Adverse Childhood Experiences

Natasha Smith, M.S., PA-C, MHSA

Henry Ford Hospital

Detroit Mi

Disclaimer

- The Michigan ACE Initiative is a grant funded program that focuses on the expanding efforts to build awareness and treatment of the Adverse Childhood Experiences (ACEs) in Michigan.
- This presentation is composed of slides from the Michigan ACE Initiative which are copyright protected and cannot be duplicated.
- I receive no financial incentives from the Michigan ACE Initiative.

Learning Objectives

- Explain the findings from the original ACE study
- Explain how Toxic Stress Impacts Neurological Development
- Explain how Toxic Stress Impacts Epigenetics
- Explain the Importance of Resilience

ADVERSE CHILDHOOD EXPERIENCE STUDY

Research Article

Relationship of Childhood Abuse and Household Dysfunction to Many of the Leading Causes of Death in Adults

The Adverse Childhood Experiences (ACE) Study

Vincent J. Felitti, MD, FACP, Robert F. Anda, MD, MS, Dale Nordenberg, MD, David F. Williamson, MS, PhD, Alison M. Spitz, MS, MPH, Valerie Edwards, BA, Mary P. Koss, PhD, James S. Marks, MD, MPH

ACE Study

- Between 1995 and 1997, over 17,000 members of the Kaiser Health Plan in San Diego California agreed to participate in the study
  - Primarily white, educated middle class
  - Insured and actively involved in their health care; those recruited were receiving preventative care

Prior to your 18th birthday:

1. Did a parent or other adult in the household often or very often… Swear at you, insult you, put you down, or humiliate you? or Act in a way that made you afraid that you might be physically hurt?
   No___If Yes, enter 1
2. Did a parent or other adult in the household often or very often… Push, grab, slap, or throw something at you? or Ever hit you so hard that you had marks or were injured?
   No___If Yes, enter 1
3. Did an adult or person at least 5 years older than you ever… Touch or fondle you or have you touch their body in a sexual way? or Attempt or actually have oral, anal, or vaginal intercourse with you?
   No___If Yes, enter 1___
4. Did you often or very often feel that … No one in your family loved you or thought you were important or special? or Your family didn't look out for each other, feel close to each other, or support each other?
   No___If Yes, enter 1
5. Did you often or very often feel that … You didn't have enough to eat, had to wear dirty clothes, and had no one to protect you? or Your parents were too drunk or high to take care of you or take you to the doctor if you needed it?
   No___If Yes, enter 1
6. Were your parents ever separated or divorced?
   No___If Yes, enter 1
7. Was your mother or stepmother:
   Often or very often pushed, grabbed, slapped, or had something thrown at her? or Sometimes, often, or very often kicked, bitten, hit with a fist, or hit with something hard? or Ever repeatedly hit over at least a few minutes or threatened with a gun or knife?
   No___If Yes, enter 1
8. Did you live with anyone who was a problem drinker or alcoholic, or who used street drugs?
   No___If Yes, enter 1
9. Was a household member depressed or mentally ill, or did a household member attempt suicide?
   No___If Yes, enter 1
10. Did a household member go to prison?
    No___If Yes, enter 1___

Now add up your "Yes" answers: _ This is your ACE Score **8**

Adverse Childhood Experiences
ARE COMMON

Household Dysfunction

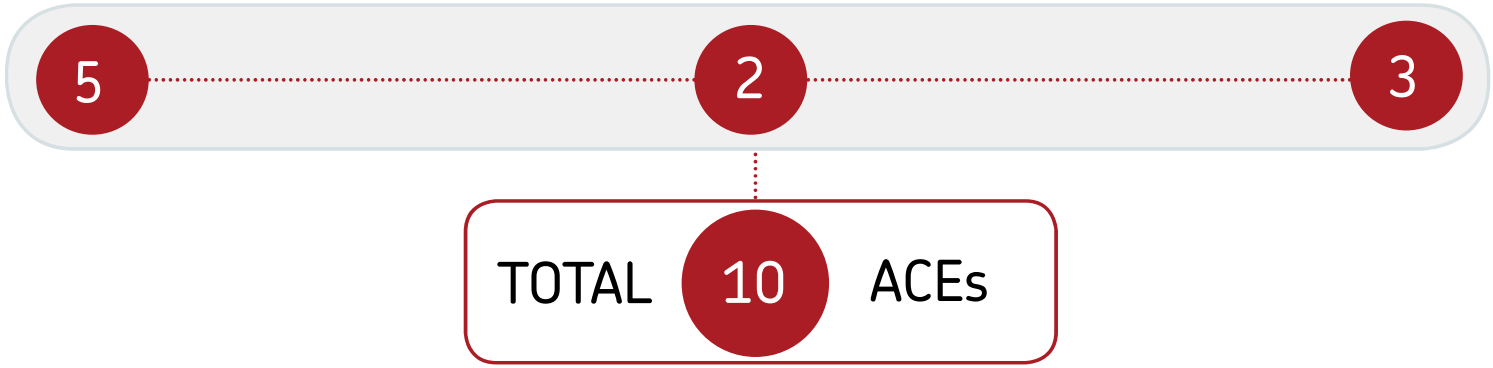
Substance Abuse	27%
Parental Sep/Divorce	23%
Mental Illness	17%
Battered Mothers	13%
Criminal Behavior	6%

