Center on the Developing Child
HARVARD UNIVERSITY

Brain Science and the Importance of Building a Strong Foundation

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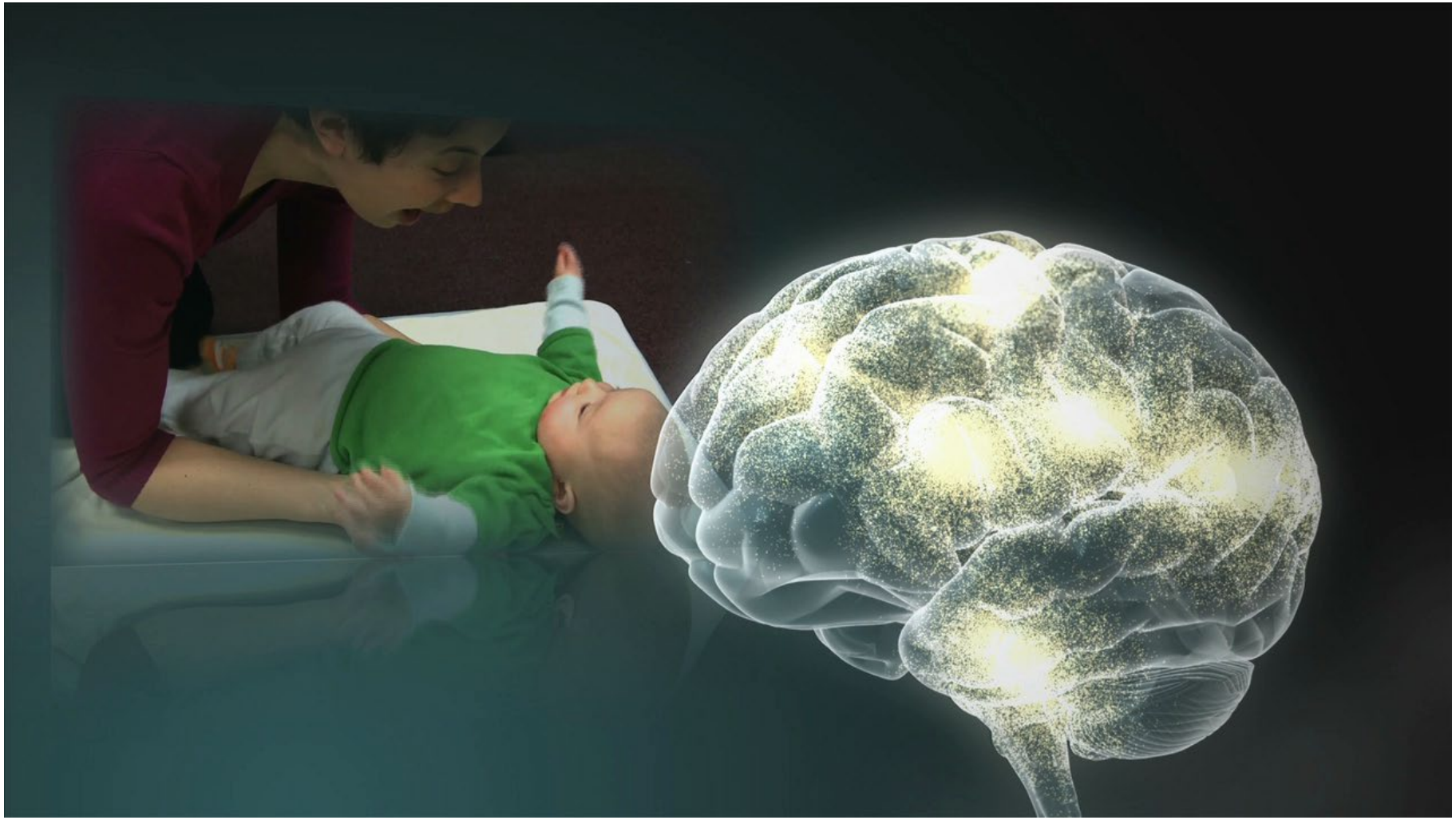
Experiences Build Brain Architecture

Serve and Return Interaction Shapes Brain Circuitry

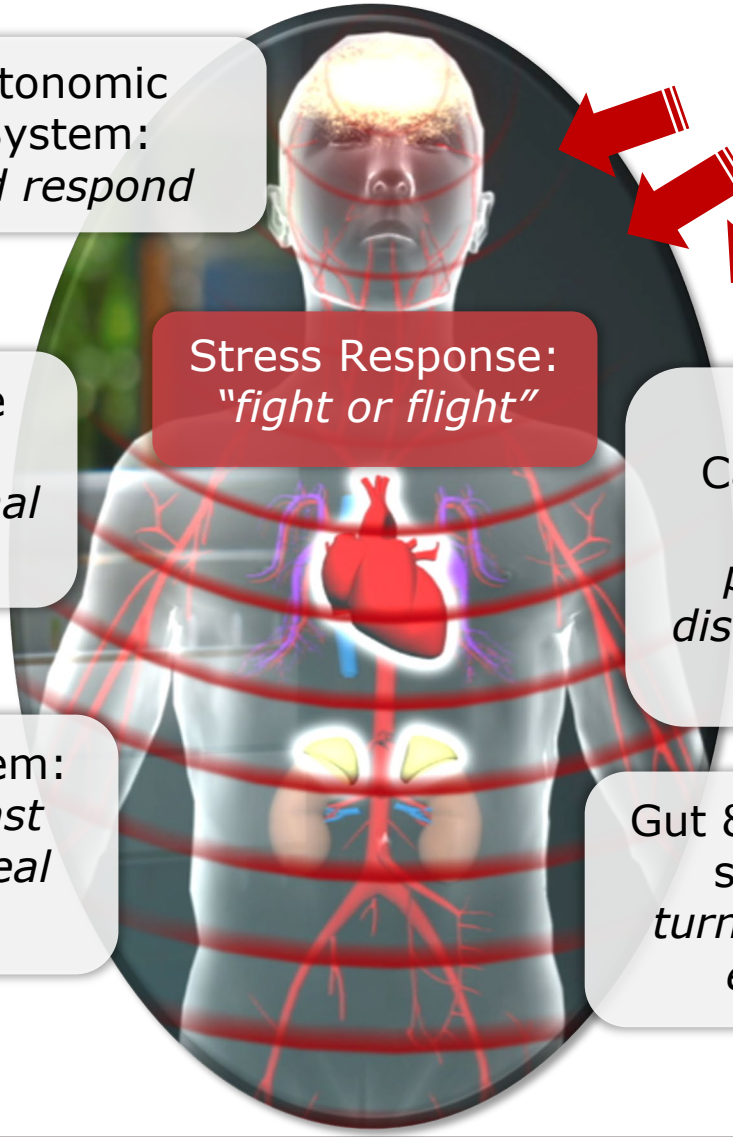


The Brain is Connected to All other Systems in the Body

Brain & Autonomic Nervous System: *manage and respond*

Neuroendocrine system: *maintain hormonal balance*

Immune system: *defend against infection & heal injury*



Stress Response: *"fight or flight"*

Stressors in the Environment

Heart & Cardiovascular system: *pump blood, distribute oxygen & glucose*

Gut & Metabolic system: *turn food into energy*

Asthma
Heart Disease
Diabetes
Obesity
Depression
Autoimmune
Dementia…

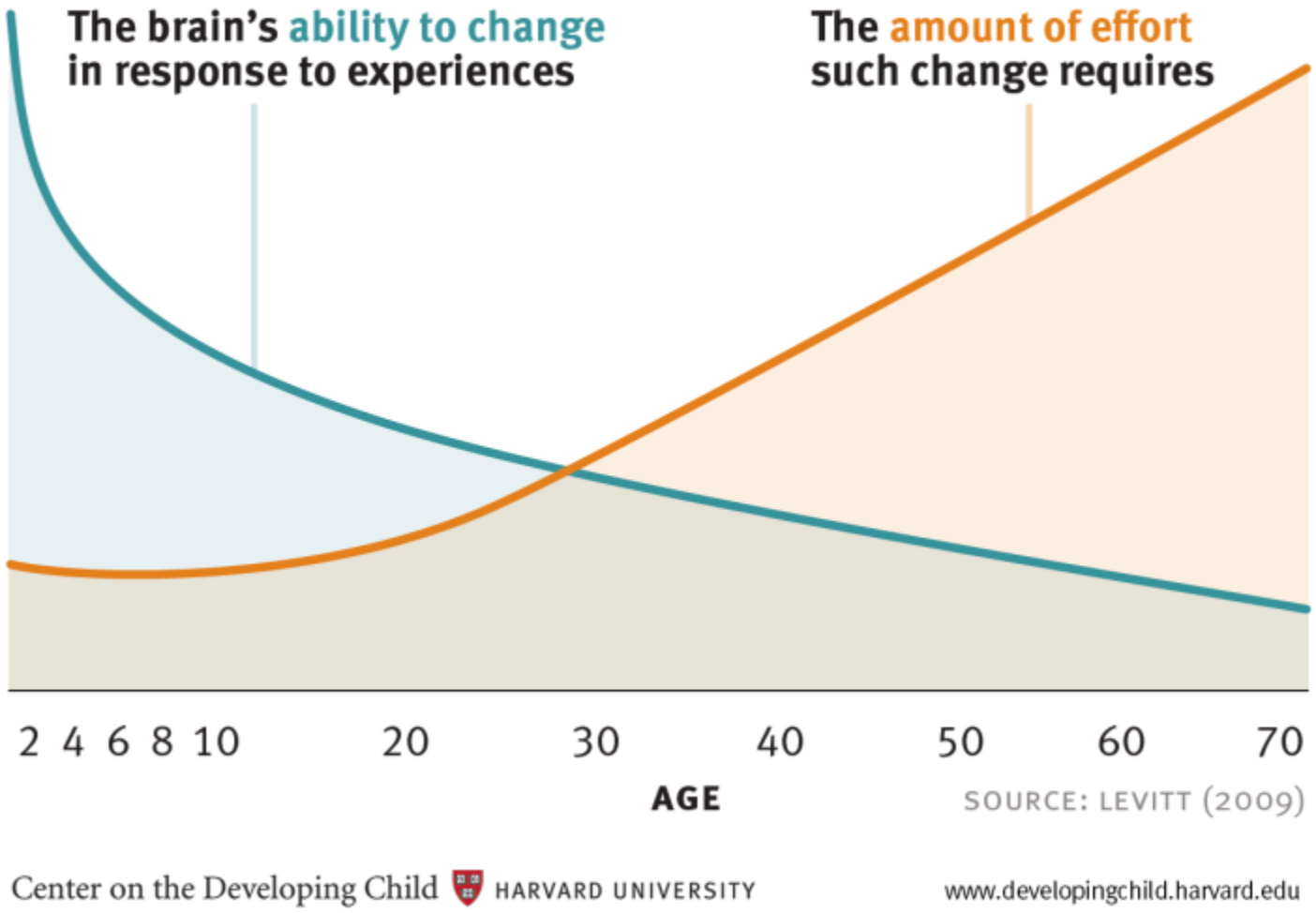
A Quick Poll in slido

On a scale from 1-5, how familiar are you with the science of early childhood development?

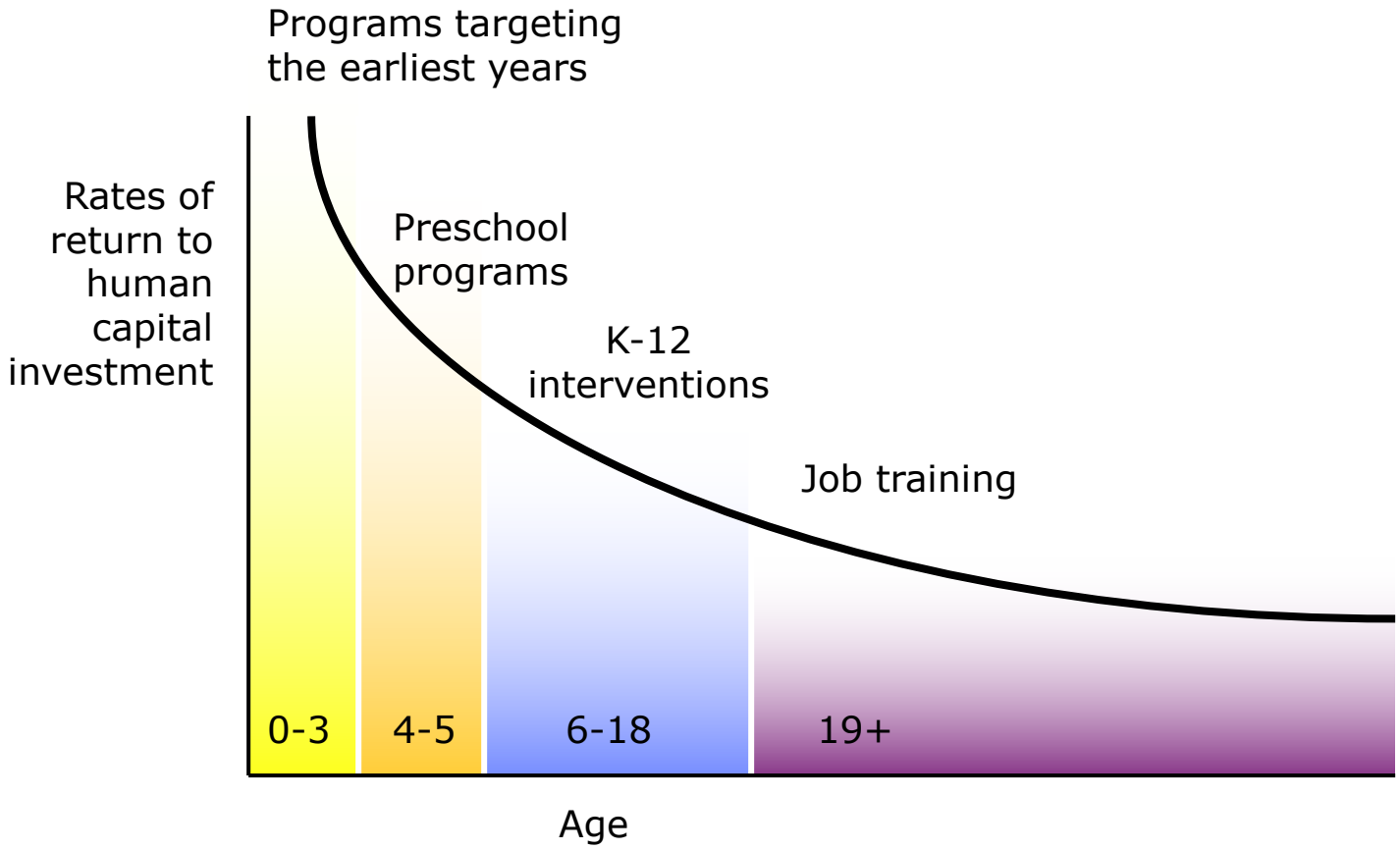
(1 = not at all familiar, 5 = very familiar)

