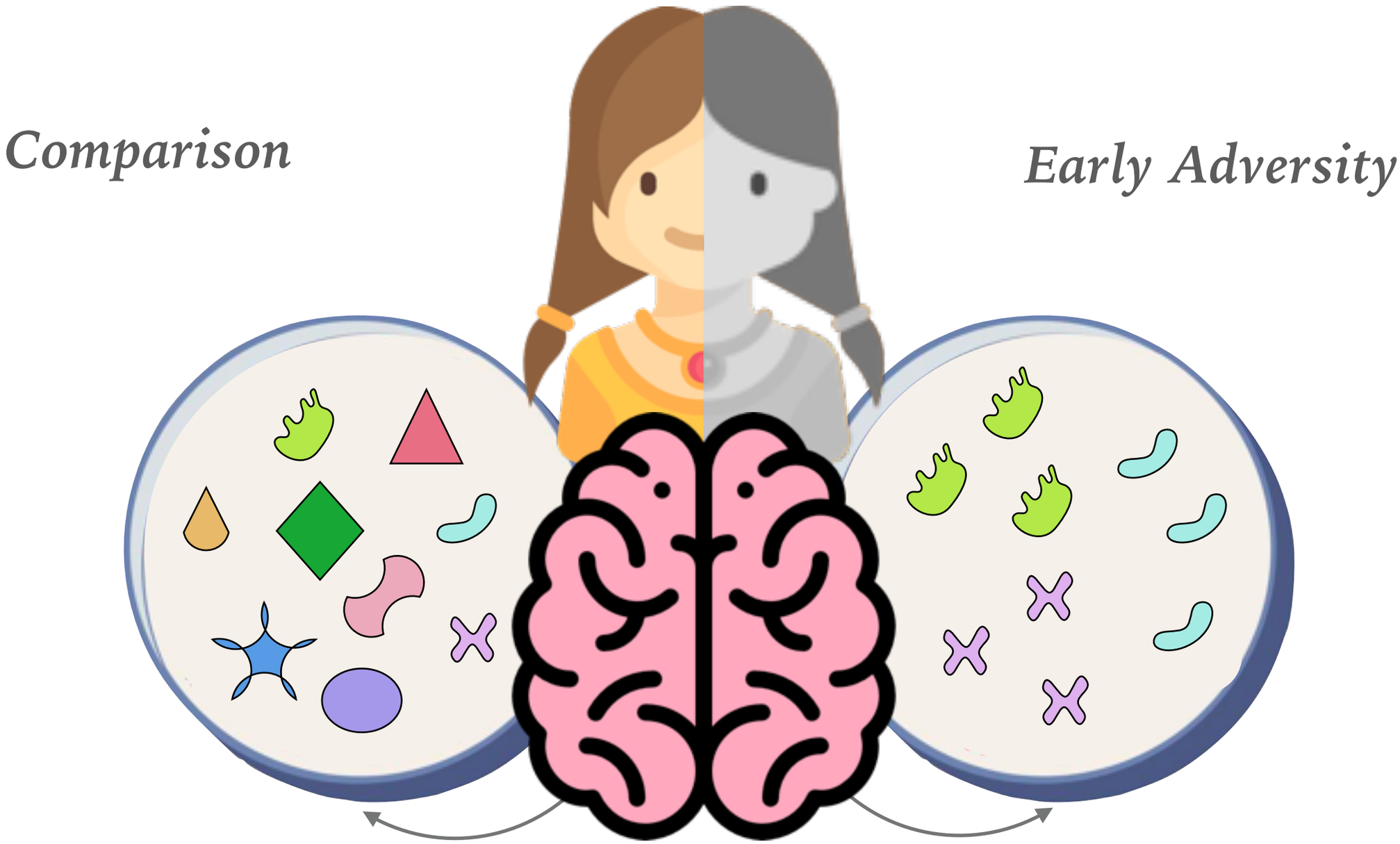
CLINICAL PROMISE IN THE MICROBIOME?

- Can we target the gut to affect brain function and behavior in humans?
- Can gut treatments be used to enhance therapies already commonly used for mental health treatment (e.g., CBT)?