Neglect

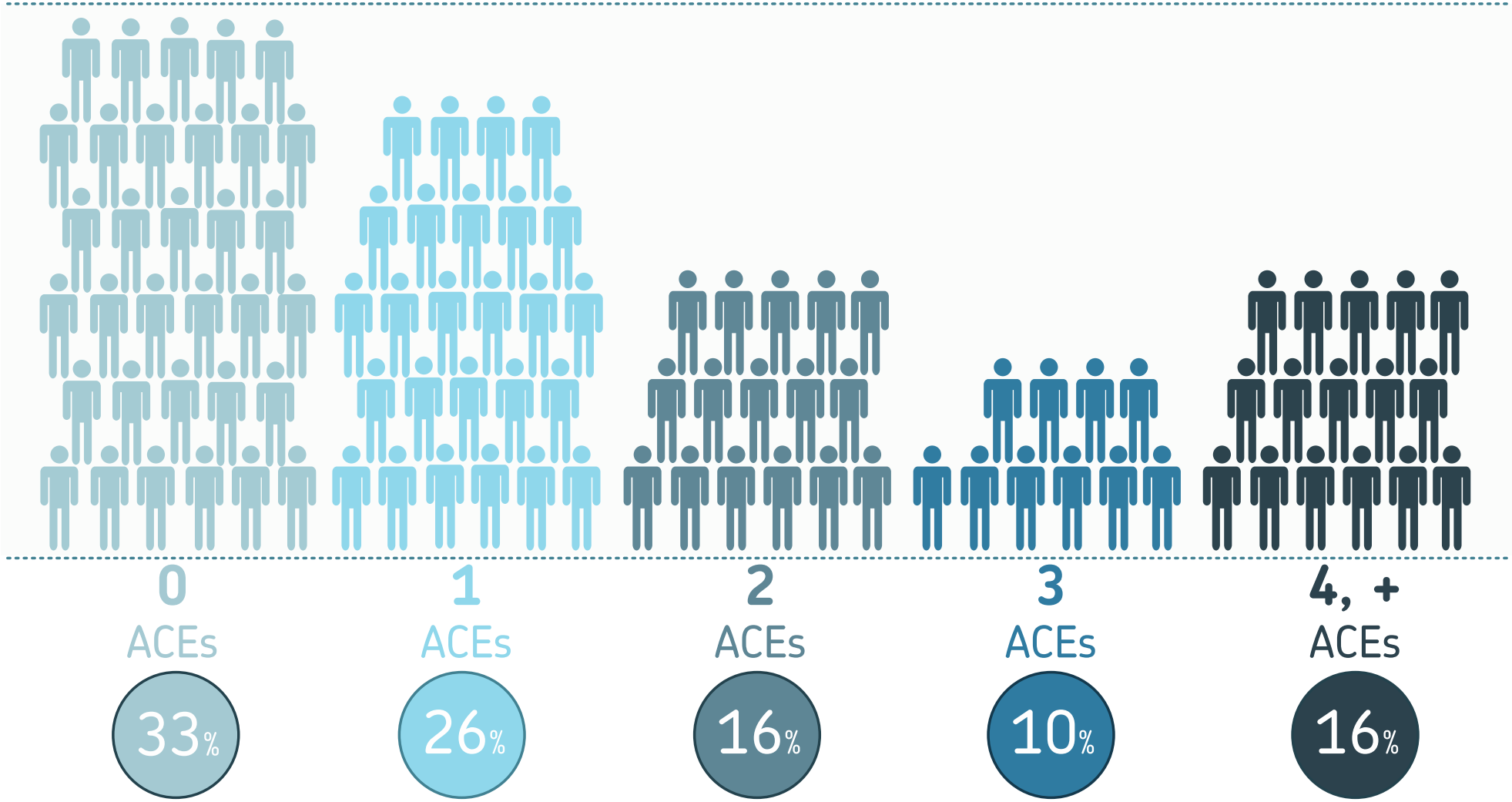
Emotional	15%
Physical	10%

Abuse

Emotional	11%
Physical	28%
Sexual	21%

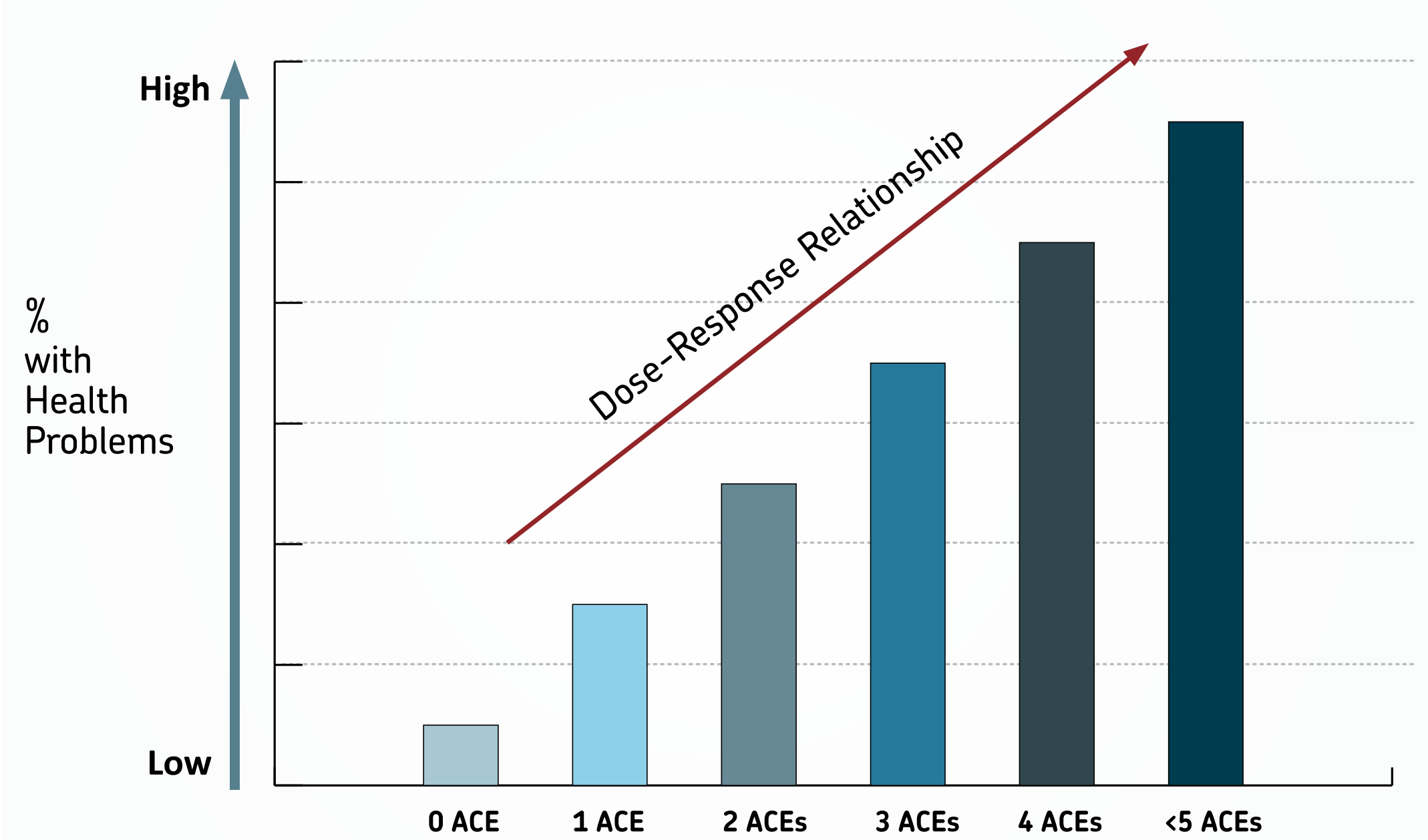


ACE Score = Number of ACE Categories

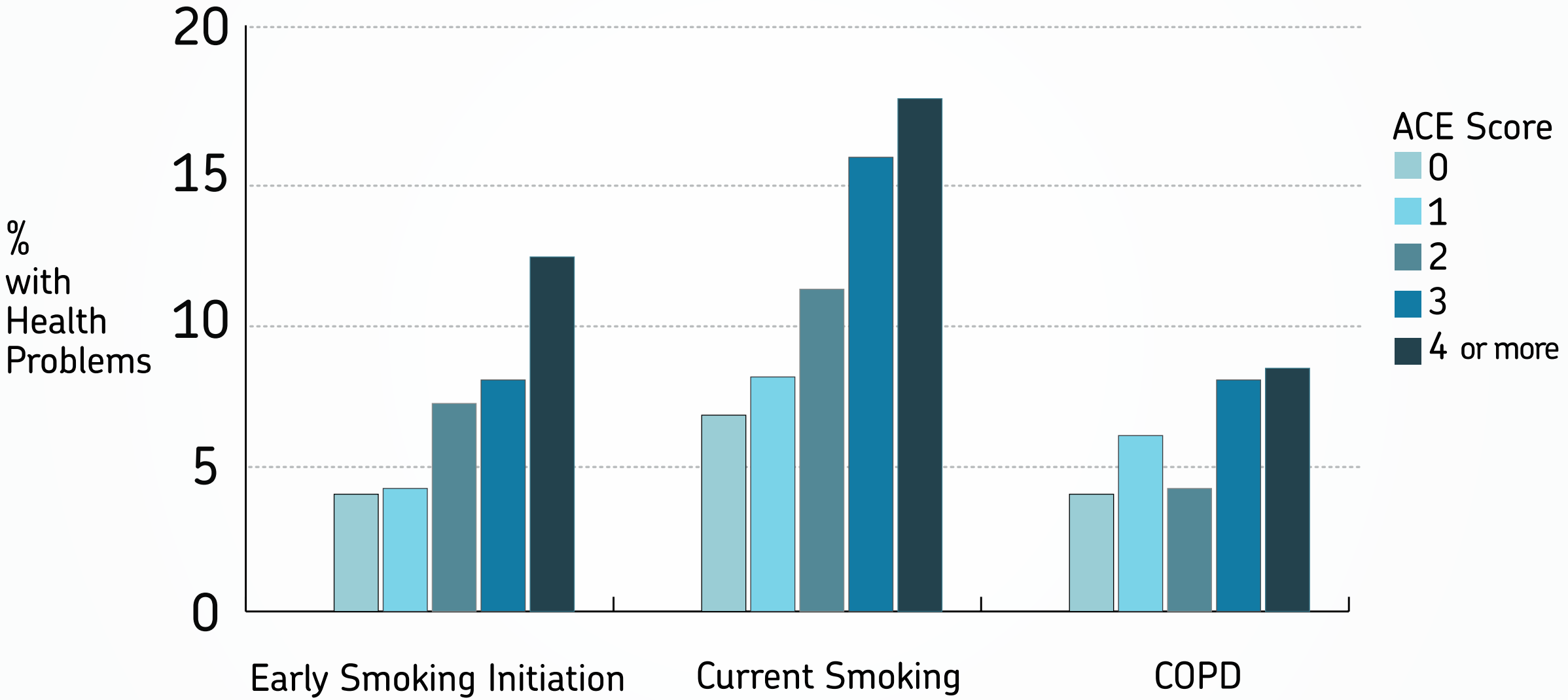


ACE Scores Reliably Predict Challenges During the Life Course

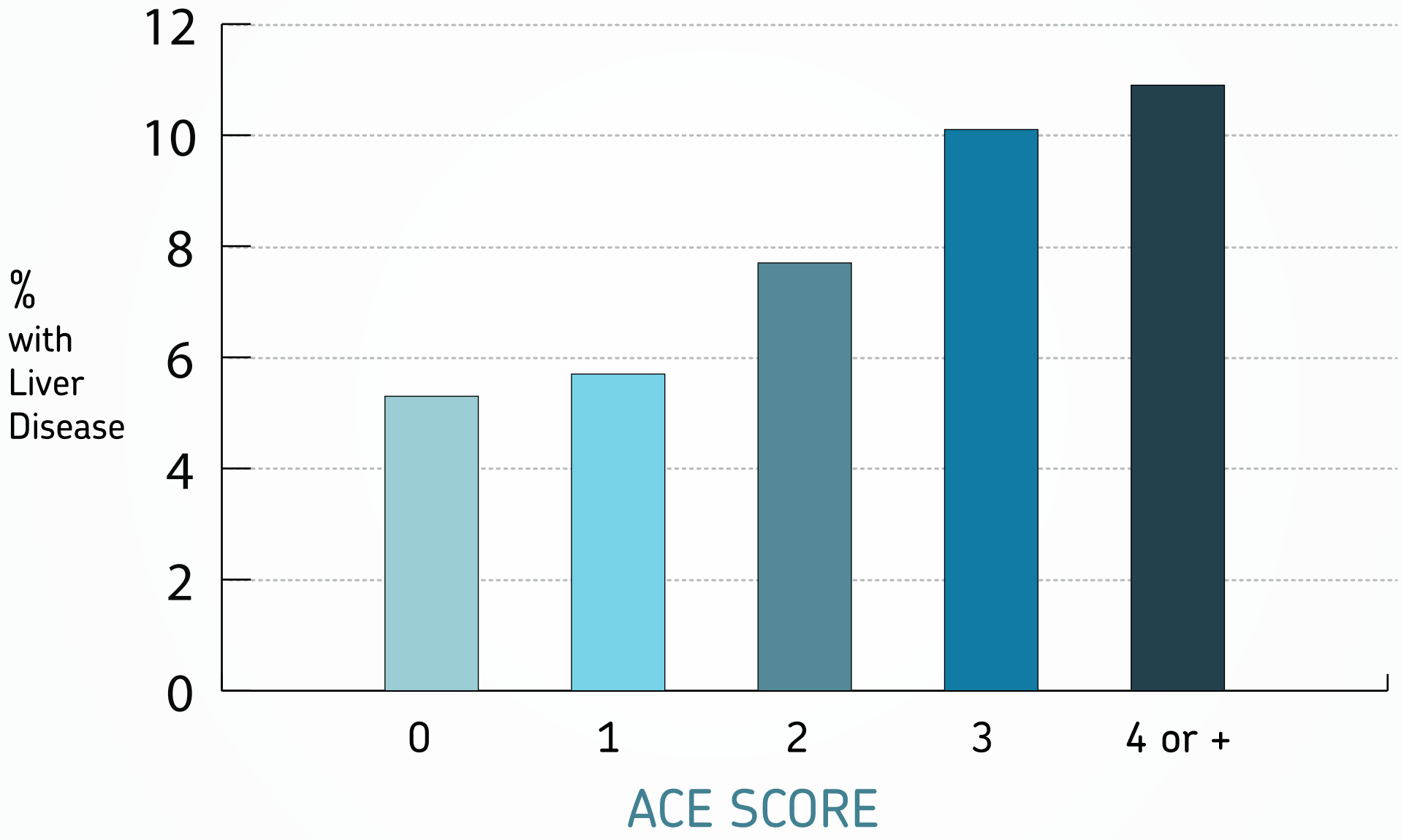
ACE Score and Health Problems



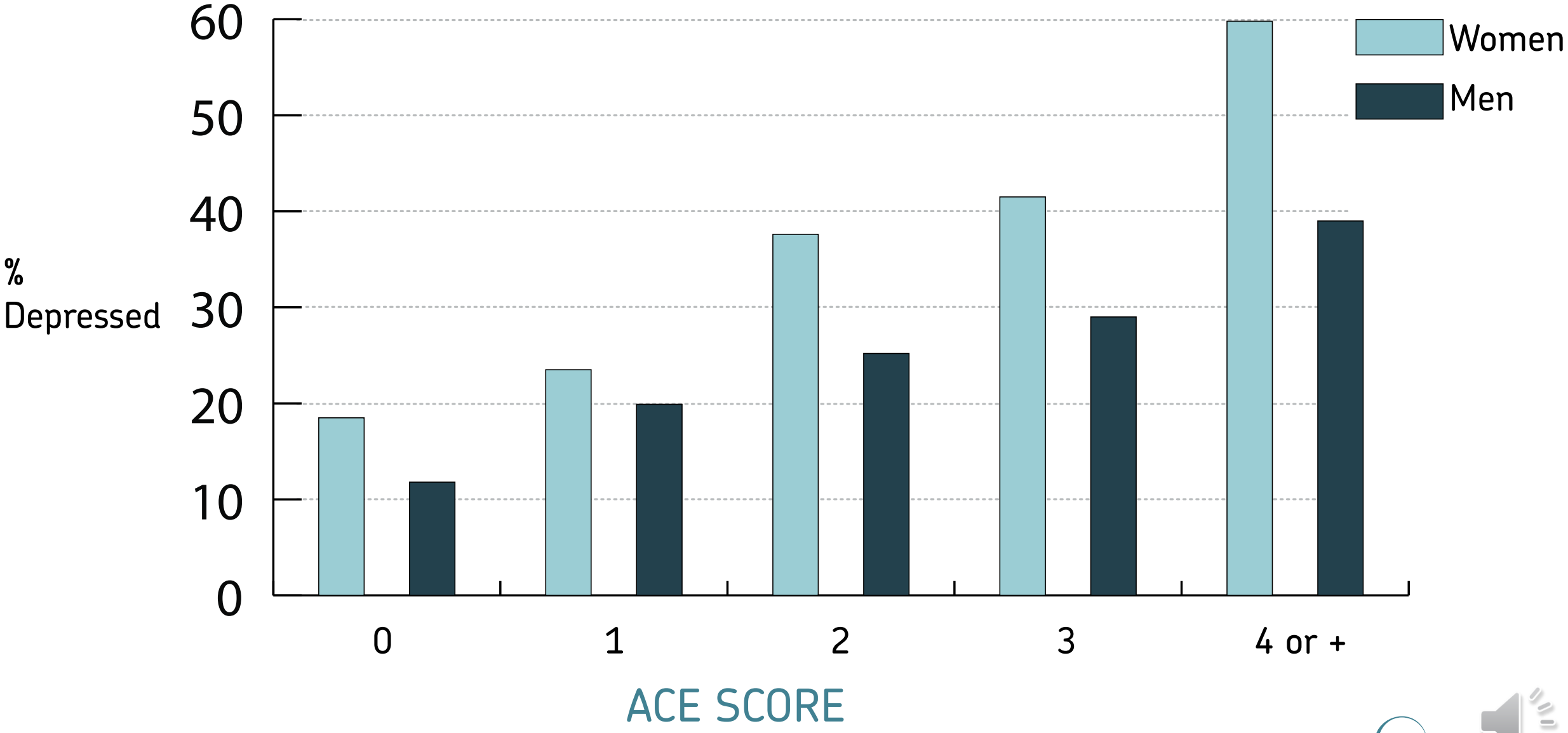
ACEs, Smoking and Lung Disease



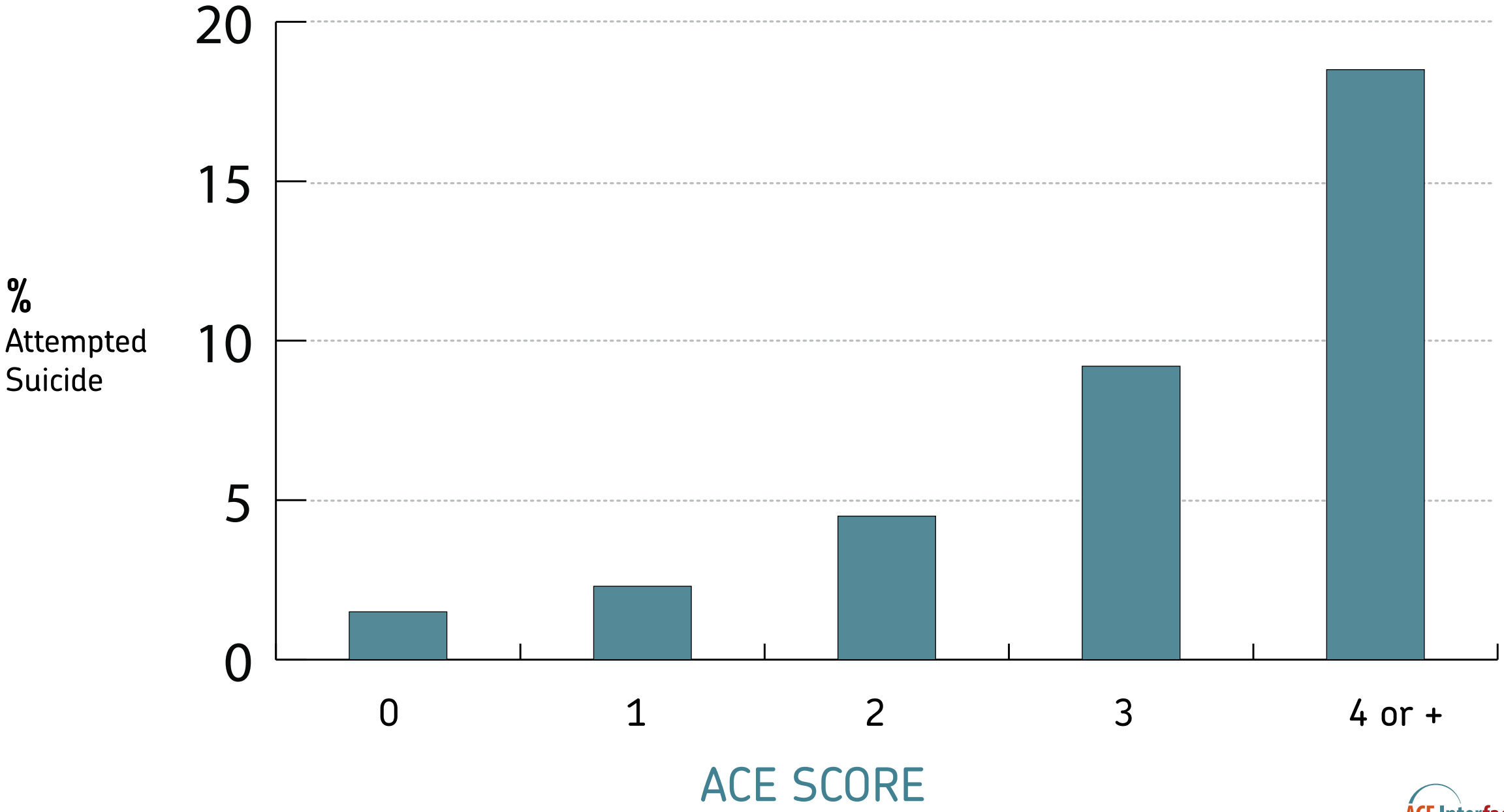
ACE Score and Liver Disease



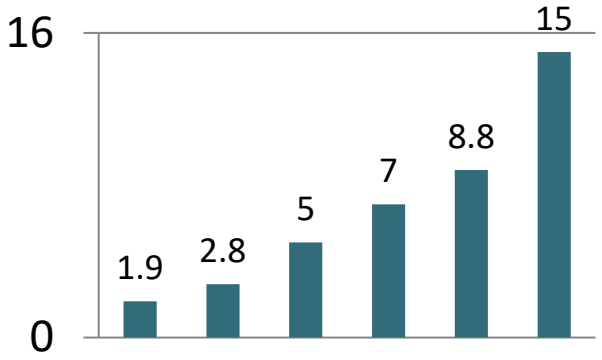
ACEs & Depression



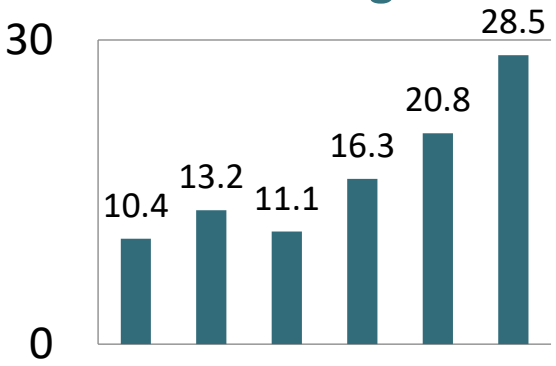
ACEs & Suicide Attempt



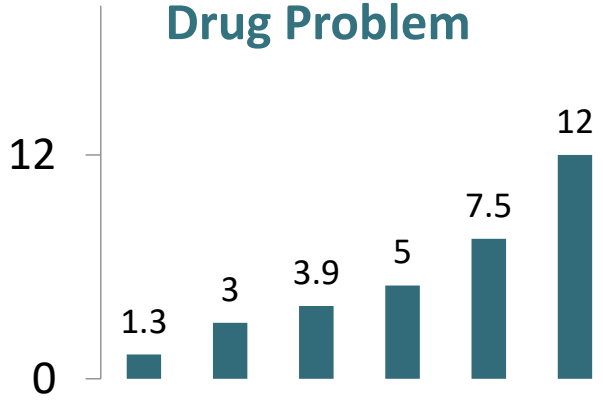
Anxiety



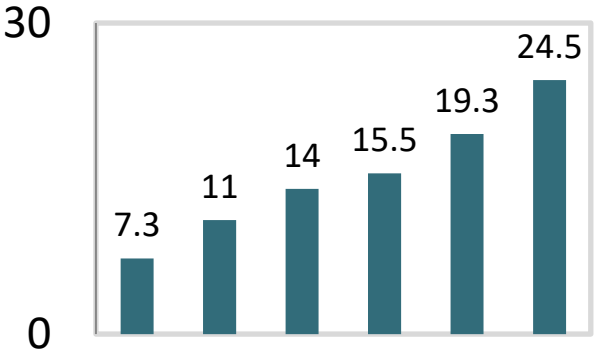
Smoking



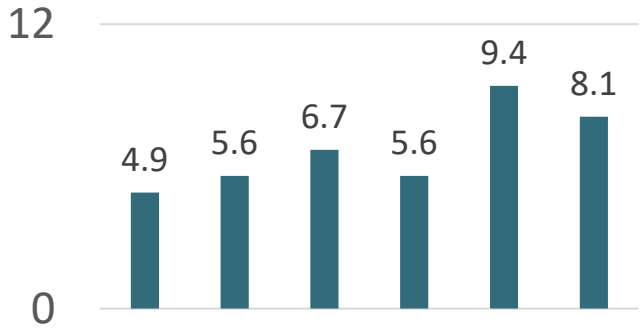
Drug Problem



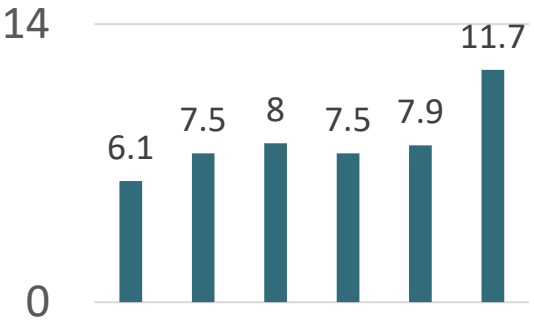
MH Treatment



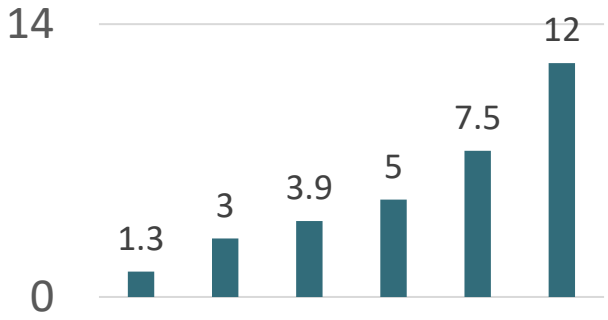
Cardio Vascular Disease



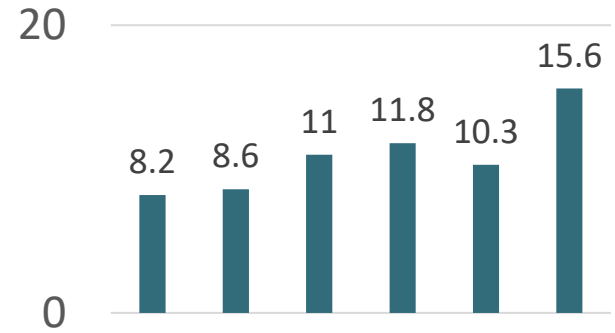
Diabetes