Experiences Build Brain Architecture

Brain Plasticity is Greatest in the Early Years



Preventive vs. Remediation

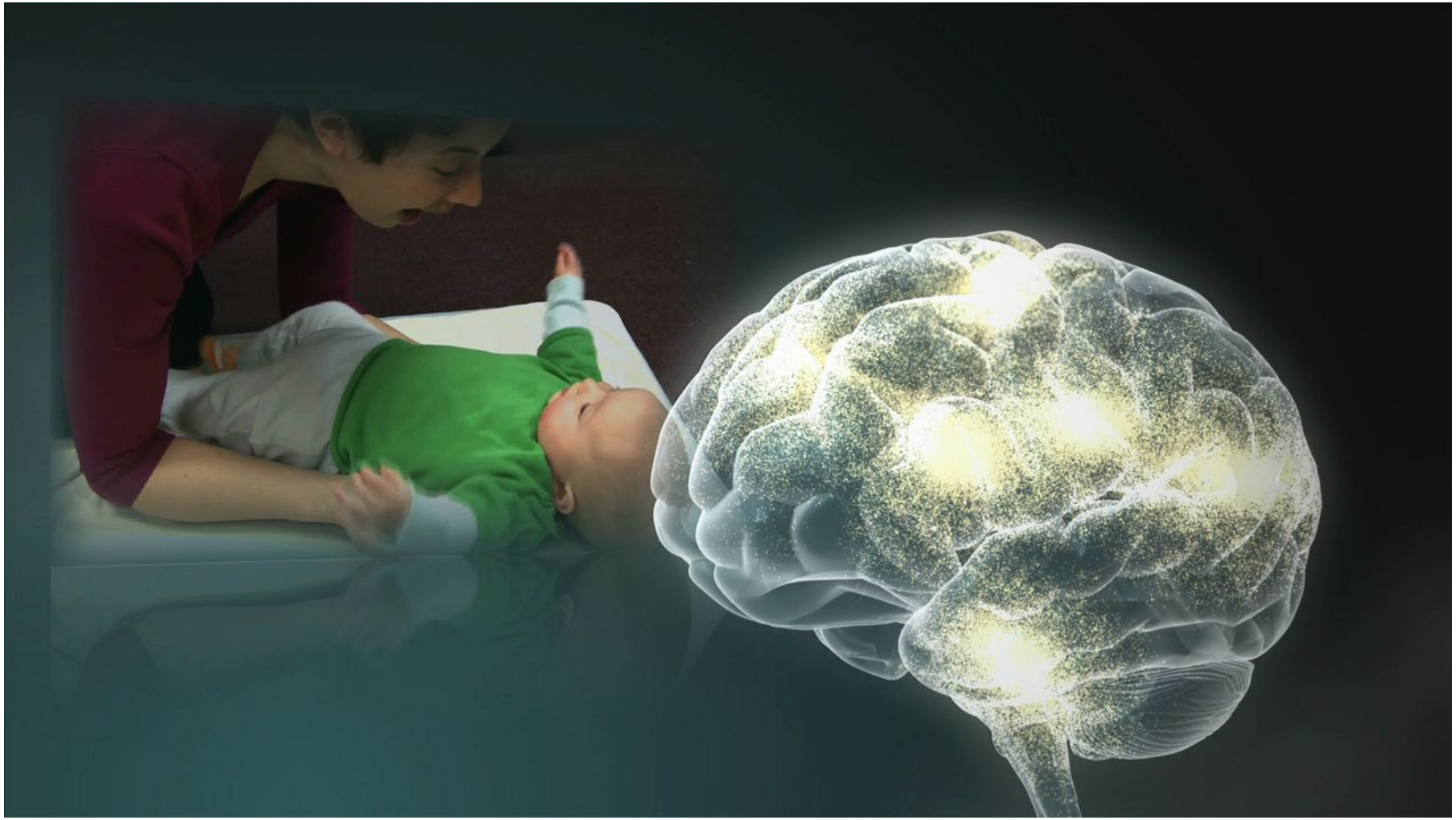


Source: Heckman (2007)

Pair and Share

How would you explain how early experiences shape brain development in your own words?

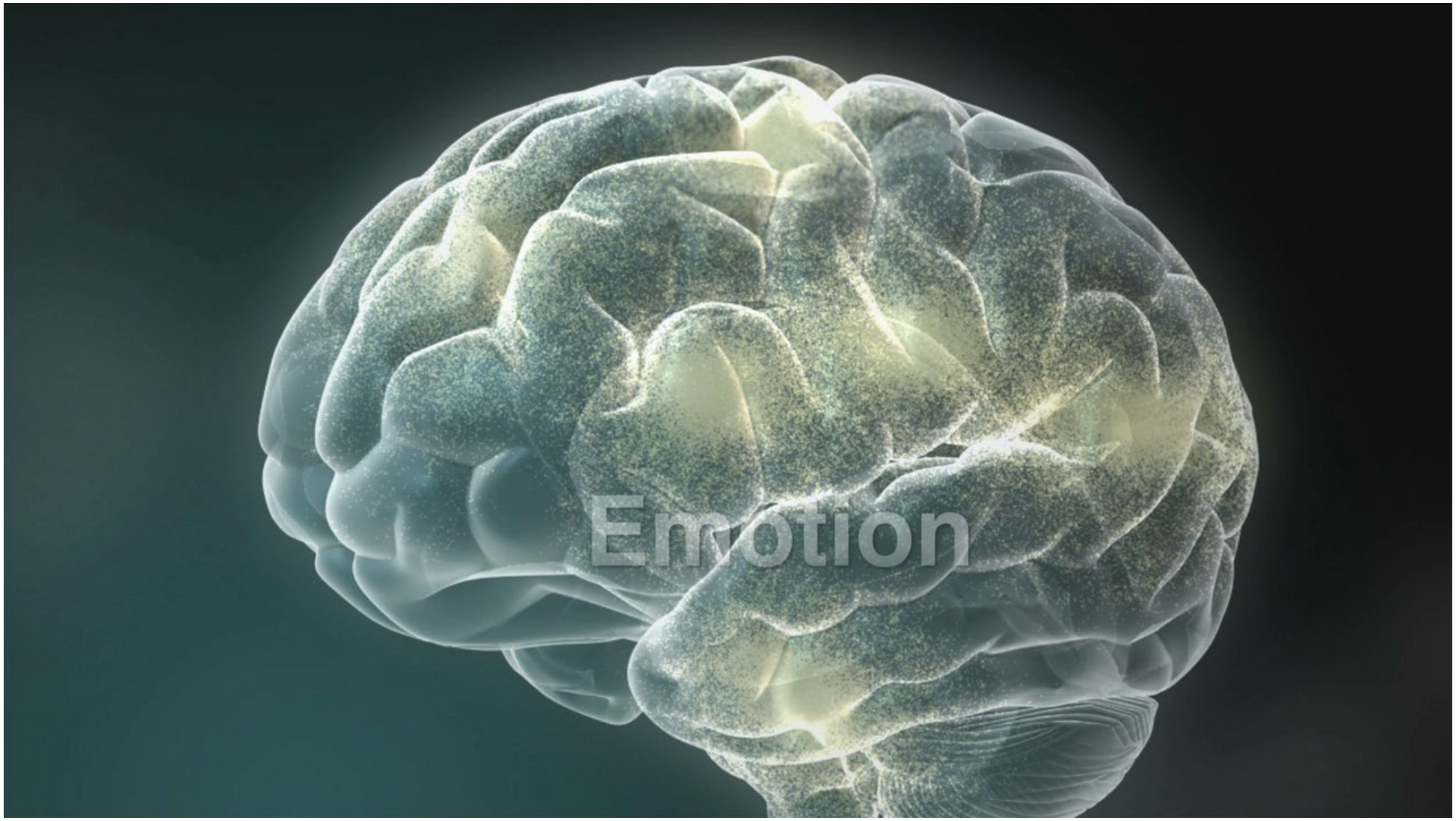
Serve and Return Interaction Shapes Brain Circuitry



Pair and Share

Think of a child in your life. What is one example of a Serve and Return interaction you've had or witnessed with that child? How might this interaction have been beneficial to the child?

Toxic Stress Can Derail Healthy Development



The Biology of Adversity: Three Levels of Stress

Positive

Brief increases in heart rate,
mild elevations in stress hormone levels.

Tolerable

Serious, temporary stress responses,
buffered by supportive relationships.

Toxic

Prolonged activation of stress response systems
in the absence of protective relationships.

The Brain is Connected to All other Systems in the Body

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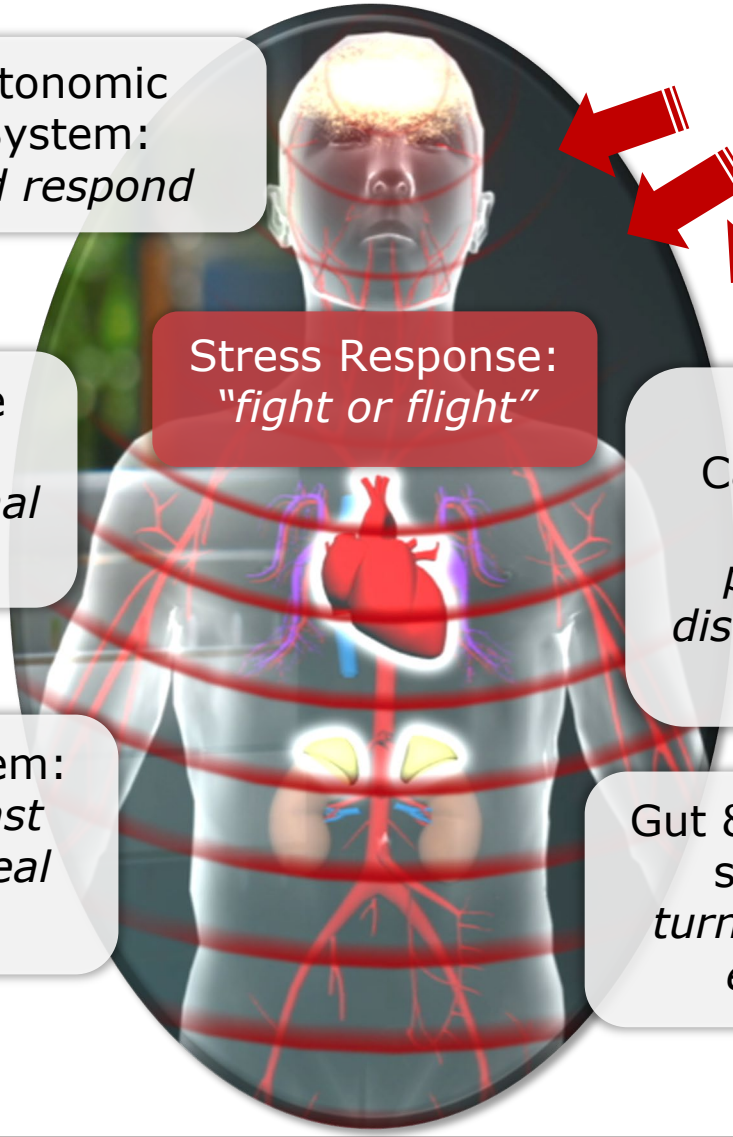

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Asthma
Heart Disease
Diabetes
Obesity
Depression
Autoimmune
Dementia…

Pair and Share

What are the common sources of stress in the community you serve? How do those stressors affect young children and their families?

3 Science-Informed Design Principles Can Improve the Impacts of Policies and Services on Children & Families

Build Responsive Relationships

Reduce Sources of Stress

Strengthen Core Skills

Children
Healthy Development & Educational Achievement

Adults
Responsive Caregiving & Economic Stability

Support Responsive Relationships

- Early experience builds brain architecture and lifelong health
- Serve & Return interaction is key
- Provides a double benefit—promoting development and buffering stress

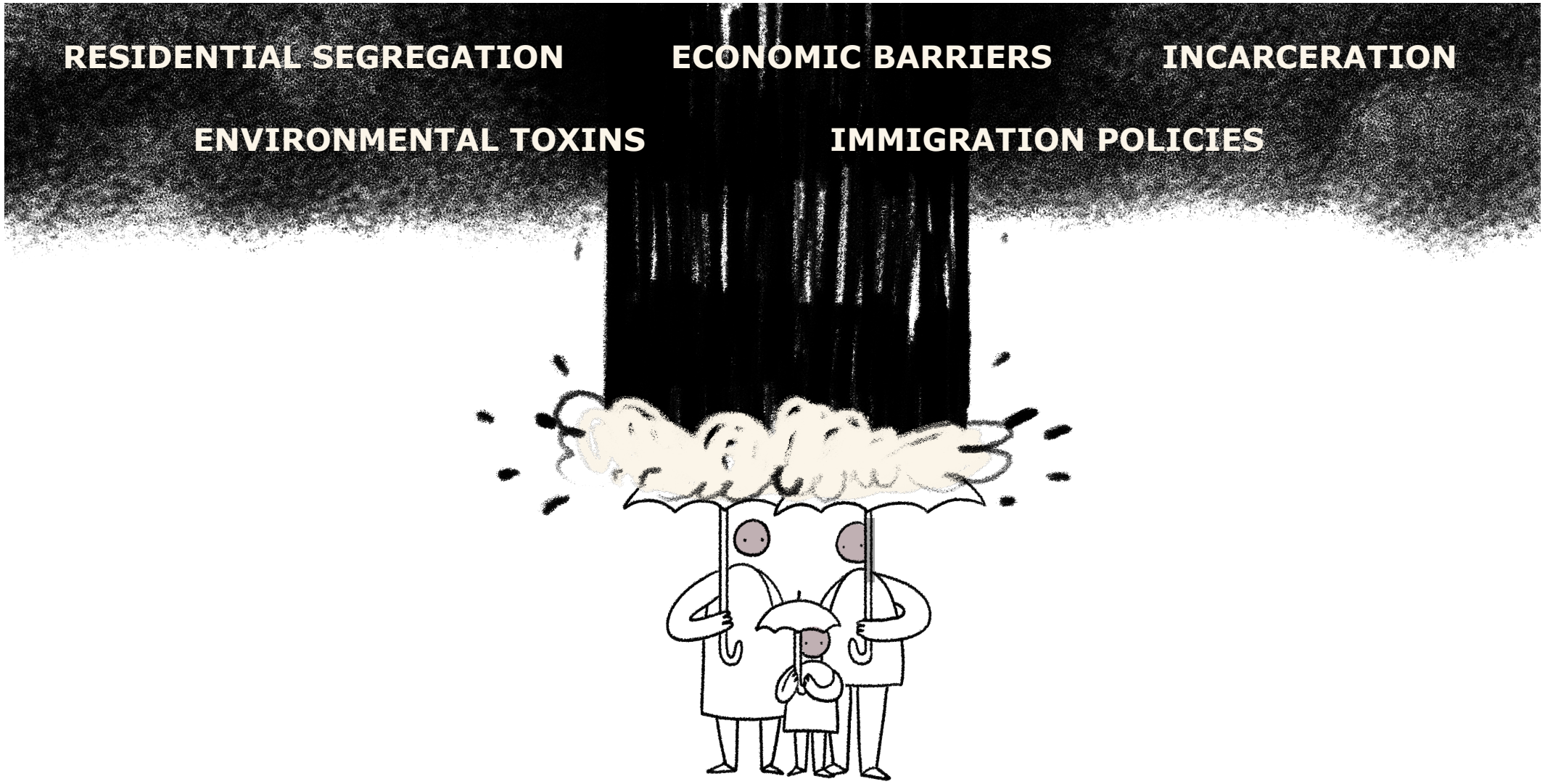
Strengthen Core Life Skills

- The essential skills we all need to manage life, work and relationships successfully
- Include executive functioning and self-regulation
- Develop over time with coaching and practice