POOP FAIRY



N = 16
Poop Fairy Study



Callaghan et al., 2019

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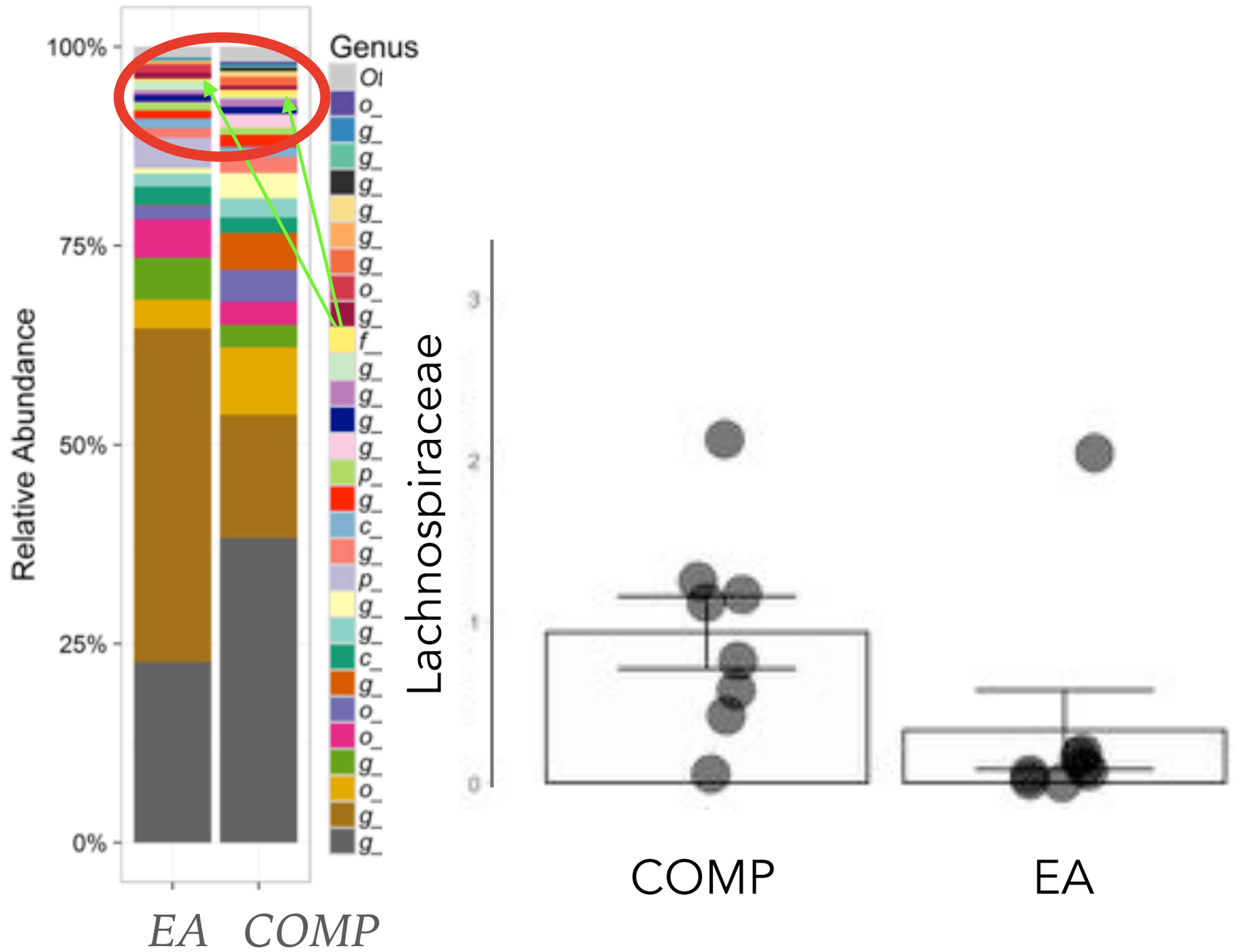
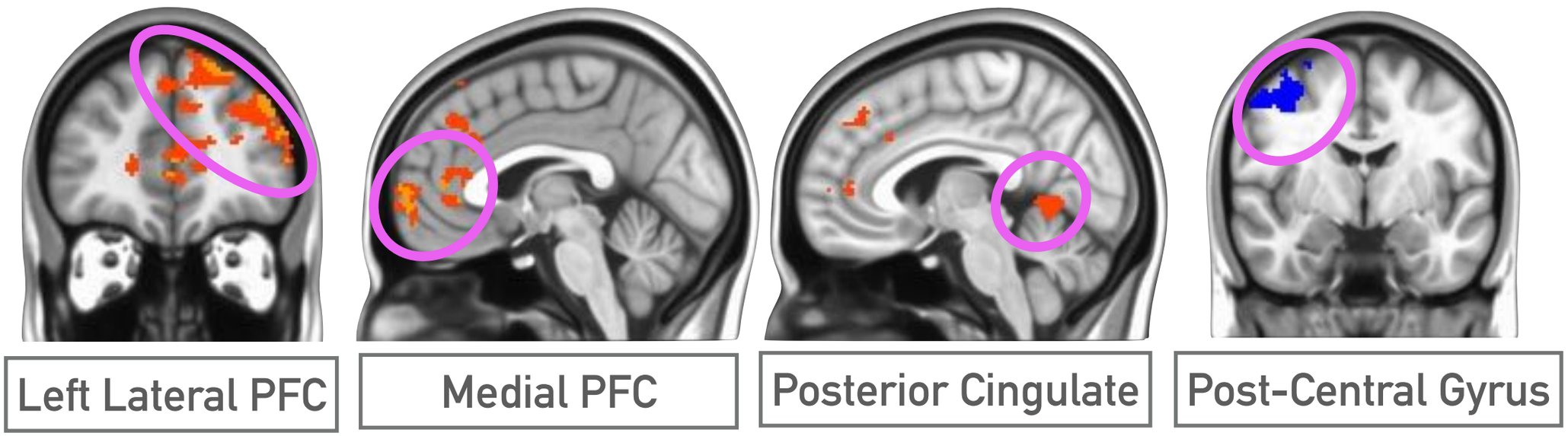
Poop Fairy Study