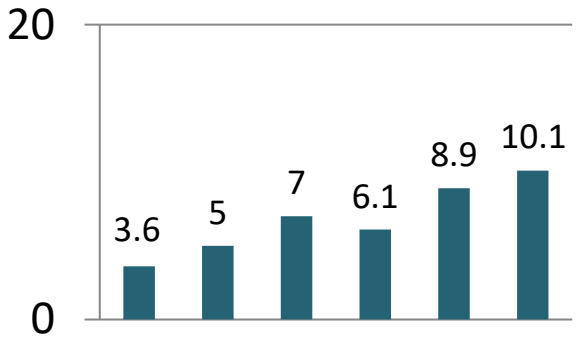
Asthma



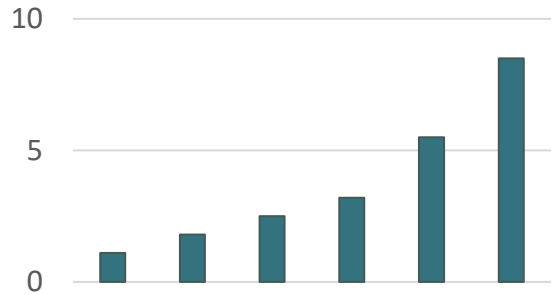
Cancer



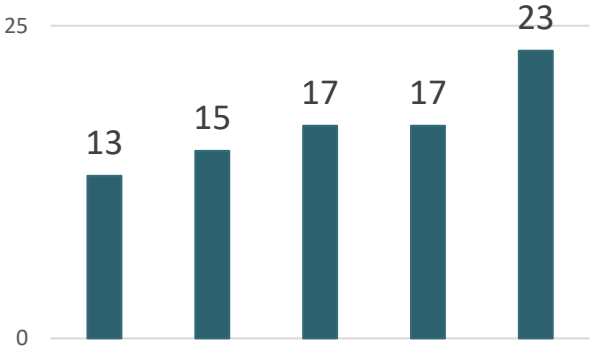
Work Injury/Illness



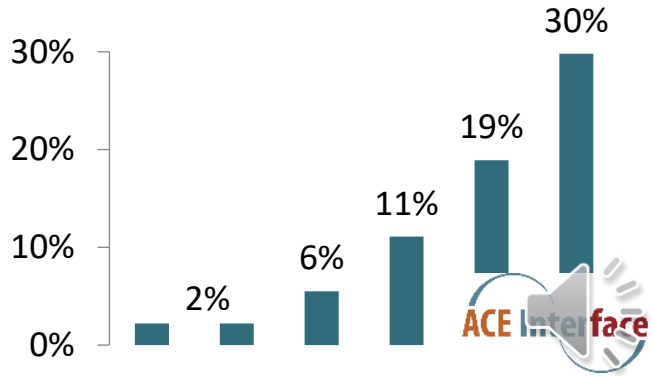
Missed 15 of 30 Work Days (MH)



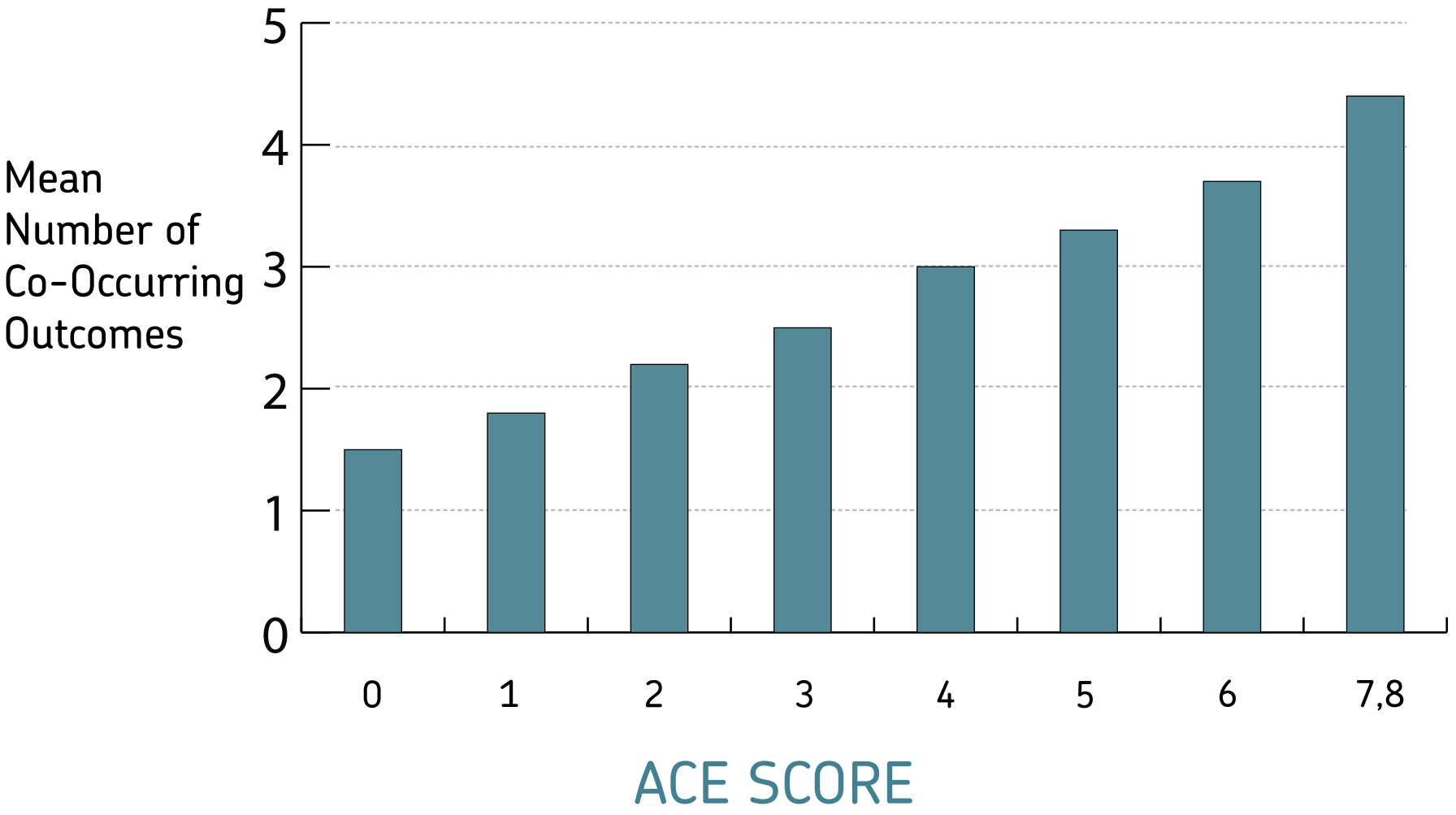
Unemployed



Homeless



Neurobiology and Epidemiology Converge



Health and Social Problems

panic reactions
depression
anxiety
hallucinations
sleep disturbances
severe obesity
pain
smoking
alcoholism
illicit drug use
IV drug use
early intercourse
promiscuity
sexual dissatisfaction
amnesia (childhood)
high stress
problems with anger
perpetrating
domestic violence

3 Realms of ACEs

Adverse childhood and community experiences (ACEs) can occur in the household, the community, or in the environment and cause toxic stress. Left unaddressed, toxic stress from ACEs harms children and families, organizations, systems and communities, and reduces the ability of individuals and entities to respond to stressful events with resiliency. Research has shown that there are many ways to reduce and heal from toxic stress and build healthy, caring communities.