Reduce Sources of Stress

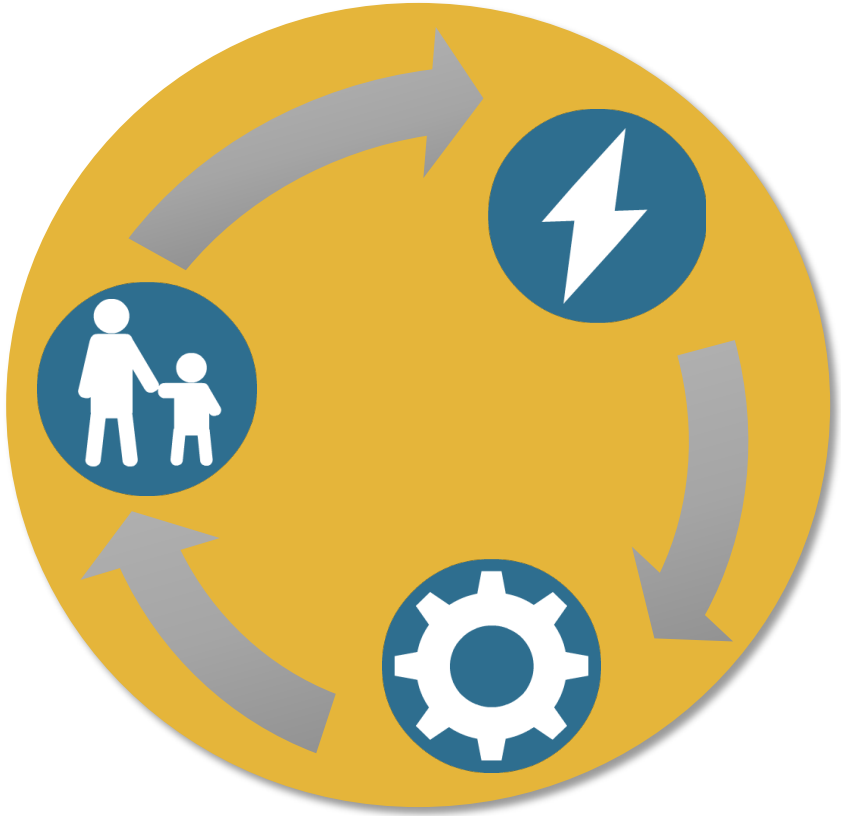
- Not all stress is bad but unrelenting, severe stress can be toxic
- Reducing toxic stress protects children directly by decreasing activation of the stress response system
- And indirectly because the adults they depend on are better able to support them

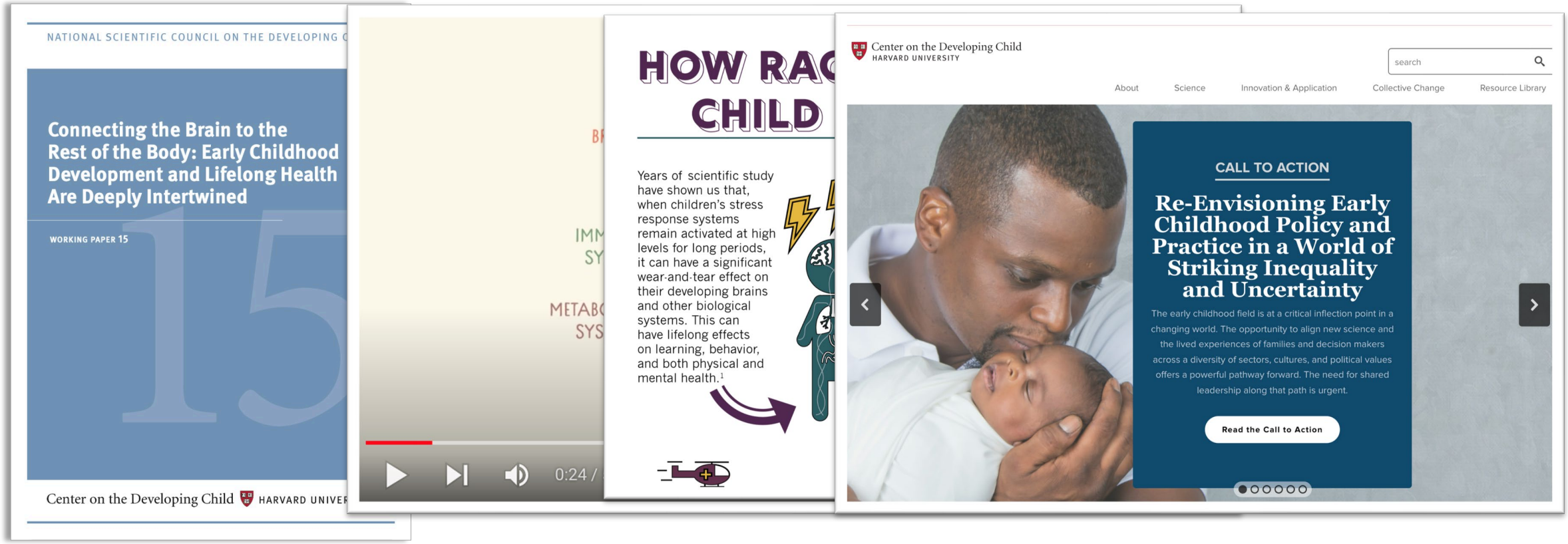
Urgent Need to "Move Upstream" and Confront Structural Inequities That Impose Disproportionate Burdens on Families of Color



Discussion in Small Groups

1) What are policies, systems and practices doing to address each principle?
2) What could be done to address them better?
3) What barriers prevent addressing them more effectively?





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ADVERSE CHILDHOOD EXPERIENCES
TRAUMA, RESILIENCE, AND THE DEVELOPING BRAIN

June 28, 2022

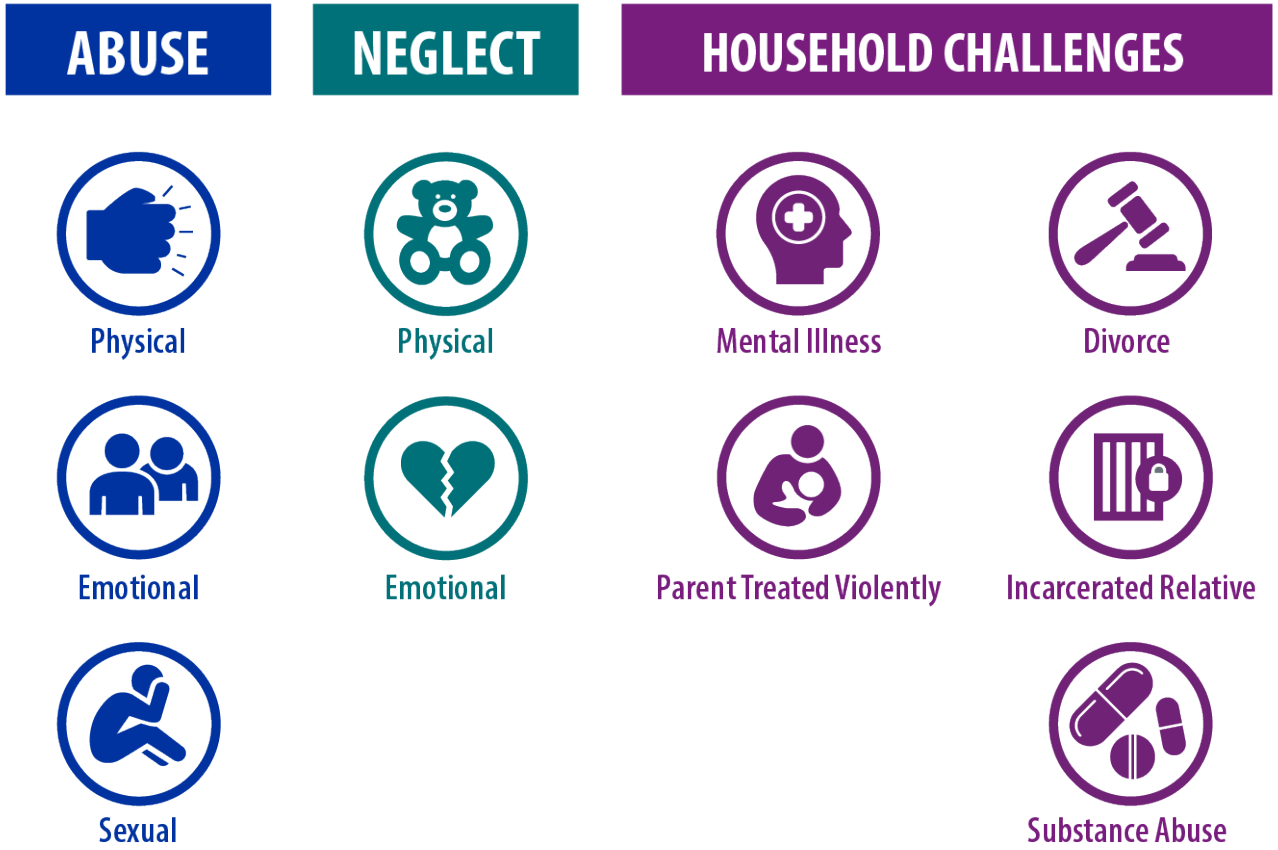
National Conference of State Legislatures

Greta Massetti, PhD

Division of Violence Prevention




Adverse Childhood Experiences



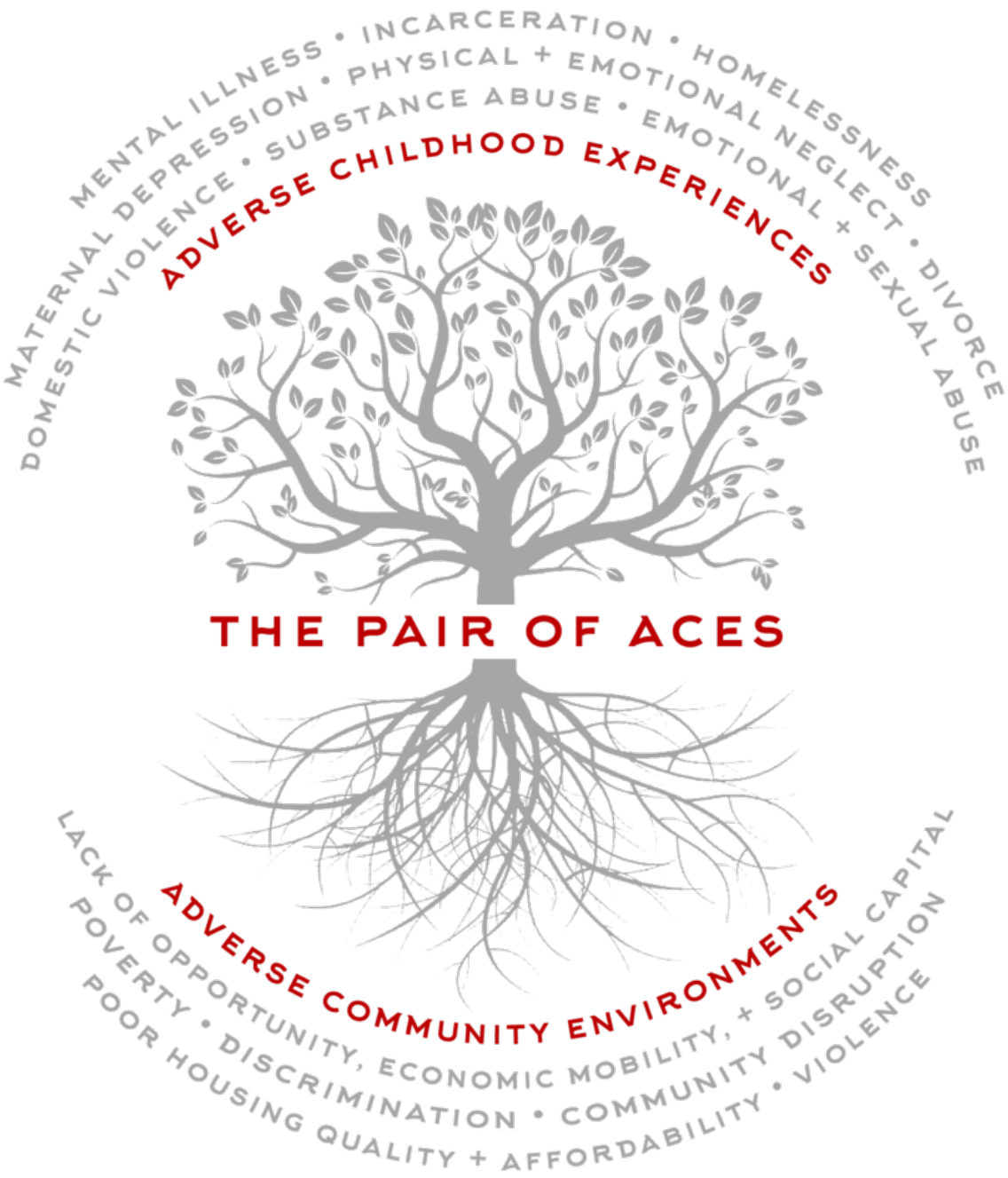
Expanded view of ACES, not included in the traditional measure

- Experiencing discrimination
- Experiencing bullying or peer violence
- Experiencing teen dating violence
- Housing insecurity or homelessness
- Food insecurity
- Living in extreme poverty
- Witnessing violence in your community