Callaghan et al., 2019; Development & Psychopathology

N = 16
Poop Fairy Study

($p < .01$, whole brain correction, alpha = .05)



Callaghan et al., 2019; Development & Psychopathology

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Virtual Research Opportunity!

Do you have an ADOPTED or GUARDIANSHIP CHILD 6-9 years old or TEEN 13-16 years old? Join our ONLINE social science research on the development of emotions and brain-body interactions in children TODAY!

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BRAIN &BODY LAB At UCLA

WHO ARE WE?

At the BRAIN & BODY LAB, we examine how early life experiences influence the development of the brain and body, and how the brain and body interact to influence how we think and feel. We study development in adopted children and adolescents between

WHAT YOU AND YOUR CHILD/TEEN WILL DO (From Home!):

Log onto a virtual session to play fun computer games, complete surveys, and give biological samples (e.g., saliva - optional).

WHAT YOU WILL GET:

-$45-$65 for participation
Your child will get toys and prizes
nces

33.8%

SUMMARY

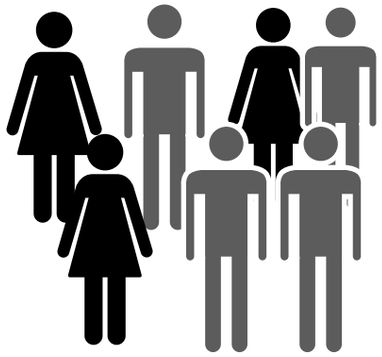
- Caregivers have a huge amount of power to positively affect their children's mental & physical health
- Children respond to caregivers at the level of their brain, biology, and behavior
- Our brains and bodies are connected. Pay attention to both mental and physical symptoms as a sign of wellness
- We might be able to use this knowledge to improve existing treatments for mental health, as well as develop new treatments (that are holistic and non-invasive)

Resources

Further reading

Participate

Join the community



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