https://www.acesconnection.com/blog/got-your-ace-resilience-scores

TOXIC STRESS

How does toxic stress affect health and development?

https://docmuscles.files.wordpress.com/2014/06/bear-rund.png

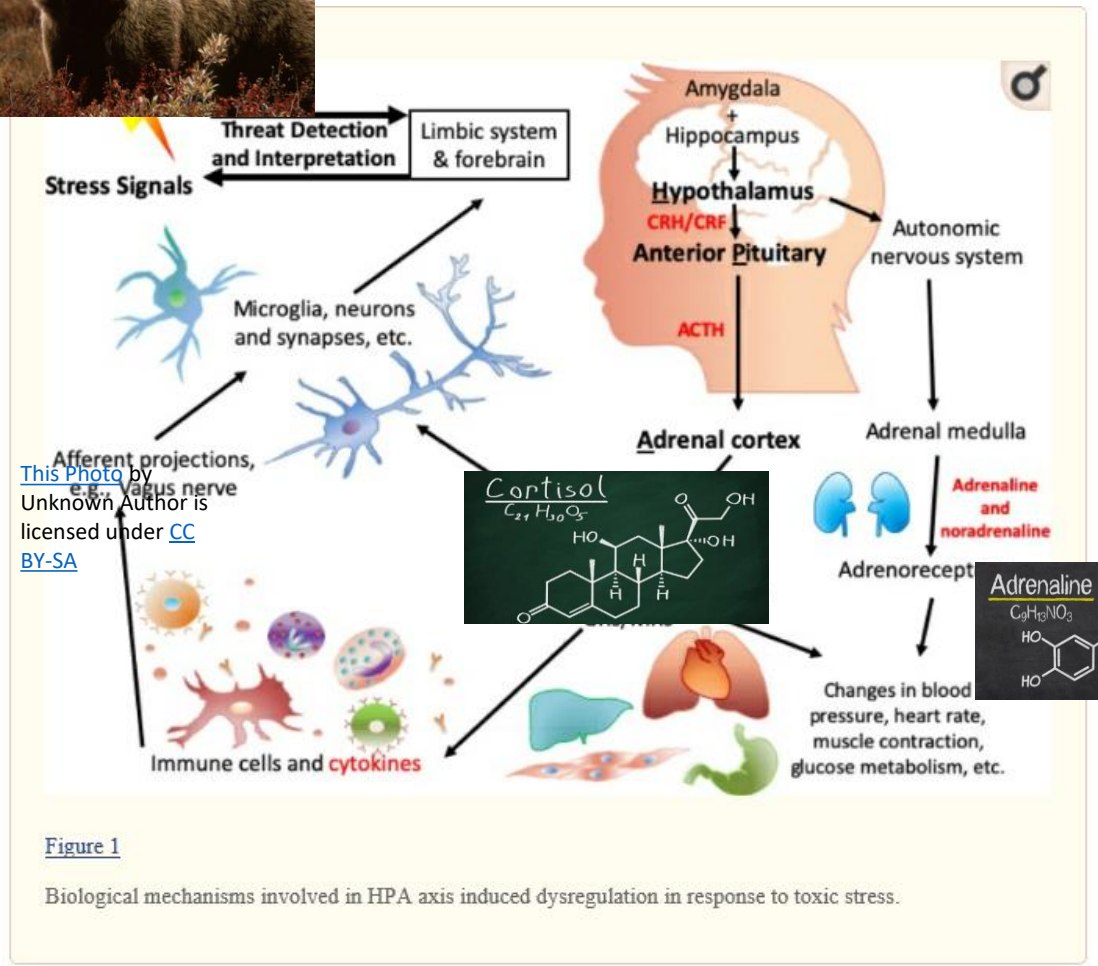


Figure 1

Biological mechanisms involved in HPA axis induced dysregulation in response to toxic stress.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6857662/

https://www.opencirclehealing.com/blog/

Types of stress responses

POSITIVE

STUDYING FOR EXAM,COMPETING IN SPORTS, STARTING NEW JOB

A normal and essential part of healthy development

EXAMPLES
getting a vaccine, first day of school

TOLERABLE

NATURAL DISASTER

Response to a more severe stressor, limited in duration

EXAMPLES
loss of a loved one, a broken bone

TOXIC

ADVERSE CHILDHOOD EXPERIENCES DAILY STRESS due to Abuse, Neglect, Household Dysfunction