PAIR OF ACEs

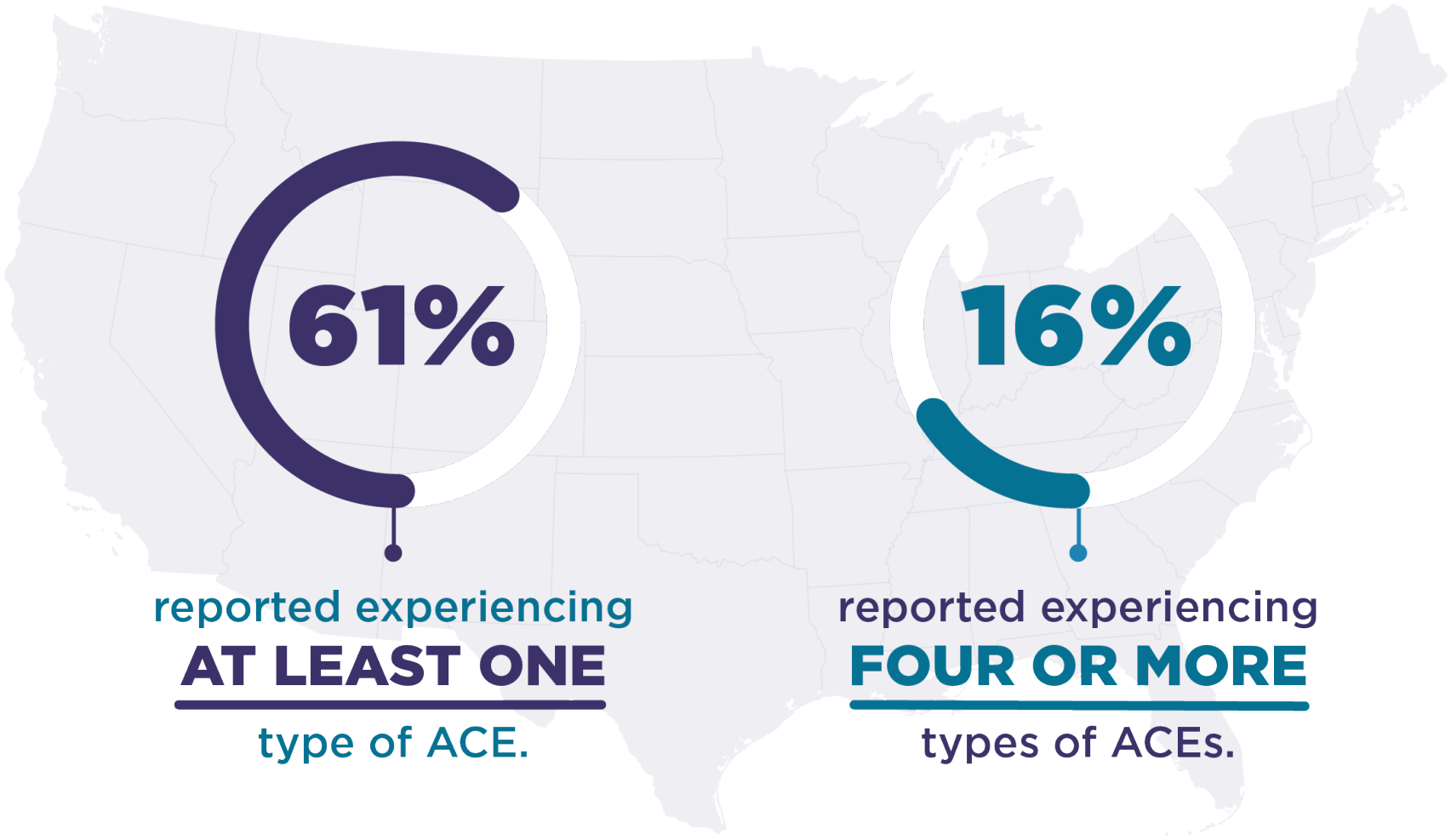
Adverse **C**hildhood **E**xperiences

Adverse **C**ommunity **E**nvironments



Many People Report ACEs

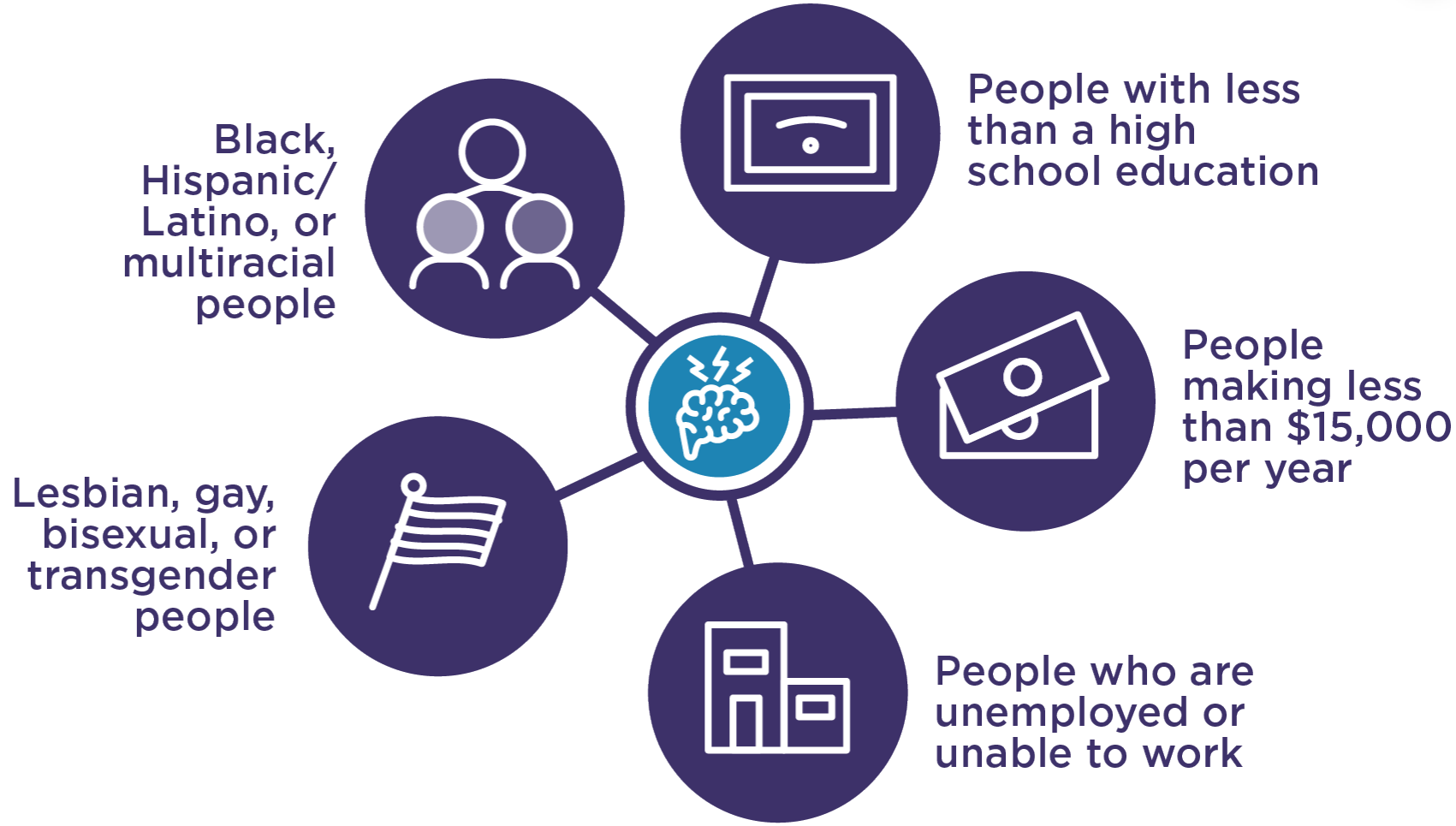
According to data collected from **more than 144,000 adults across 25 states** between 2015 and 2017:



Source: CDC

Some Groups Are More Likely to Have Experienced ACEs

Multiple studies show that people who identified as members of these groups as adults reported experiencing **significantly more ACEs:**



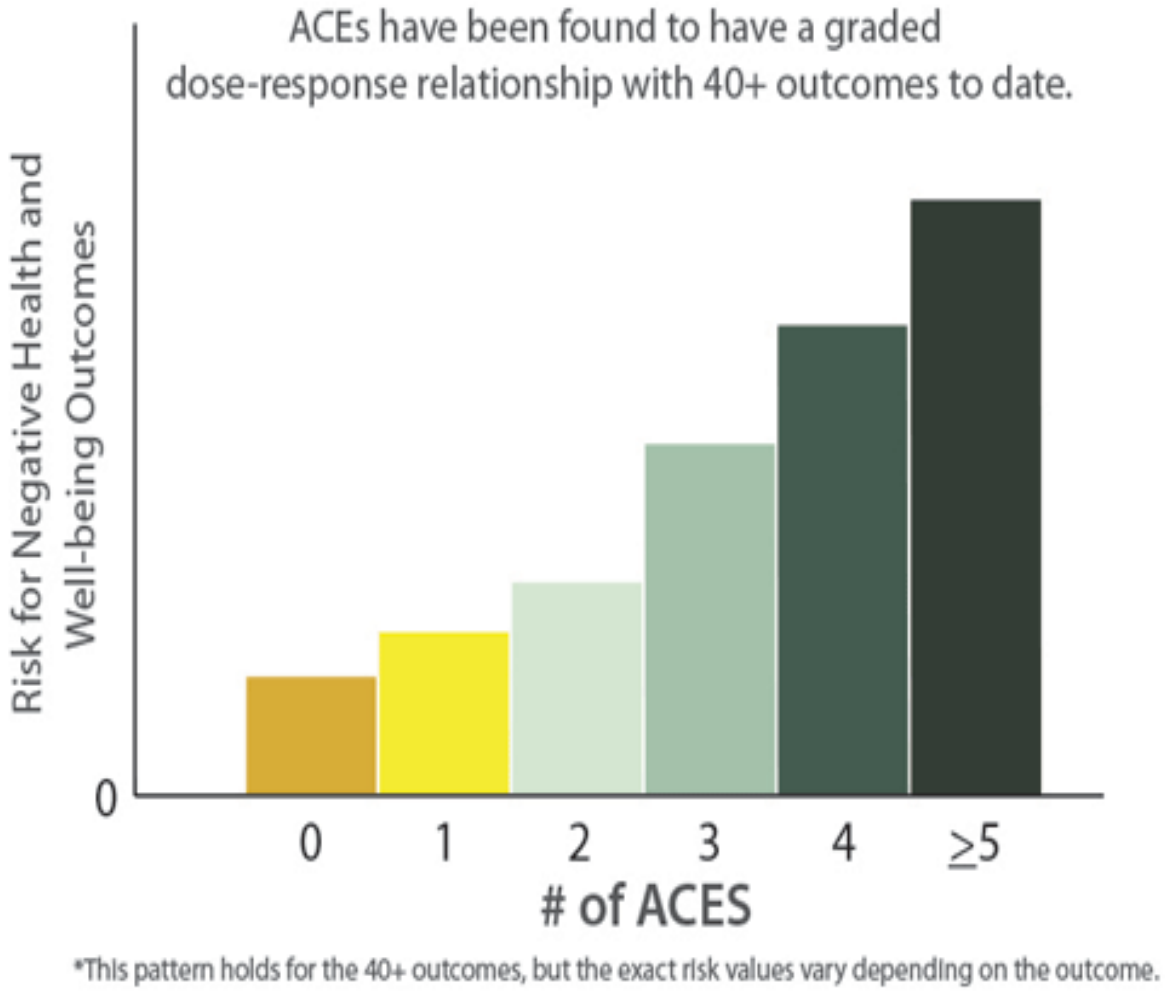
Source: CDC

ACES can have lasting effects on….

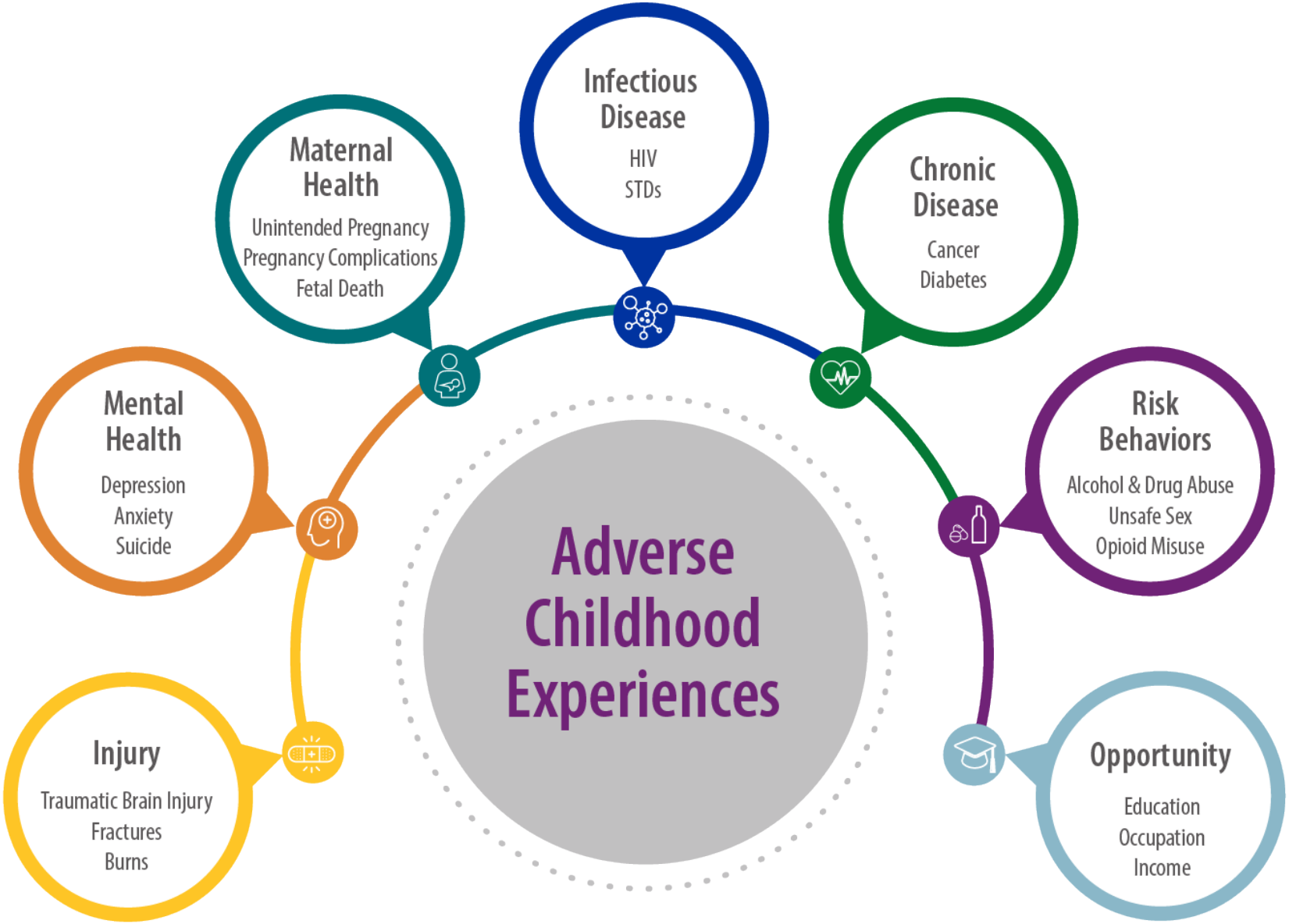
Health (obesity, diabetes, depression, suicide attempts, STDs, heart disease, cancer, stroke, COPD, broken bones)

Behaviors (smoking, alcoholism, drug use)

Life Potential (graduation rates, academic achievement, lost time from work)