Experiencing strong, frequent, and/or prolonged adversity

EXAMPLES
physical or emotional abuse, exposure to violence

https://media1.kaboom.org/app/assets/resources/000/000/598/original/stress_responses.png

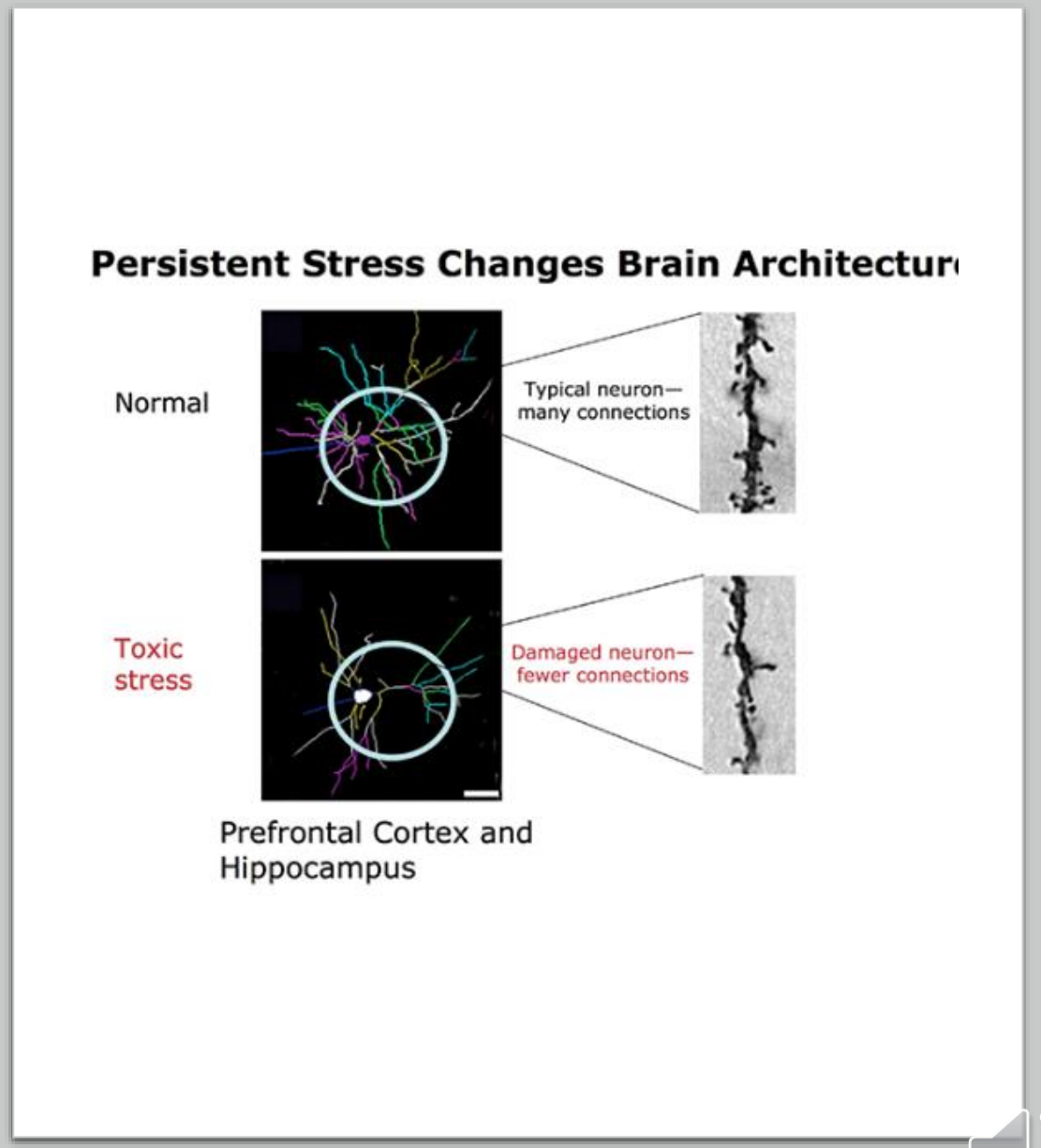
Chronic Unpredictable Mild Stress

- Chronic Unpredictable Stress causes significant changes in the receptors in the brain's hippocampus
- When stress is completely predictable, even if it is more traumatic, the stress does not cause the same changes to the hippocampus
- **Rats exposed to chronic unpredictable stress were unable to turn off the stress response (Childhood Disrupted Nakazawa, 2015)**

- Male and Female rats were exposed to 3 weeks of chronic unpredictable mild stress
- Every day exposed to low grade stressors:
- (1)cage was rotated,
- (2)five-minute swim,
- (3) bedding was dampened,
- (4) a day without food,
- (5) physically restrained for 30 min,
- (6) or exposed to 30 min of strobe lights

Trauma and Neural Pathways

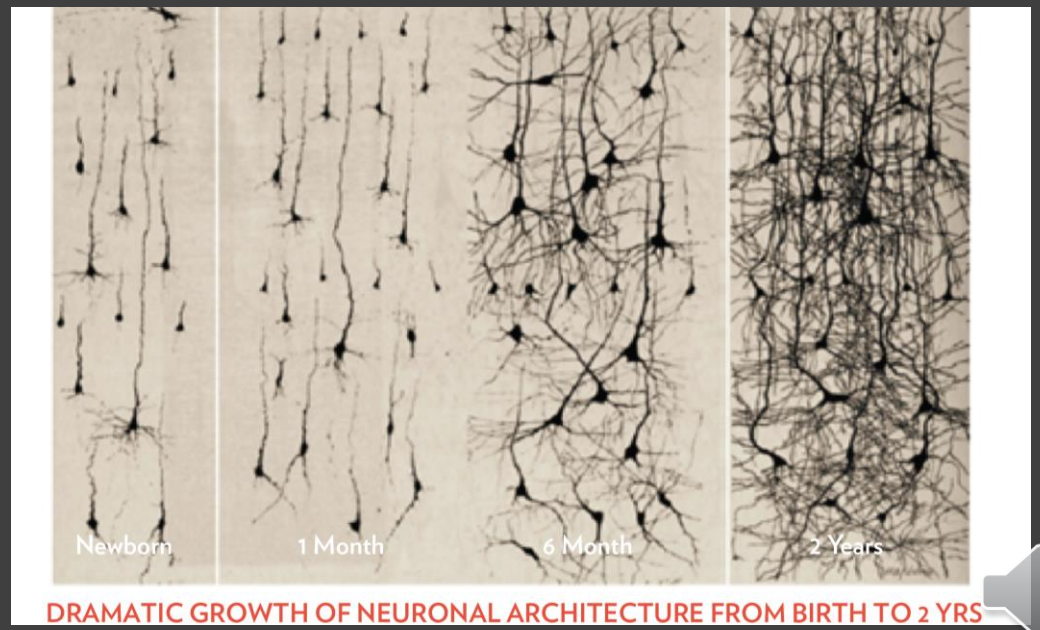
- Continuous trauma can weaken remaining neural pathways to the thinking part of the brain AND **strengthen neural pathways to the survival part**
- Causes some children less capable of coping with adversity (more likely to be hypervigilant, quick to respond)



https://salud-america.org/state-latino-early-childhood-development-research-review/

Neurological Development

- We are born with 100 billion neurons
- 90 percent of child's brain develops by the time they are 5 years old
- Neural circuits built in childhood are the foundation for later development
- Pruning of brain's synapses indicates the influence experience and environment play in shaping a young brain



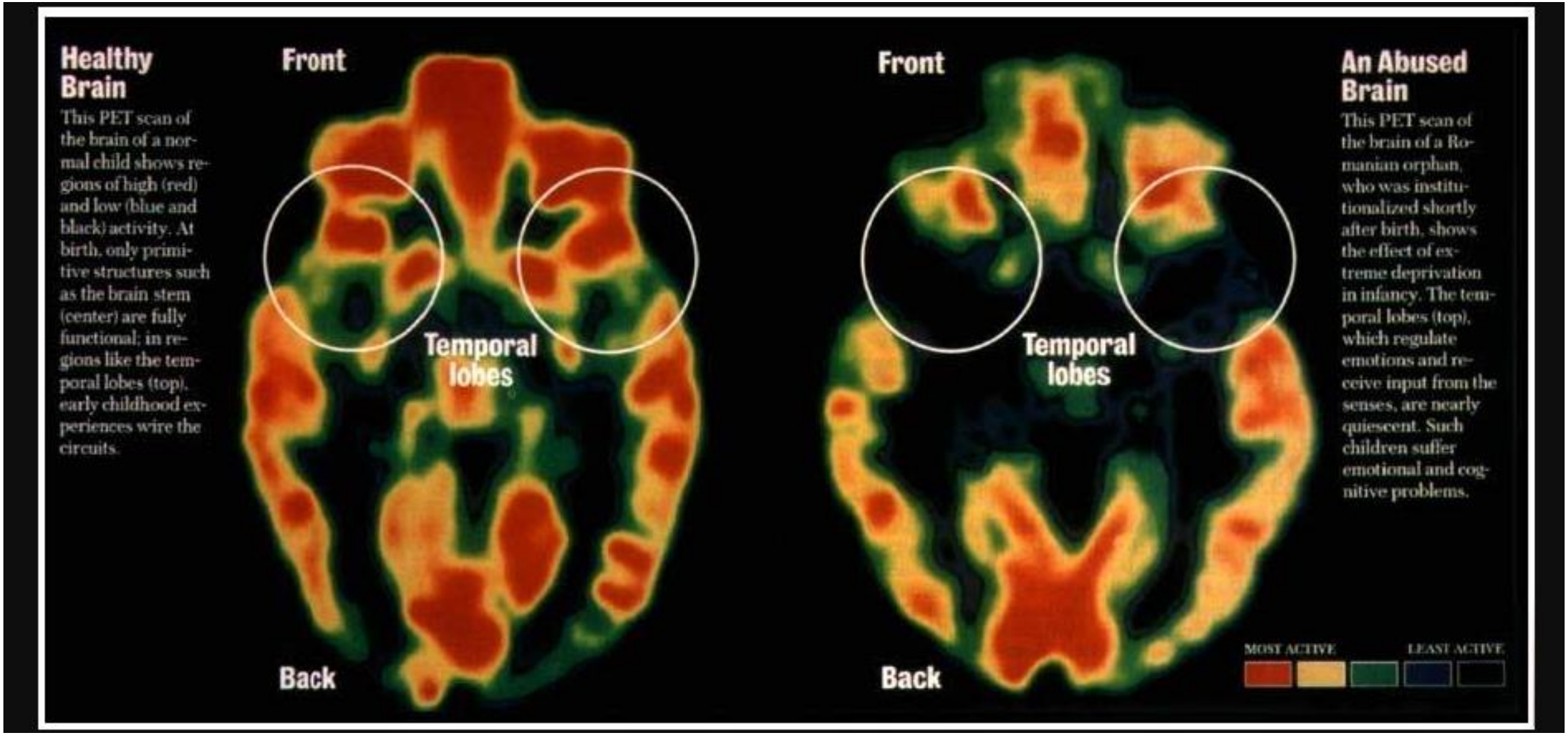
https://www.startingblocks.gov.au/other-resources/factsheets/brain-development-in-children/

Single Neuron

At Birth

Elementary Age

Puberty



https://www.lcsun-news.com/story/news/local/new-mexico/2018/01/21/severe-childhood-trauma-alter-developing-brain-create-lifetime-risk/1039104001/

Childhood maltreatment and biomarkers for cardiometabolic disease in mid-adulthood in a prospective British birth cohort: associations and potential explanations

Leah Li, Snehal M Pinto Pereira, Christine Power

Author affiliations +

Newsroom / Search News Releases / Abuse and adversity in childhood linked to more cardiovascular risk in adulthood

Categories: Scientific Statements/Guidelines | Published: December 18, 2017

Abuse and adversity in childhood linked to more cardiovascular risk in adulthood

American Heart Association Scientific Statement

Related Images

Cumulative childhood adversity and adult cardiometabolic disease: A meta-analysis.

EXPORT | Add To My List | Request Permissions | Database: APA PsycArticles | Journal Article

Jakubowski, Karen P. | Cundiff, Jenny M. | Matthews, Karen A.

RUSH

Excellence is just the beginning. Search Site

SERVICES & CONDITIONS | FIND A DOCTOR | PATIENTS & VISITORS | LOCATIONS | HEALTH & WELLNESS | ABOUT US

Health & Wellness

DISCOVER HEALTH | EVENTS AND CLASSES | QUICK GUIDES | SUPPORT GROUPS | HEALTHY RECIPES | VIDEO LIBRARY

Early Emotional Abuse and Stroke Risk

Physical and Sexual Abuse in Childhood as Predictors of Early-Onset Cardiovascular Events in Women

Janet W. Rich-Edwards, Susan Mason, Kathryn Rexrode, Donna Spiegelman, Eileen Hibert, Ichiro Kawachi, Hee Jin Jun, and Rosalind J. Wright

Originally published 11 Jul 2012 | https://doi.org/10.1161/CIRCULATIONAHA.111.076877 | Circulation. 2012;126:920–927

Other version(s) of this article

REVIEW ARTICLE | Free Access

Childhood adversity and mechanistic links to hypertension risk in adulthood

Ijeoma E. Obi, Kasi C. McPherson, Jennifer S. Pollock

First published: 17 January 2019 | https://doi.org/10.1111/bph.14576 | Citations: 4

Find It @ Sladen

Gender Differences in the Association between Parental Divorce during Childhood and Stroke in Adulthood: Findings from a Population-Based Survey

Esme Fuller-Thomson*, Angela D. Dalton

First Published December 11, 2012 | Research Article | Find in PubMed | Check for updates

https://doi.org/10.1111/j.1747-4949.2012.00935.x

Article information

Altmetric 2

FULL TEXT ARTICLE

Adverse childhood experiences and adult inflammation: Single adversity, cumulative risk and latent class approaches

Rebecca E. Lacey, Snehal M. Pinto Pereira, Leah Li and Andrea Danese

Brain, Behavior, and Immunity, 2020-07-01, Volume 87, Pages 820-830, Copyright © 2020 The Authors

FULL TEXT ARTICLE

The association between childhood physical abuse and heart disease in adulthood: Findings from a representative community sample

Esme Fuller-Thomson, Sarah Brennenstuhl and John Frank

Child Abuse & Neglect, 2010-09-01, Volume 34, Issue 9, Pages 689-698, Copyright © 2010 Elsevier Ltd

Brief Report
Published: 10 July 2018

Adverse childhood experience and rheumatic diseases

Ana Paula Lopes Luiz[1], Heloisa de Alencar Antico[1], Thelma Larocca Skare[1], Angelica Beate Winter Boldt[2] & Renato Nisihara [1,3,4]

Clinical Rheumatology **37**, 2863–2867(2018) | Cite this article

Review > Inj Prev. 2019 Dec;25(6):514-520. doi: 10.1136/injuryprev-2018-042927. Epub 2018 Oct 13.

Associations between adverse childhood experiences and acquired brain injury, including traumatic brain injuries, among adults: 2014 BRFSS North Carolina

Angie S Guinn [1], Katie A Ports [2], Derek C Ford [2], Matt Breiding [3], Melissa T Merrick [2]

Affiliations + expand

PMID: 30317219 PMCID: PMC6462254 DOI: 10.1136/injuryprev-2018-042927
Free PMC article

> Psychoneuroendocrinology. 2017 Oct;84:190-196. doi: 10.1016/j.psyneuen.2017.07.482. Epub 2017 Jul 20.

Childhood maltreatment is associated with increased risk of subclinical hypothyroidism in pregnancy

Nora K Moog [1], Christine M Heim [2], Sonja Entringer [3], Norbert Kathmann [4], Pathik D Wadhwa [5], Claudia Buss [6]

Affiliations + expand

PMID: 28755549 PMCID: PMC5572821 DOI: 10.1016/j.psyneuen.2017.07.482
Free PMC article

> Psychoneuroendocrinology. 2015 Jan;51:58-67. doi: 10.1016/j.psyneuen.2014.09.008. Epub 2014 Sep 19.

Blunted endocrine and cardiovascular reactivity in young healthy women reporting a history of childhood adversity

Annette Voellmin [1], Katja Winzeler [1], Evelin Hug [1], Frank H Wilhelm [2], Valérie Schaefer [3], Jens Gaab [4], Roberto La Marca [5], Jens C Pruessner [6], Klaus Bader [7]

Affiliations + expand

PMID: 25290347 DOI: 10.1016/j.psyneuen.2014.09.008

> Arch Pediatr Adolesc Med. 2009 Dec;163(12):1135-43. doi: 10.1001/archpediatrics.2009.214.

Adverse childhood experiences and adult risk factors for age-related disease: depression, inflammation, and clustering of metabolic risk markers

Andrea Danese [1], Terrie E Moffitt, HonaLee Harrington, Barry J Milne, Guilherme Polanczyk, Carmine M Pariante, Richie Poulton, Avshalom Caspi

Affiliations + expand

PMID: 19996051 PMCID: PMC3560401 DOI: 10.1001/archpediatrics.2009.214
Free PMC article

> Brain Behav Immun. 2020 Aug;88:566-572. doi: 10.1016/j.bbi.2020.04.050. Epub 2020 Apr 24.

Adverse childhood experiences (ACEs), cell-mediated immunity, and survival in the context of cancer

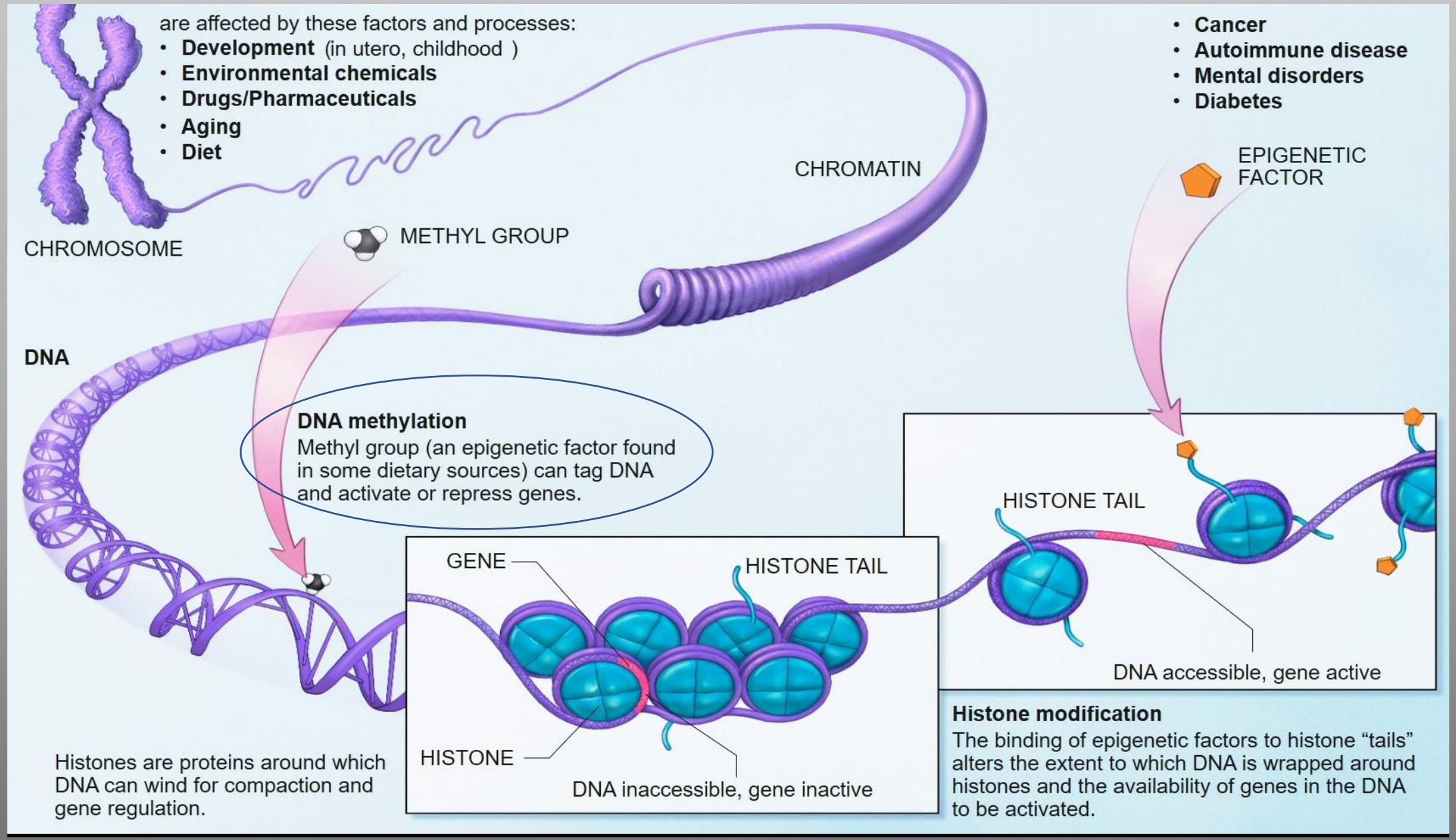
Jennifer L Steel [1], Michael Antoni [2], Ritambhara Pathak [3], Lisa H Butterfield [4], Yoram Vodovotz [3], Alexandra Savkova [3], Marsh Wallis [3], Yisi Wang [3], Hui Jing [3], Elizabeth Grammer [3], Robin Burke [3], Mya Brady [3], David A Geller [3]

Affiliations + expand

PMID: 32339603 PMCID: PMC7415584 (available on 2021-08-01) DOI: 10.1016/j.bbi.2020.04.050

EPIGENETICS AND HISTORICAL TRAUMA

https://www.bbc.com/future/article/20190326-what-is-epigenetics



https://en.wikipedia.org/wiki/Epigenetics#/media/File:Epigenetic_mechanisms.jpg

Methylation/Epigenetic Programming

- DNA Methylation can activate or repress how genes are expressed
  - Different environmental exposures may impact epigenetic patterns
  - Psychosocial stressors (ACE's, famine, warfare) can have epigenetic impacts
  - Epigenetic differences can have the same consequences as genetic polymorphisms
  - Epigenetic changes may be passed down to next generation

Review > Epigenomics. 2016 Dec;8(12):1653-1669. doi: 10.2217/epi-2016-0075.
Epub 2016 Nov 21.