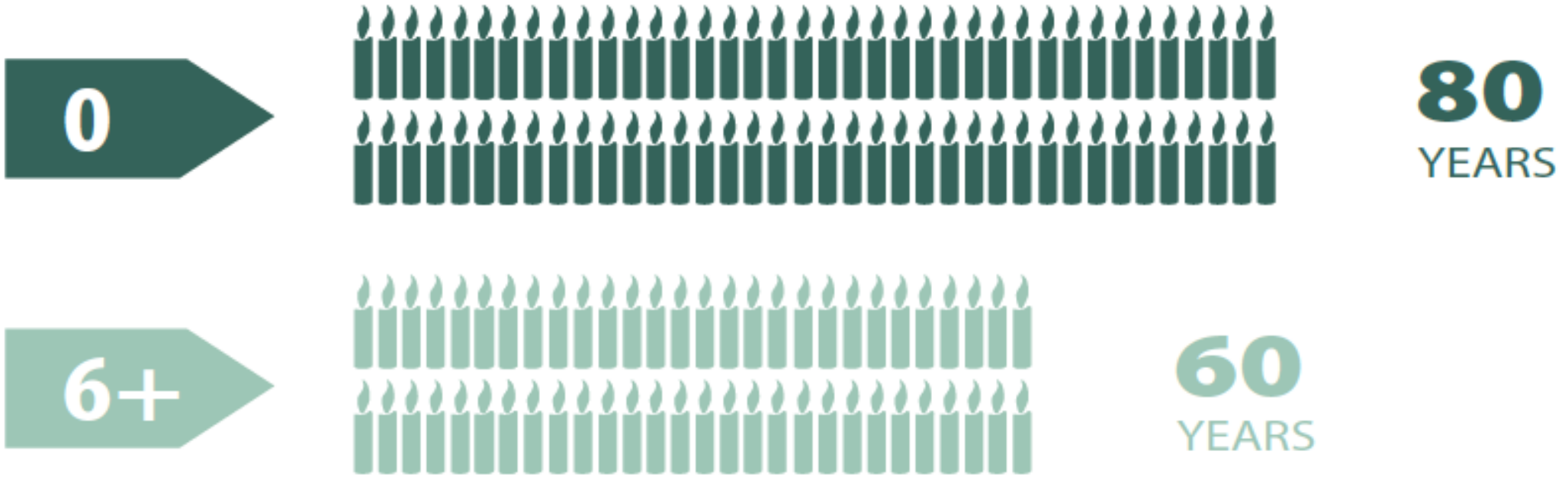
Early Adversity has Lasting Impacts Across the Lifespan



HOW DO ACEs AFFECT OUR SOCIETY?

LIFE EXPECTANCY

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



ECONOMIC TOLL

The lifetime cost of non-fatal child maltreatment (which covers 5 of 10 ACEs) incurred annually in the United States is **$401 billion.**

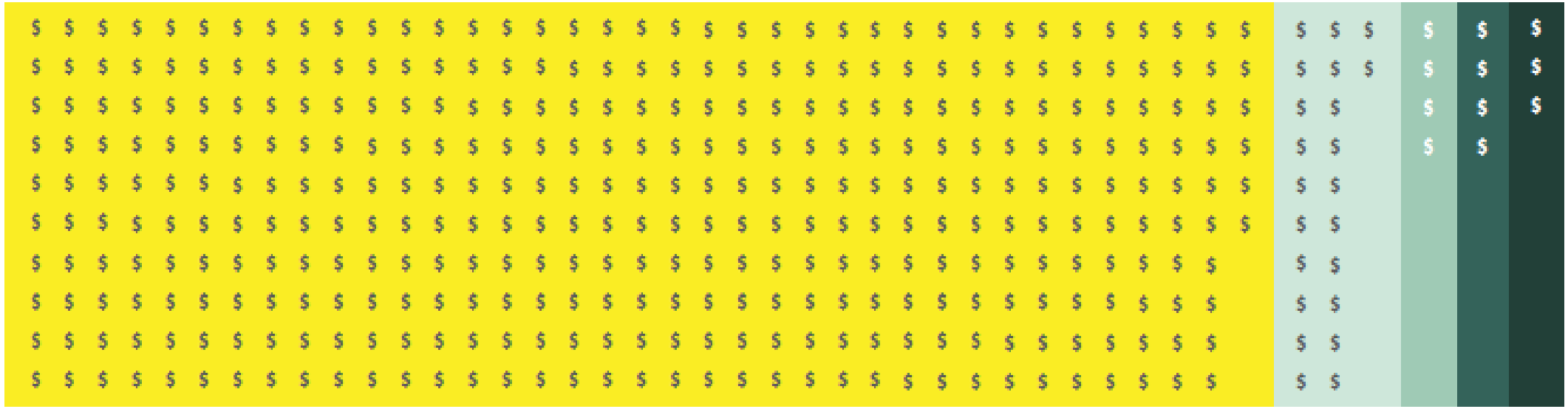
$366.3 BILLION
QUALITY-ADJUSTED LIFE YEAR REDUCTION
GENERIC MEASURE OF DISEASE BURDEN INCLUDING BOTH THE QUANTITY AND QUALITY OF LIFE LIVED.

$22.4 BILLION
HEALTH CARE

$4.2 BILLION
SPECIAL EDUCATION

$4.1 BILLION
CHILD WELFARE

$3.5 BILLION
CRIMINAL JUSTICE

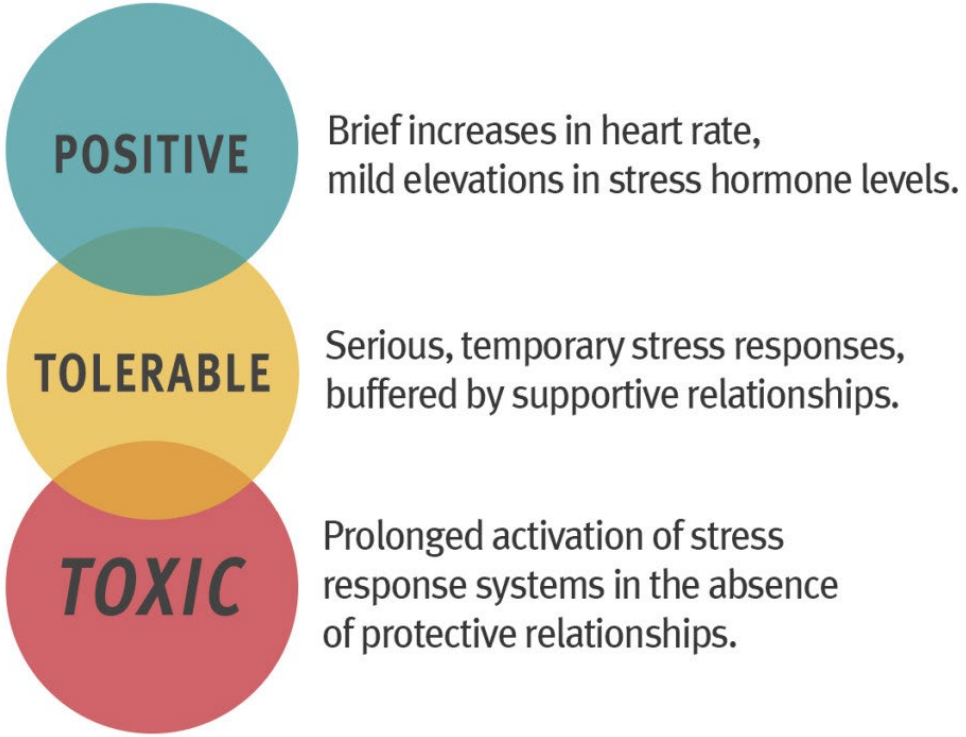


Peterson, C., Florence, C., & Klevens, J. (2018). The economic burden of child maltreatment in the United States, 2015. Child abuse & neglect, 86, 178-183.

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

2015 non-fatal child maltreatment estimates

Stress or Toxic Stress?



What explains the links between adverse experiences and outcomes?

Frameworks and mechanisms

Cumulative Risk Model of Adversity

Perpetuating factors
Some experiences continue to contribute to accumulated risk

Precipitating factors
New adverse experiences in life accumulate risk

Predisposing factors
Present at birth or very early childhood

Protective factors
Protect from harm by preventing adversity or its impacts

Cumulative Risk Model of Adversity

Perpetuating factors

Precipitating factors

Predisposing factors

Protective factors

Core concepts

- Children often exposed to multiple forms of adversity; many ACEs co-occur
- At core of framework: focus on the **amount** of exposure to adversity, not the **kind** of exposure a child experienced
- Evidence is robust
  - Dose-response relationship between exposures and outcomes
  - Multiple forms of adversity appear to have common “endpoints”

Cumulative Risk Model of Adversity

Perpetuating factors

Precipitating factors

Predisposing factors

Protective factors

Gaps

- What is the **mechanism** that forges this link?
  - Evidence suggests multiple mechanisms – could vary by exposure or by group or by outcome
  - Stress is **one** mechanism through which adversity impacts neural development; not the **only** mechanism
- Also involved:
  - Learning processes
  - Neural plasticity
  - **Sensitive periods** in development, including adolescence

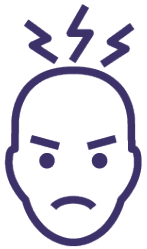
ACEs Can Accumulate and Their Effects Last Beyond Childhood

The effects of ACEs can add up over time and affect a person throughout their life.

Children who repeatedly and chronically experience adversity can suffer from **toxic stress.**

Toxic stress happens when the brain endures **repeated stress or danger,** then releases fight or flight hormones like cortisol.

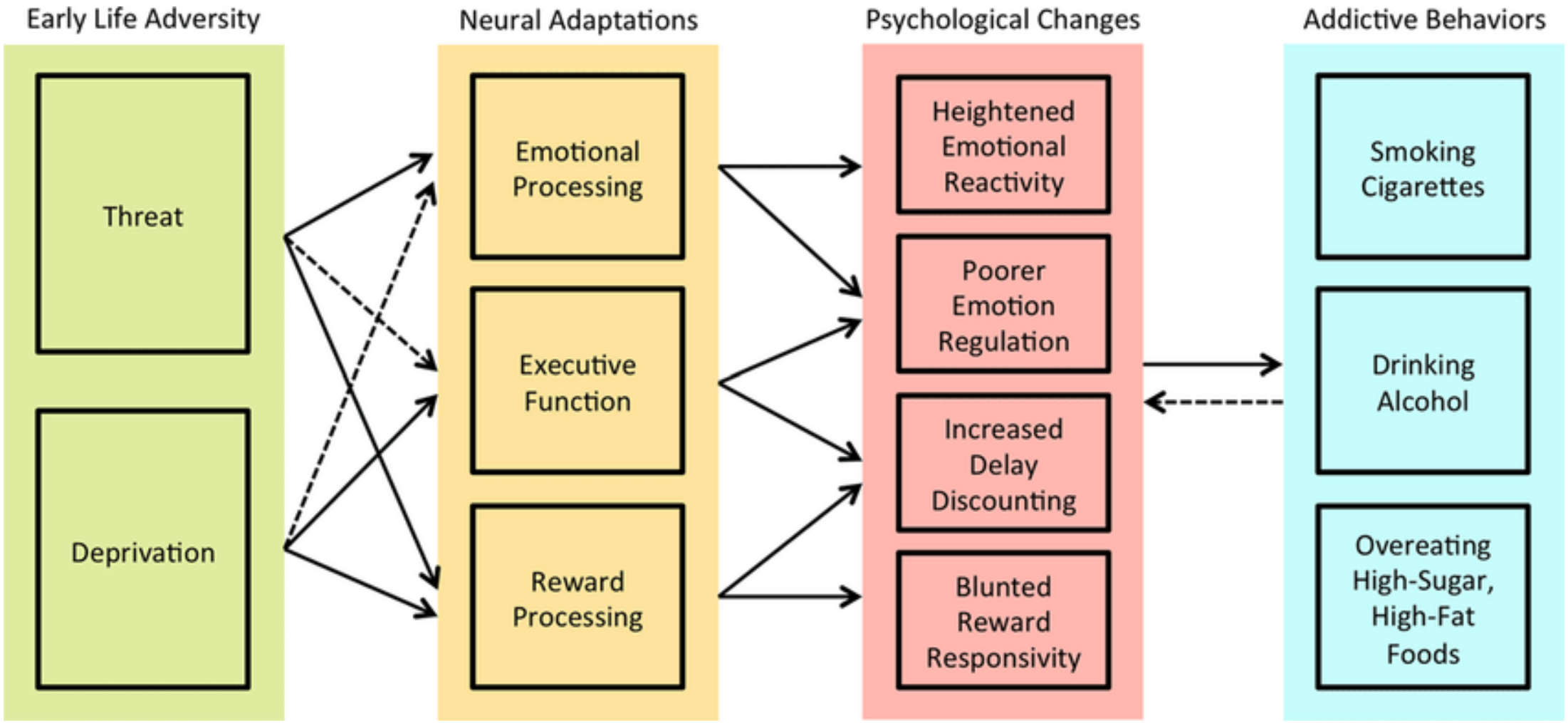
This internal alarm system **increases heart rate** and **blood pressure** and **damages the digestive and immune systems**.



Toxic stress can disrupt organ, tissue, and brain development. Over time, this can limit a person's ability to process information, make decisions, interact with others, and regulate emotions. **These consequences may follow a person into adulthood.**

Source: CDC

Dimensions of Childhood Adversity and Mechanisms of Impact



Disrupted emotion regulation

- Challenges in processing and regulating emotions
- Suppressed or intensified emotional expression
- Increased risk for mood disorders and other social and emotional impairments

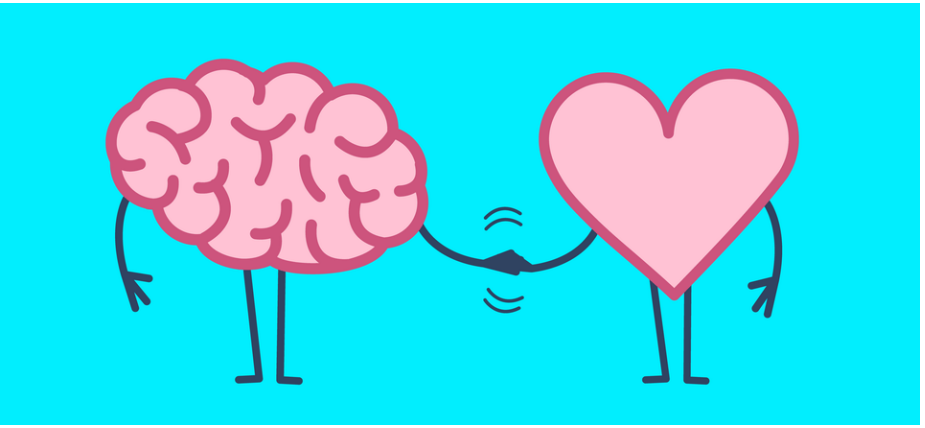
Source: Developmental differences in children who have experienced adversity: Difficulty with executive functioning

Impaired executive function

- Challenges in planning, organizing, executing, monitoring behavior and responses
- Increased risk for learning and behavior disorders

Source: Developmental differences in children who have experienced adversity: Difficulty with executive functioning

Diminished social rewards



- Impaired response to rewarding events or activities
- Increased risk for mood and addiction problems

Source: Developmental differences in children who have experienced adversity: Difficulty with executive functioning

Enhanced threat bias

- Impaired reaction to everyday events and stimuli
- Automatic threat bias
- Increased risk for anxiety and related problems

Source: Developmental differences in children who have experienced adversity: Difficulty with executive functioning

Adverse Childhood Experiences

We Can Prevent Childhood Adversity

The Science of Adverse Childhood Experiences (ACEs) Shows We Can Improve People's Lives and Help Them Thrive

Preventing ACEs could reduce a large number of health conditions.