The epigenetic impacts of social stress: how does social adversity become biologically embedded?

Vincent T Cunliffe [1]

Affiliations + expand

PMID: 27869483 PMCID: PMC5289034 DOI: 10.2217/epi-2016-0075

Free PMC article

Table 1. Examples of differentially methylated genes associated with social stress.

Stressor	Species	Genes	Ref.
Early-life stress	Mouse	*Avp, Nr3c1, Prkcc*	[11,24–28,158]
	Rat	*Bdnf, Nr3c1, Pcdh*	[7–10,21–23,28]
	Macaque monkey	*NR3C1, MMP7, RALB, CYP7A1, CLEC9, XM_001092634.1, KIAA1671, ST6GALNAC1, MTTP, APEX2, INTS7, TRAK1, TTC35, ZNF724P, ZG16, MORC1*	[14,19,28]
	Human	*NR3C1, MAOA, CRH, CRHBP, FKBP5, GAS5, miR-124, LGI1/LGI2, MORC1, BDNF, SLC6A4, KITLG, PM20D1, SLC17A3, PCDH*	[19,28,29,32–39,44–49,129]
Acute stress of subordinates by dominant conspecifics	Cichlid	*GnRH1*	[80]
Low socioeconomic status	Human	*PCDHB4, PCDHB3, PCDHGA11, MBD4, HEMK2, DICER1, SERPINB10, WWC1, HTRA3, LINC01072, AVP, FKBP5, OXTR, CCL1, CD1D, F8, KLRG1, NLRP12, TLR3, NFATC1, IL1A, GPR132, MAPK36, CXCL2, PTGS2, SLC6A4*	[121,122,124–126,128,130]
Genocidal war	Human	*NR3C1, CRH, FKBP5, CRHBP*	[31,39,147]
Combat PTSD	Human	*NR3C1, SKA2*	[148–150]
Suicide	Human	*NR3C1, SKA2*	[29,32,151,152]
Holocaust	Human	*NR3C1, FKBP5*	[154,155]

Trauma, PTSD, and suicide are associated with variable DNA methylation at loci such as **NR3C1, SKA2, and FKBP5**

The Epigenetic impacts of social stress: how does social adversity become biologically embedded? Epigenomics. Vincent Cunliffe. 27 September 2016

Low levels of postnatal maternal care in a range of experimental animal species increase DNA methylation and attenuate transcription at **Nr3c1, Avp, Bdnf** loci in offspring while increasing anxiety, depressive symptoms and stress reactivity

Published: 27 June 2004

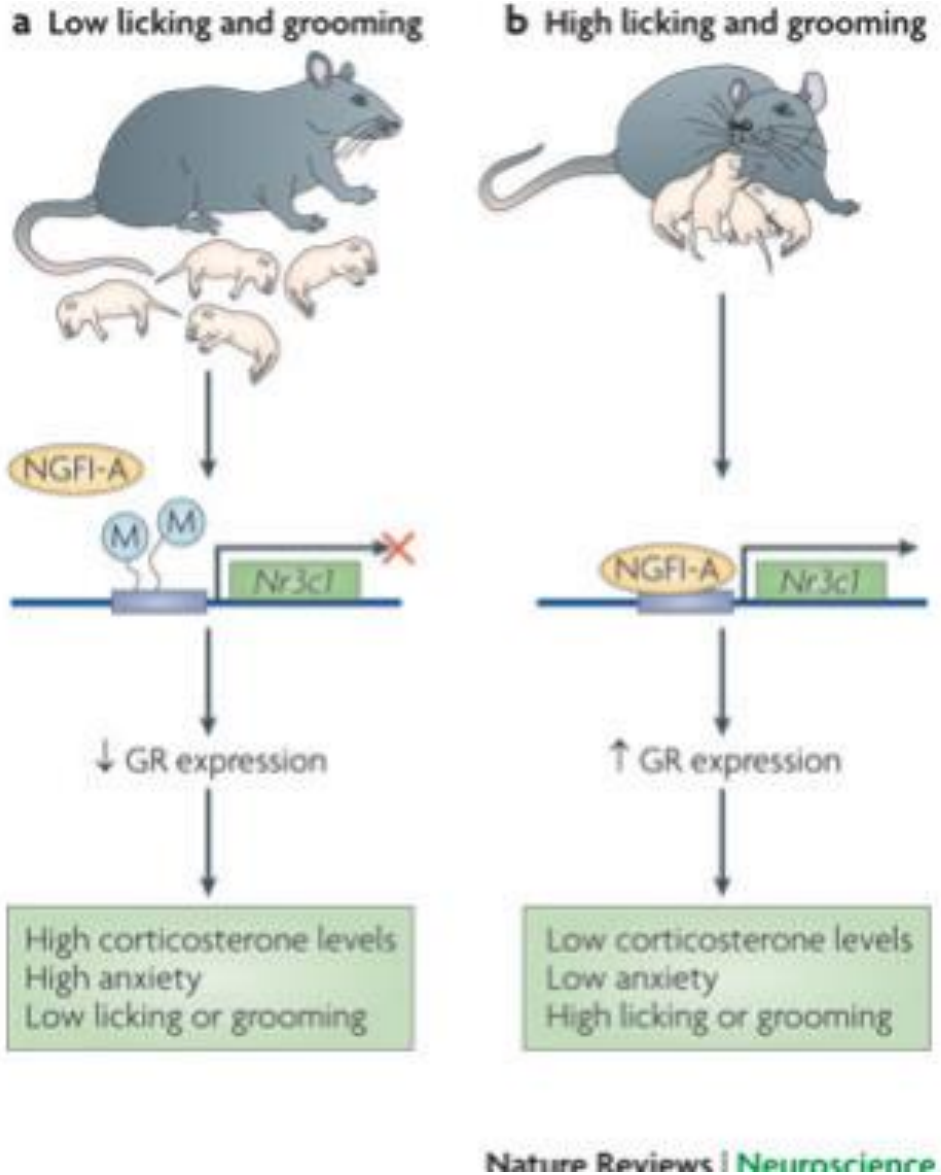
Epigenetic programming by maternal behavior

Ian C G Weaver, Nadia Cervoni, Frances A Champagne, Ana C D'Alessio, Shakti Sharma, Jonathan R Seckl, Sergiy Dymov, Moshe Szyf & Michael J Meaney

Nature Neuroscience **7**, 847–854(2004) | Cite this article

Epigenetic Programming by Maternal Behavior (2004)

- Increased pup licking and grooming (LG) and arched-back nursing (ABN) by rat mothers altered the offspring epigenome at a glucocorticoid receptor (GR) gene promoter in the hippocampus
- Differences in DNA methylation were associated with altered histone acetylation and transcription factor (NGFI-A) binding to the GR promoter

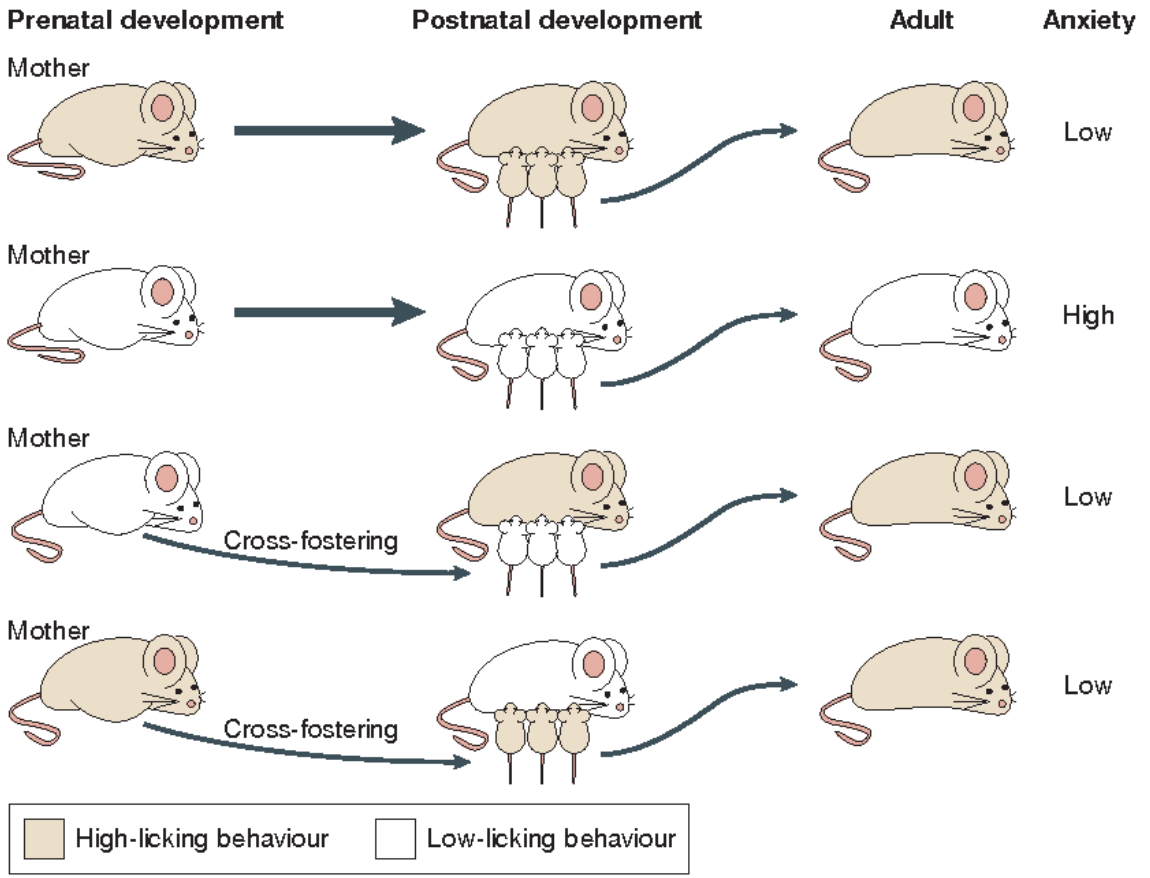


https://www.semanticscholar.org/paper/The-developmental-origins-of-anxiety-Gross-Hen/e44f6547c330bfa29fc43df1f45c181ebdec6901/figure/3

Epigenetic Programming by Maternal Behavior (2004)

Offspring of mothers that showed high levels of LG and ABN were found to have differences in DNA methylation, as compared to offspring of 'low-LG-ABN' mothers.