UP TO

21 MILLION

CASES OF DEPRESSION

UP TO

1.9 MILLION

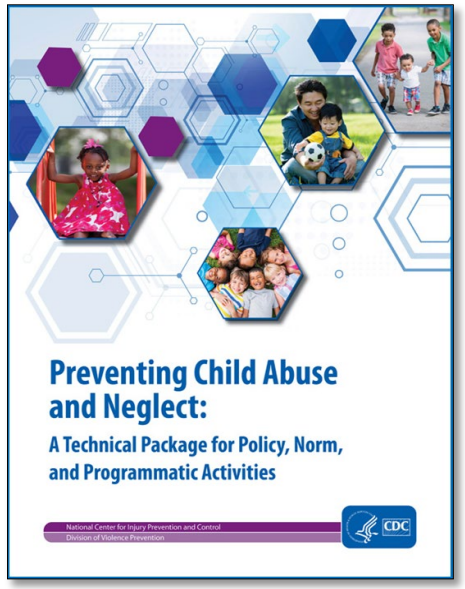
CASES OF HEART DISEASE

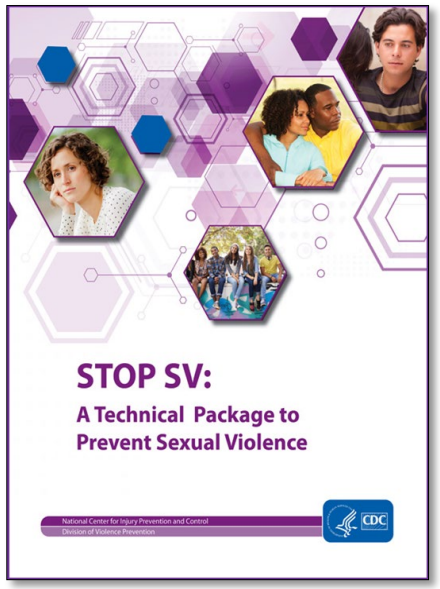
UP TO

2.5 MILLION

CASES OF OVERWEIGHT/OBESITY

SOURCE: National Estimates based on 2017 BRFSS; Vital Signs, MMWR November 2019.


Preventing Child Abuse and Neglect:
A Technical Package for Policy, Norm, and Programmatic Activities
National Center for Injury Prevention and Control
Division of Violence Prevention
CDC


STOP SV:
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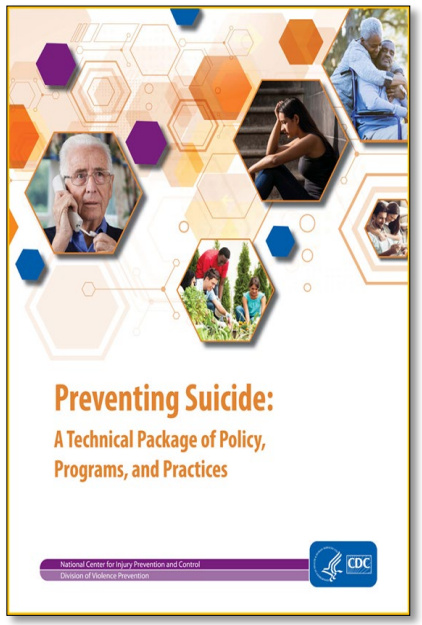
Preventing Suicide:
A Technical Package of Policy, Programs, and Practices
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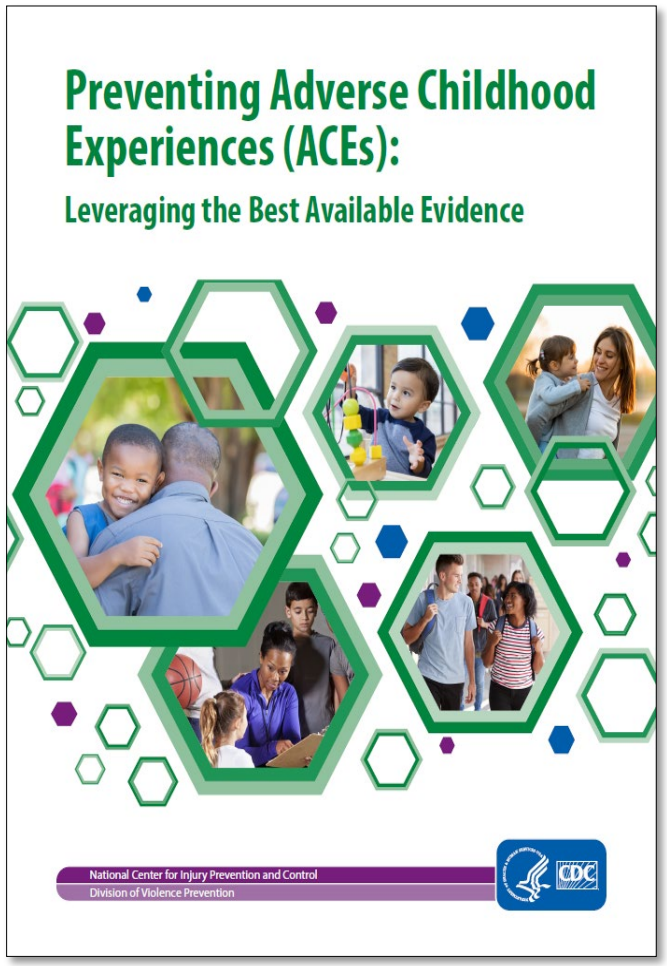
Preventing Adverse Childhood Experiences (ACEs):
Leveraging the Best Available Evidence
National Center for Injury Prevention and Control
Division of Violence Prevention
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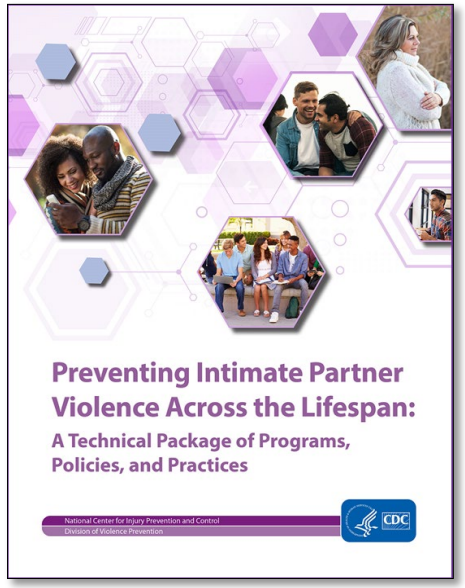
Preventing Intimate Partner Violence Across the Lifespan:
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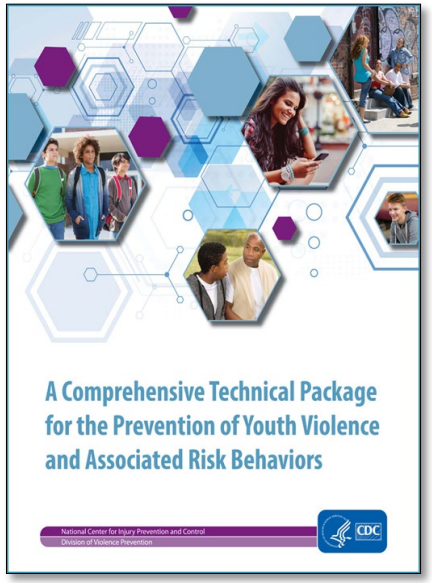
A Comprehensive Technical Package for the Prevention of Youth Violence and Associated Risk Behaviors
National Center for Injury Prevention and Control
Division of Violence Prevention
CDC

We Can Create Positive Childhood Experiences

Strengthen families' financial stability

Promote social norms that protect against violence

Help kids have a good start

Teach healthy relationship skills

Connect youth with activities and caring adults

Intervene to lessen immediate and long-term harms

Thank you!

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The findings and conclusions in this presentation are those of the author and do not necessarily represent the official position of the Centers for Disease Control and Prevention

Extra Slides

Impacts of COVID-19 pandemic on children, families, and communities


COLLATERAL DAMAGE
DRUGS
HEALTH CARE DELAYS
OVERDOSES
SUICIDES
SMALL BIZ
CHILDREN'S EDUCATION
COVID
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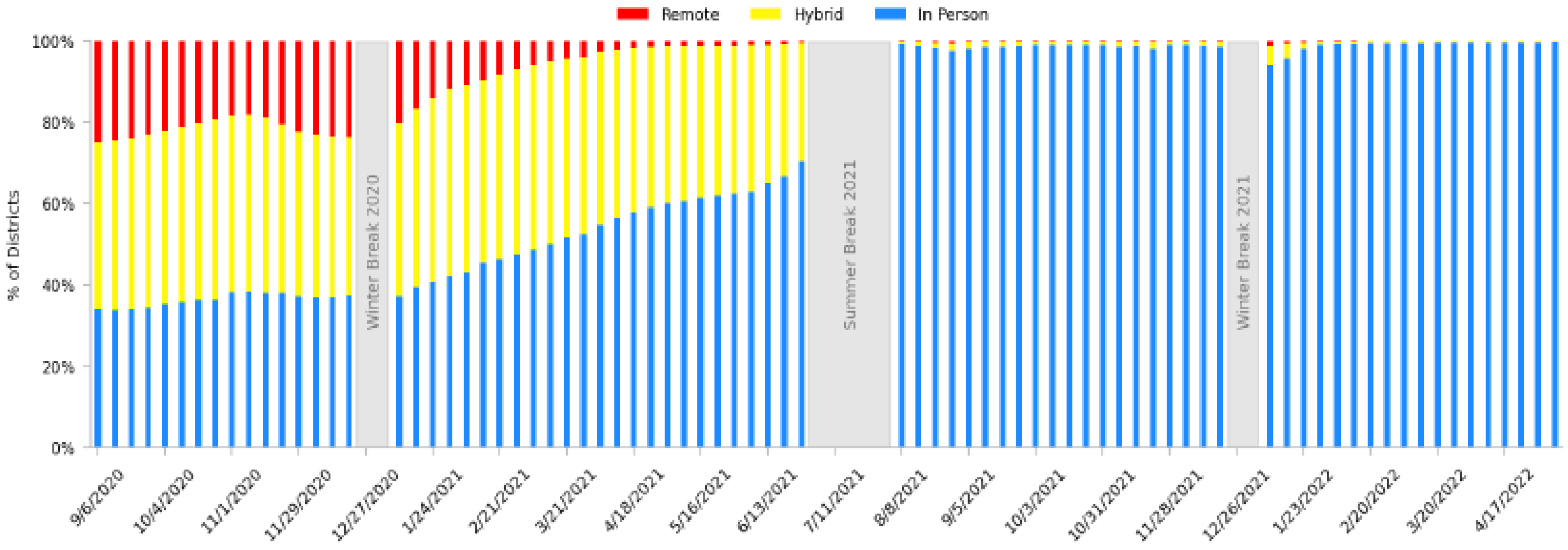
COVID-19 Impacts on Child and Family Well-being, Mental Health, and Education

- **Pandemic impacts on health, economic stability, social fabric in US**
- **Disruptions in access to services**
- **Challenges in real-time data and monitoring**
  - Data availability
  - Research ethics and protections for vulnerable populations

Trends in learning modalities in K-12 schools, December 2020 – May 2022

Percent of U.S. K-12 school districts by school learning modality (remote; hybrid; in-person)



Source: JHU APL laboratories HMM modeling. Dates omitted include December 21, 2020 - January 3, 2021 (winter break), June 28, 2021 - August 1, 2021 (summer break), and December 20, 2021 - January 2, 2022 (winter break)

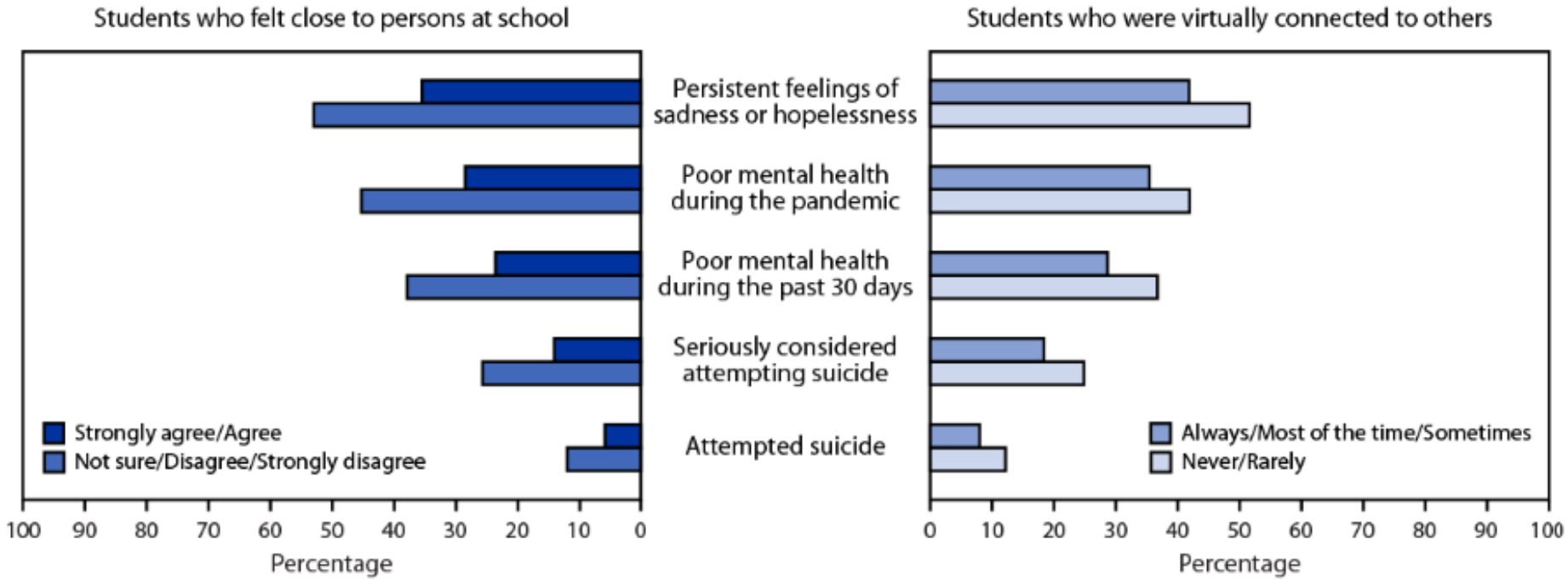
Implications and mental health of children and families

- **CDC study of parents of children aged 5–12 years: parents of children in virtual instruction reported more problems with child mental health and parent emotional distress**
- **CDC ABES survey of mental health during the pandemic**

+ More than **1 in 3 high school students** experienced poor mental health
+ Nearly **half of students** felt persistently sad or hopeless
+ Female and LGBQ students experienced disproportionate levels of poor mental health and suicide-related behaviors
  - 12% of female students, >25% of LGB students, and 17% of other or questioning students attempted suicide during the past year compared to 5% of male peers and 5% of heterosexual peers

Connectedness can be an important factor in supporting youth mental health

FIGURE. Persistent feelings of sadness or hopelessness, perceptions of mental health, and suicidal thoughts and attempts among high school students during the COVID-19 pandemic, by feeling close to persons at school* and being virtually connected† — Adolescent Behaviors and Experiences Survey, United States, January–June 2021



* All comparisons of having felt close versus not sure, disagree, or strongly disagree they felt close were significantly different, based on *t*-test analysis ($p<0.05$).

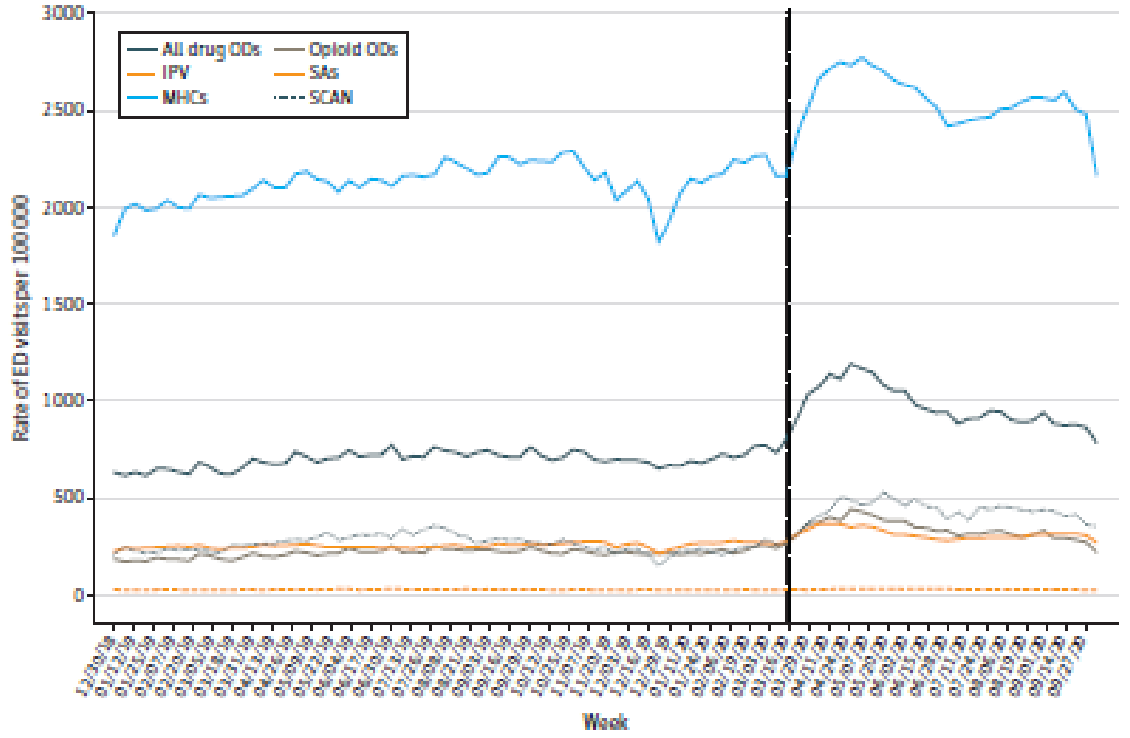
† All comparisons of being connected versus never or rarely felt connected were significantly different, based on *t*-test analysis ($p<0.05$).

Source: [Mental Health, Suicidality, and Connectedness Among High School Students During the COVID-19 Pandemic — Adolescent Behaviors and Experiences Survey, United States, January–June 2021 | MMWR (cdc.gov)]

Trends in U,S, emergency department (ED) visits for mental health, overdose, and violence, Dec. 2018-Oct. 2020

- ED visit volume decreased in March 2020, then increased
- Rates of ED visits were significantly higher in 2020 compared to 2019 for mental health, overdose, but not intimate partner violence or suspected child abuse and neglect

Figure 2. Rate of Emergency Department (ED) Visits for All Drug and Opioid Overdoses (ODs), Intimate Partner Violence (IPV), Suicide Attempts (SAs), Mental Health Conditions (MHCs), and Suspected Child Abuse and Neglect (SCAN) per 100 000 ED Visits in the US, December 30, 2018, to October 10, 2020



Source: Trends in US Emergency Department Visits for Mental Health, Overdose, and Violence Outcomes Before and During the COVID-19 Pandemic | JAMA Psychiatry

Studies indicate intimate partner violence increased during the COVID-19 pandemic

- Systematic review and meta-analysis identified 18 studies with methodological rigor
- Effects were stronger when only U.S. studies were considered

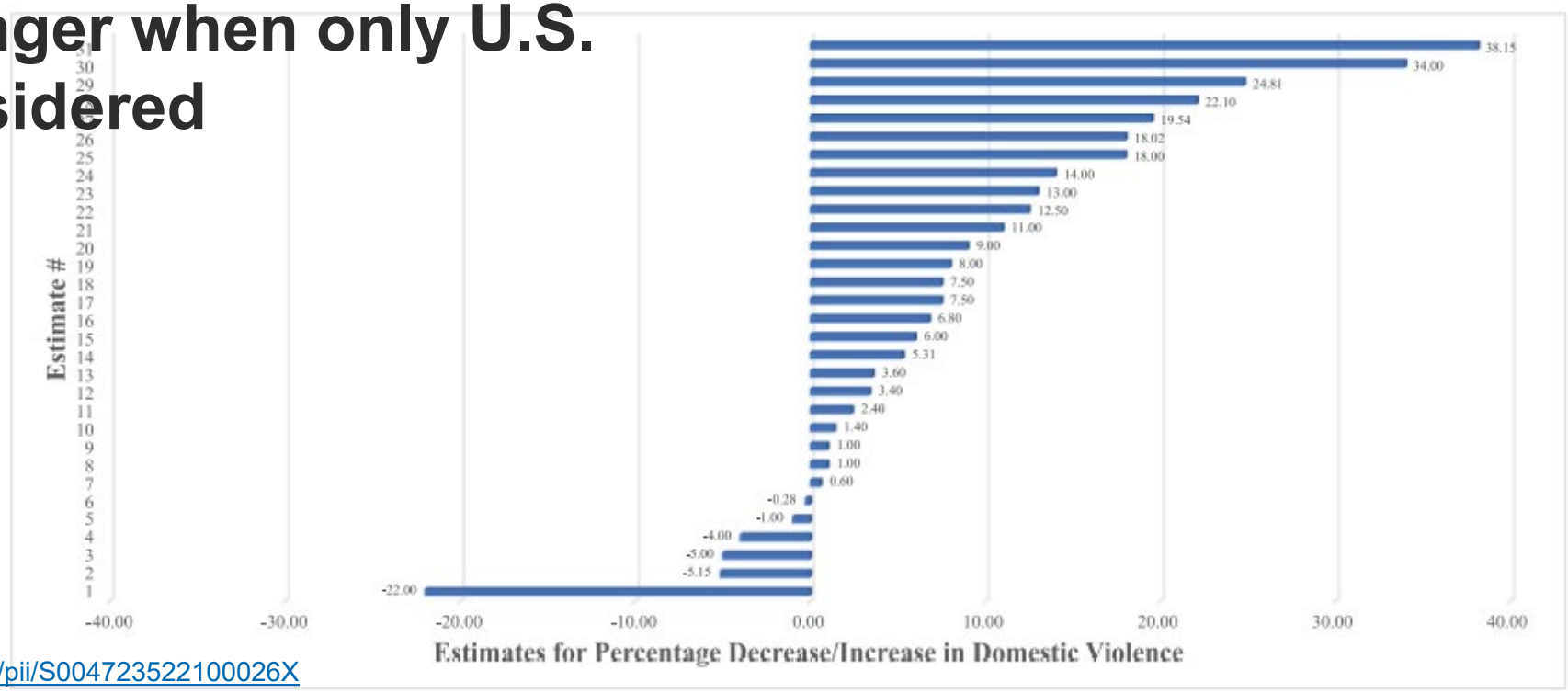
Contents lists available at ScienceDirect

Journal of Criminal Justice

journal homepage: www.elsevier.com/locate/jcrimjus

Domestic violence during the COVID-19 pandemic - Evidence from a systematic review and meta-analysis

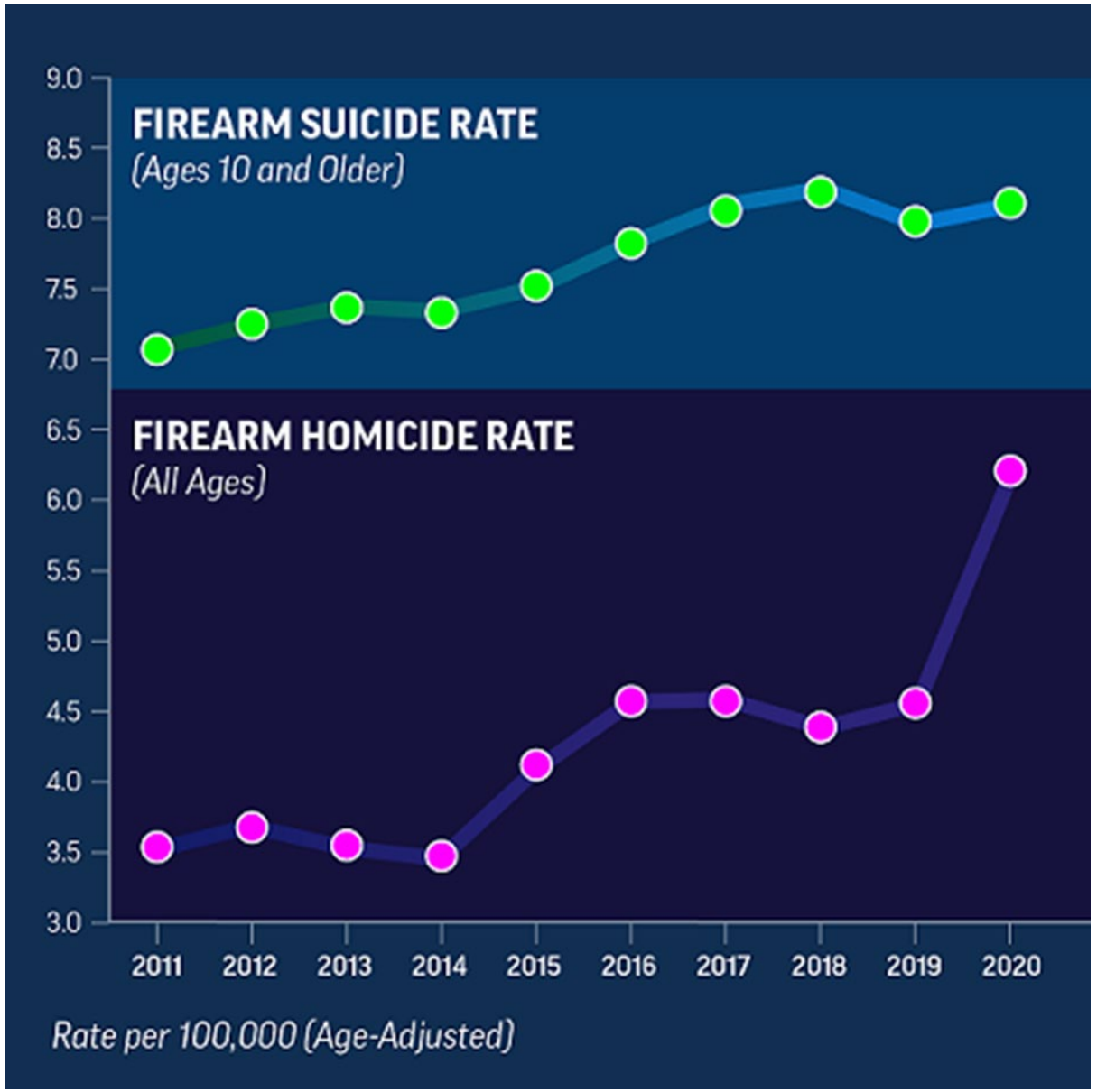
Alex R. Piquero [a,b,*], Wesley G. Jennings [c], Erin Jemison [d], Catherine Kaukinen [e], Felicia Marie Knaul [f]



Source: https://www.sciencedirect.com/science/article/abs/pii/S004723522100026X

Firearm Homicides Rose Sharply, and Firearm Suicides Remained High

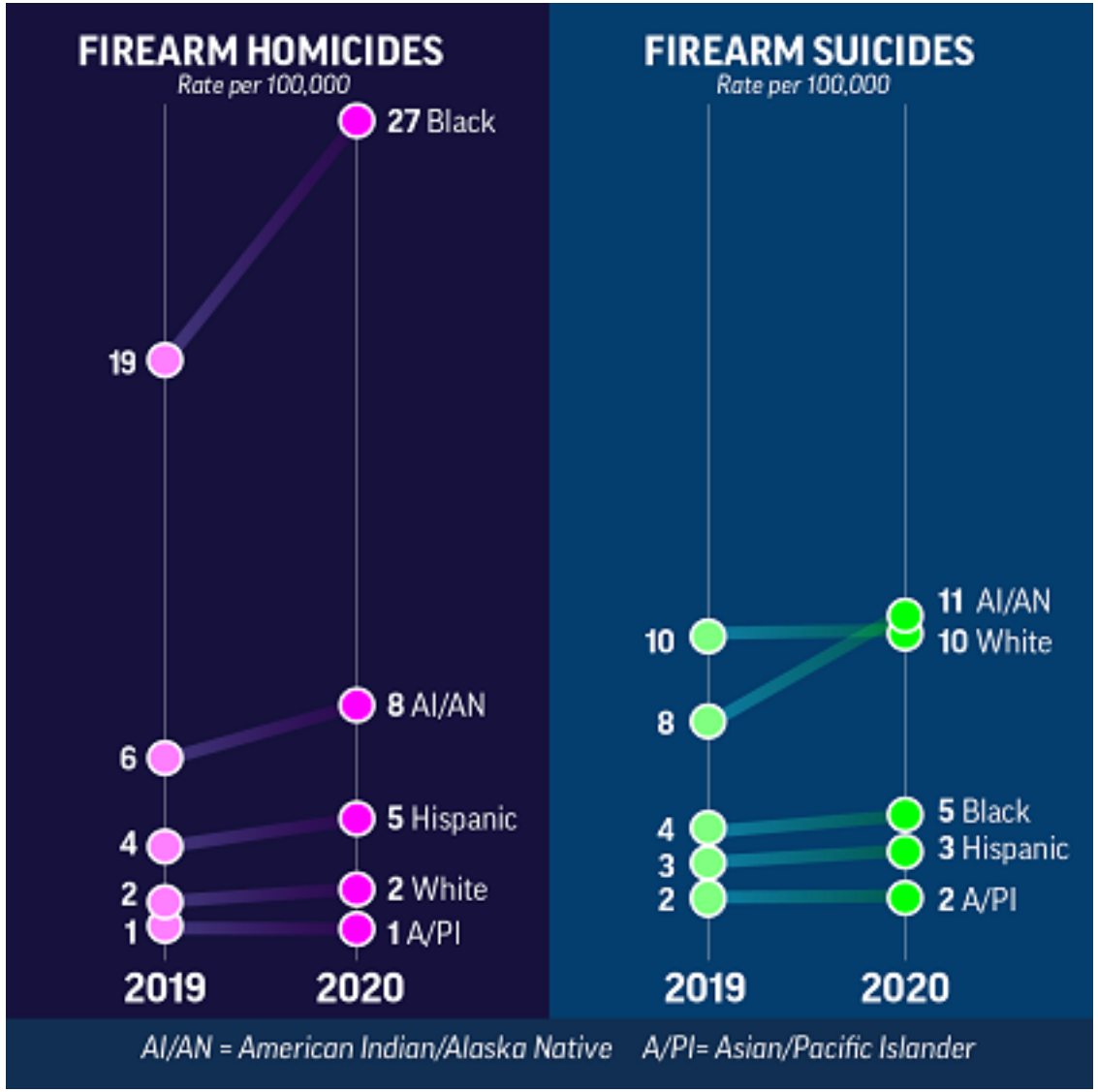
From 2019 to 2020, the firearm homicide rate increased about 35%, while the firearm suicide rate remained high.



Source: Vital Signs: Changes in Firearm Homicide and Suicide Rates — United States, 2019–2020 | MMWR (cdc.gov)

Firearm Homicides and Suicides Increased for Some Racial/Ethnic Groups

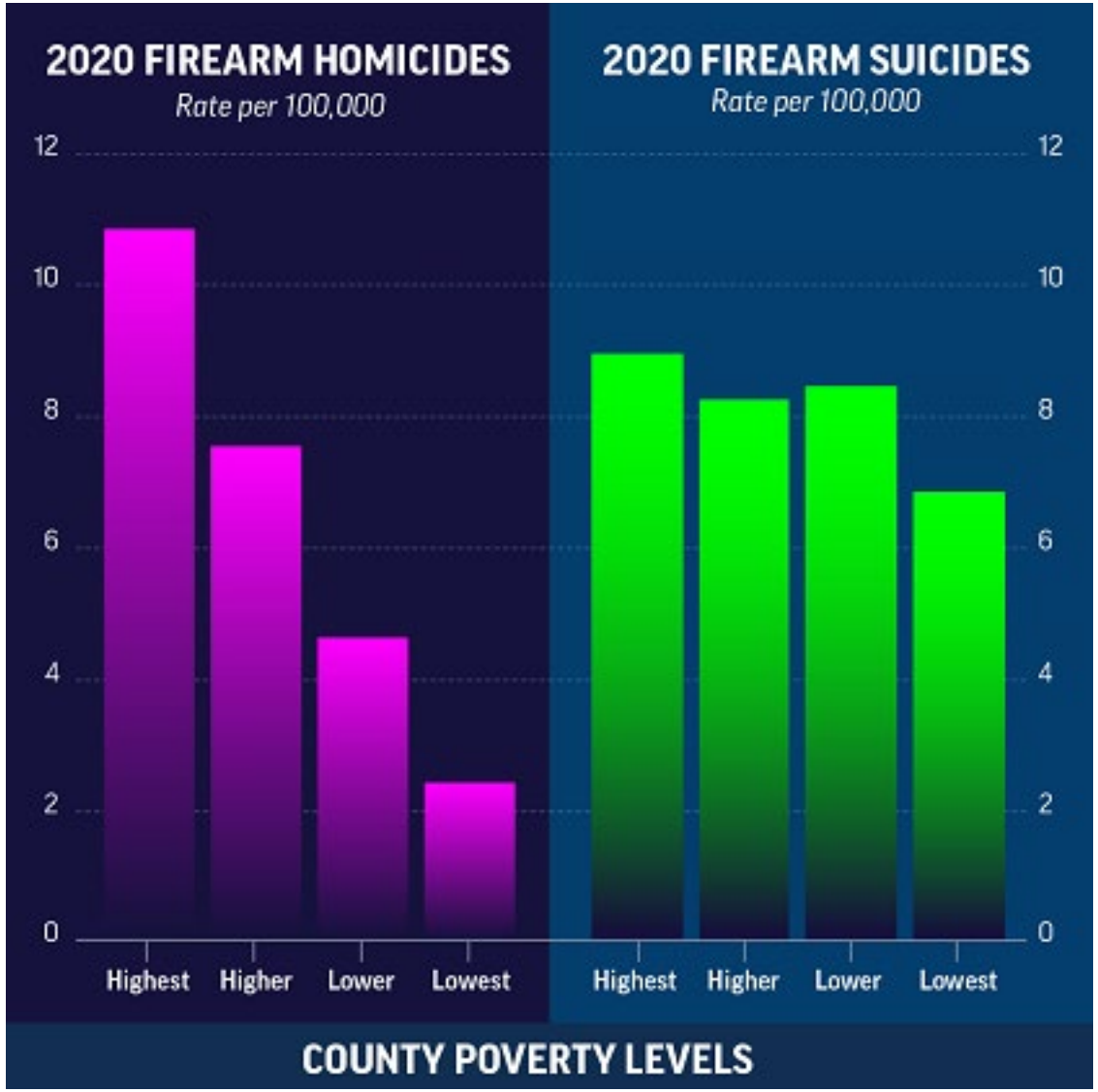
The firearm homicide rate increased most for Black people, and the suicide rate increased most for American Indian/Alaska Native people.



Source: Vital Signs: Changes in Firearm Homicide and Suicide Rates — United States, 2019–2020 | MMWR (cdc.gov)

Conditions of Poverty Are Associated with Firearm Deaths

In 2020, counties with the highest poverty level had firearm homicide rates 4.5 times as high and firearm suicide rates 1.3 times as high as counties with the lowest poverty level.



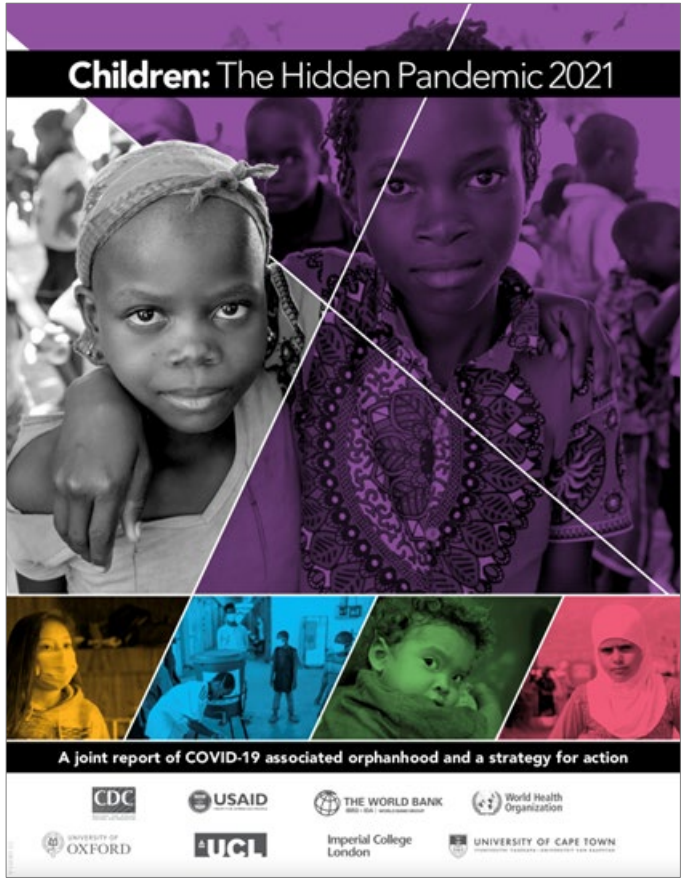
Source: Vital Signs: Changes in Firearm Homicide and Suicide Rates — United States, 2019–2020 | MMWR (cdc.gov)

Comprehensive Actions with Approaches that Work

Strategies are needed to address physical, social, economic, and structural conditions known to increase firearm homicide and suicide risks.

Source: Vital Signs: Changes in Firearm Homicide and Suicide Rates — United States, 2019–2020 | MMWR (cdc.gov)

COVID-19-related orphanhood studies and reports



THE LANCET

Articles

Global minimum estimates of children affected by COVID-19-associated orphanhood and deaths of caregivers: a modelling study

Susan D Hillis, H Juliette T Unwin*, Yu Chen*, Lucie Cluver, Lorraine Sherr, Philip S Goldman, Oliver Ratmann, Christl A Donnelly, Samir Bhatt, Andrés Villaveces, Alexander Butchart, Gretchen Bachman, Laura Rawlings, Phil Green, Charles A Nelson III†, Seth Flaxman†*

THE LANCET
Child & Adolescent Health

Articles

Global, regional, and national minimum estimates of children affected by COVID-19-associated orphanhood and caregiver death, by age and family circumstance up to Oct 31, 2021: an updated modelling study

H Juliette T Unwin, Susan Hillis*, Lucie Cluver, Seth Flaxman, Philip S Goldman, Alexander Butchart, Gretchen Bachman, Laura Rawlings, Christl A Donnelly, Oliver Ratmann, Phil Green, Charles A Nelson, Alexandra Blenkinsop, Samir Bhatt, Chris Desmond, Andrés Villaveces†, Lorraine Sherr†*

American Academy of Pediatrics
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COVID-19–Associated Orphanhood and Caregiver Death in the United States

Susan D. Hillis, PhD,[a,*] Alexandra Blenkinsop, PhD,[b,*] Andrés Villaveces, MD, PhD,[a] Francis B. Annor, PhD,[a] Leandris Liburd, PhD,[a] Greta M. Massetti, PhD,[a] Zewditu Demissie, PhD,[a] James A. Mercy, PhD,[a] Charles A. Nelson III, PhD,[d] Lucie Cluver, PhD,[e,g] Seth Flaxman, PhD,[b] Lorraine Sherr, PhD,[h] Christl A. Donnelly, ScD,[f,c] Oliver Ratmann, PhD,[b,**] H. Juliette T. Unwin, PhD[c,**]

Source: https://www.cdc.gov/coronavirus/2019-ncov/downloads/community/orphanhood-report.pdf

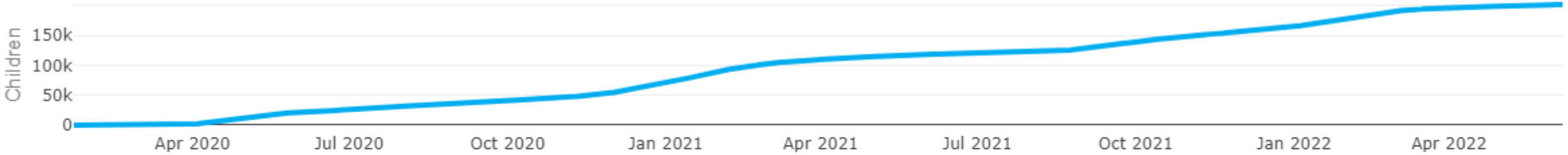
More than 250,000 children have experienced caregiver loss in the US

United States of America

Orphanhood estimates:

202,000

(death of one or both parents)



Estimates of loss of primary caregiver:

216,500

(death of one or both parents or death of custodial grandparents)

Estimates of children losing primary or secondary caregivers:

254,000

(death of one or both parents, death of custodial grandparents, and/or death of other co-residing grandparents)

Source : covid19orphans.widget.(imperialcollegelondon.github.io)

Substantial disparities in caregiver loss

Disparities

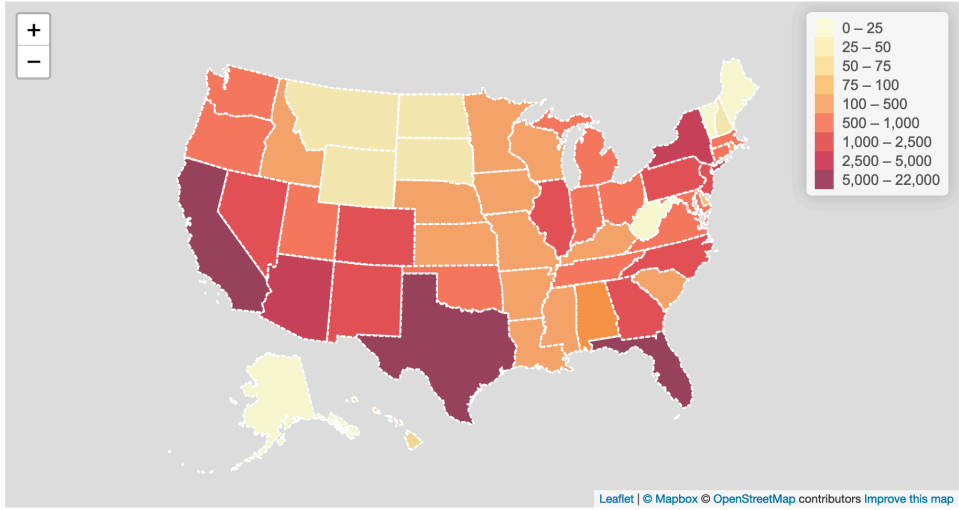
Children who lost a primary or secondary caregiver, reported as rates (per 100,000 children), as the proportionate burden (100,000/rate), and as a rate ratio (relative to White children).

Race/ethnicity	Loss of Parents or Caregivers per 100,000 Children of Each Race and Ethnicity	Reported as Proportionate Burden	Reported Relative to White Children
White	283 [282-285]	1 of 352 [350-354]	1 [1-1]
Black	577 [573-581]	1 of 173 [172-174]	2.04 [2.02-2.05]
American Indian or Alaska Native	1072 [1053-1127]	1 of 93 [88-94]	3.78 [3.71-3.98]
Asian	222 [221-228]	1 of 451 [438-453]	0.78 [0.78-0.8]
Hispanic	419 [416-422]	1 of 238 [236-240]	1.48 [1.47-1.49]
Total	366 [365-367]	1 of 273 [272-273]	

By race/ethnicity

Hispanic | White | Black | Asian | American Indian or Alaska Native

Hispanic children losing a primary or secondary caregiver, from April 1st 2020 through 31st March 2022.



Data for Puerto Rico not available

Colour scales in legend differ to reflect population sizes of each racial/ethnic group.

Source: https://imperialcollegelondon.github.io/orphanhood_USA/