- Differences in DNA methylation emerged over the first week of life were reversed with cross-fostering
- Differences in DNA methylation persisted into adulthood



https://www.semanticscholar.org/paper/The-developmental-origins-of-anxiety-Gross Hen/e44f6547c330bfa29fc43df1f45c181ebdec6901/figure/3

Published as: *Nat Neurosci*. 2014 January ; 17(1): 89–96.

Parental olfactory experience influences behavior and neural structure in subsequent generations

Brian G Dias[1,2] and **Kerry J Ressler**[1,2,3]

[1]Department of Psychiatry and Behavioral Sciences, Emory University School of Medicine, Atlanta, Georgia, USA

[2]Yerkes National Primate Research Center, Atlanta, Georgia, USA

[3]Howard Hughes Medical Institute, Chevy Chase, Maryland, USA

“Parental olfactory experience influences behavior and neural structure in subsequent generations”(2014)

Researchers taught male mice to fear the smell of cherry blossoms by associating the scent with mild foot shocks

- After three days of fear conditioning, the cherry blossom mice later reproduced
- The resulting offspring, having grown to adulthood, had a heightened jumpiness to the cherry blossom smell (without previous exposure to the smell)
    - **CpG hypomethylation in the *Olfr151* gene in both the sperm of the father mice and the sperm of the offspring**

- Researchers artificially inseminated females using the sperm from the original fear-conditioned mice
    - The results were the same, suggesting epigenetic inheritance rather than environment

› Biol Psychiatry. 2016 Sep 1;80(5):372-80. doi: 10.1016/j.biopsych.2015.08.005. Epub 2015 Aug 12.

Holocaust Exposure Induced Intergenerational Effects on FKBP5 Methylation

Rachel Yehuda [1], Nikolaos P Daskalakis [2], Linda M Bierer [2], Heather N Bader [2], Torsten Klengel [3], Florian Holsboer [4], Elisabeth B Binder [3]

Affiliations + expand

PMID: 26410355 DOI: 10.1016/j.biopsych.2015.08.005

FKBP5 Intron 7 Methylation in Holocaust Survivors and FO Comparison Subjects

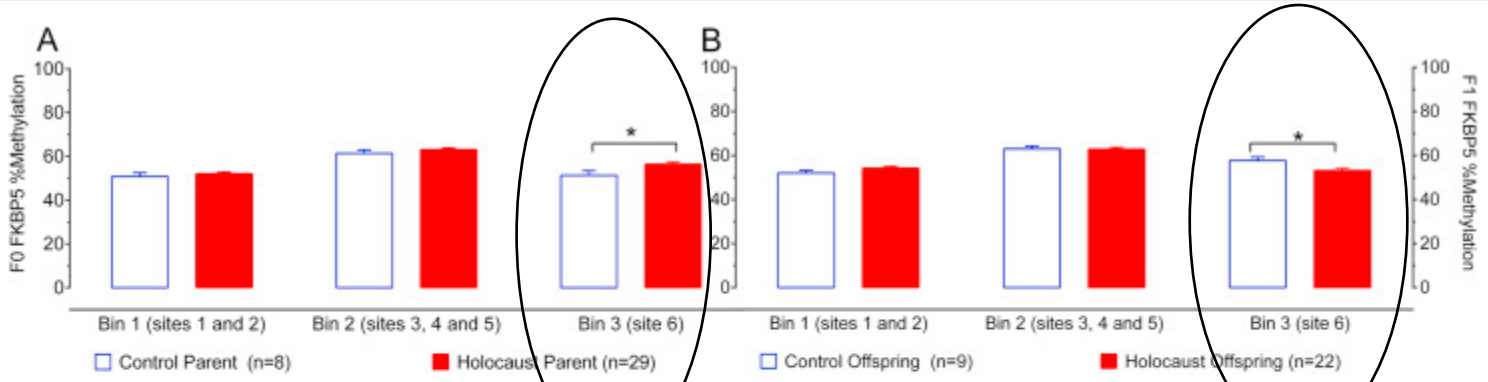


Figure 2

Methylation at *FKBP5* intron 7, bins 1, 2, and 3 for Holocaust survivors **(A)** , Holocaust survivor offspring **(B)** , and their respective comparison subjects. The percent methylation (mean ± SEM) is represented by red bars for Holocaust survivor parents (F0) and their offspring (F1) (F0: $n = 32$, F1: $n = 22$) and by white bars for F0 and F1 control subjects (F0: $n = 8$, F1: $n = 9$). Division of sites into bins is indicated. * $p < .05$.

https://www.clinicalkey.com/#!/content/playContent/1-s2.0S0006322315006526?returnurl=https:%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS0006322315006526%3Fshowall%3Dtrue&referrer=https:%2F%2Fpubmed.ncbi.nlm.nih.gov%2F

Holocaust Exposure Induced Intergenerational Effects on FKBP5 Methylation

- Study of 32 Jewish Men and Women who had either been in Nazi concentration camp, witnessed or experienced torture or who had to hide during WWII
  - Holocaust exposure had an effect on **FKBP5 methylation** at bin 3/site 6
  - In Holocaust survivors, methylation at this site was higher than in controls
  - Found epigenetic tags on the very same part of the gene in both the Holocaust survivors and their offspring

PEDIATRICS®
OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Article

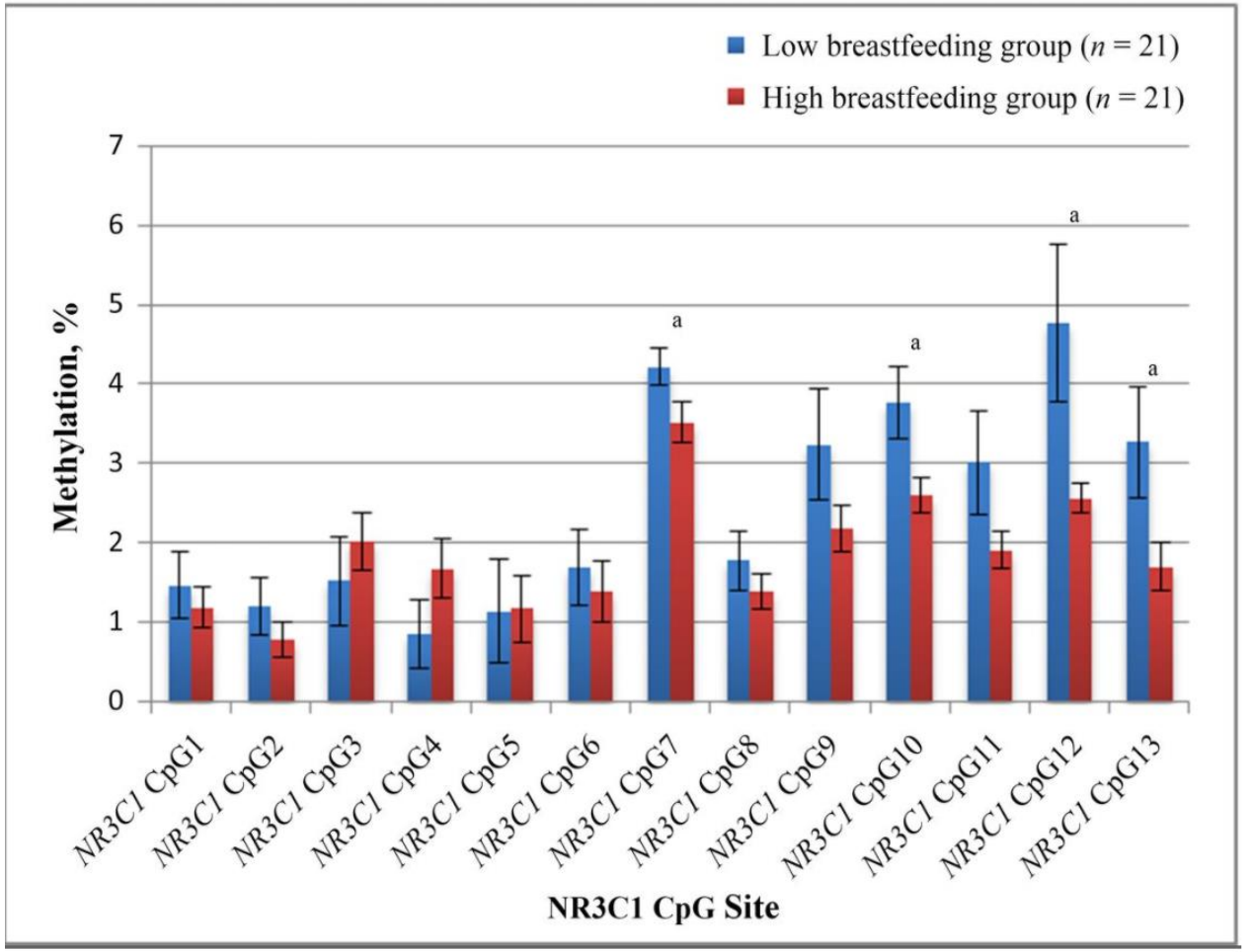
Epigenetic Programming by Maternal Behavior in the Human Infant

Barry M. Lester, Elisabeth Conradt, Linda L. LaGasse, Edward Z. Tronick, James F. Padbury and Carmen J. Marsit

Pediatrics October 2018, 142 (4) e20171890; DOI: https://doi.org/10.1542/peds.2017-1890

“Epigenetic Programming by Maternal Behavior in the Human Infant” (2018)

- First study in which researchers recapitulate the effects of maternal care in rodents by demonstrating that maternal care can alter DNA methylation in human infants healthy
  - A cohort study of term, healthy infants and their mothers who did (n = 21) or did not (n = 21) breastfeed for the first 5 months was used in this analysis
  - DNA samples were prepared from cheek swabs and subjected to quantitative analysis of the extent of methylation
  - Cortisol stress reactivity was measured in infant saliva by using a mother-infant interaction procedure and DNA methylation of a regulatory region of the glucocorticoid receptor gene


Low breastfeeding group (n = 21)
High breastfeeding group (n = 21)
Methylation, %
0
1
2
3
4
5
6
7
a
a
a
a
NR3C1 CpG1
NR3C1 CpG2
NR3C1 CpG3
NR3C1 CpG4
NR3C1 CpG5
NR3C1 CpG6
NR3C1 CpG7
NR3C1 CpG8
NR3C1 CpG9
NR3C1 CpG10
NR3C1 CpG11
NR3C1 CpG12
NR3C1 CpG13
NR3C1 CpG Site

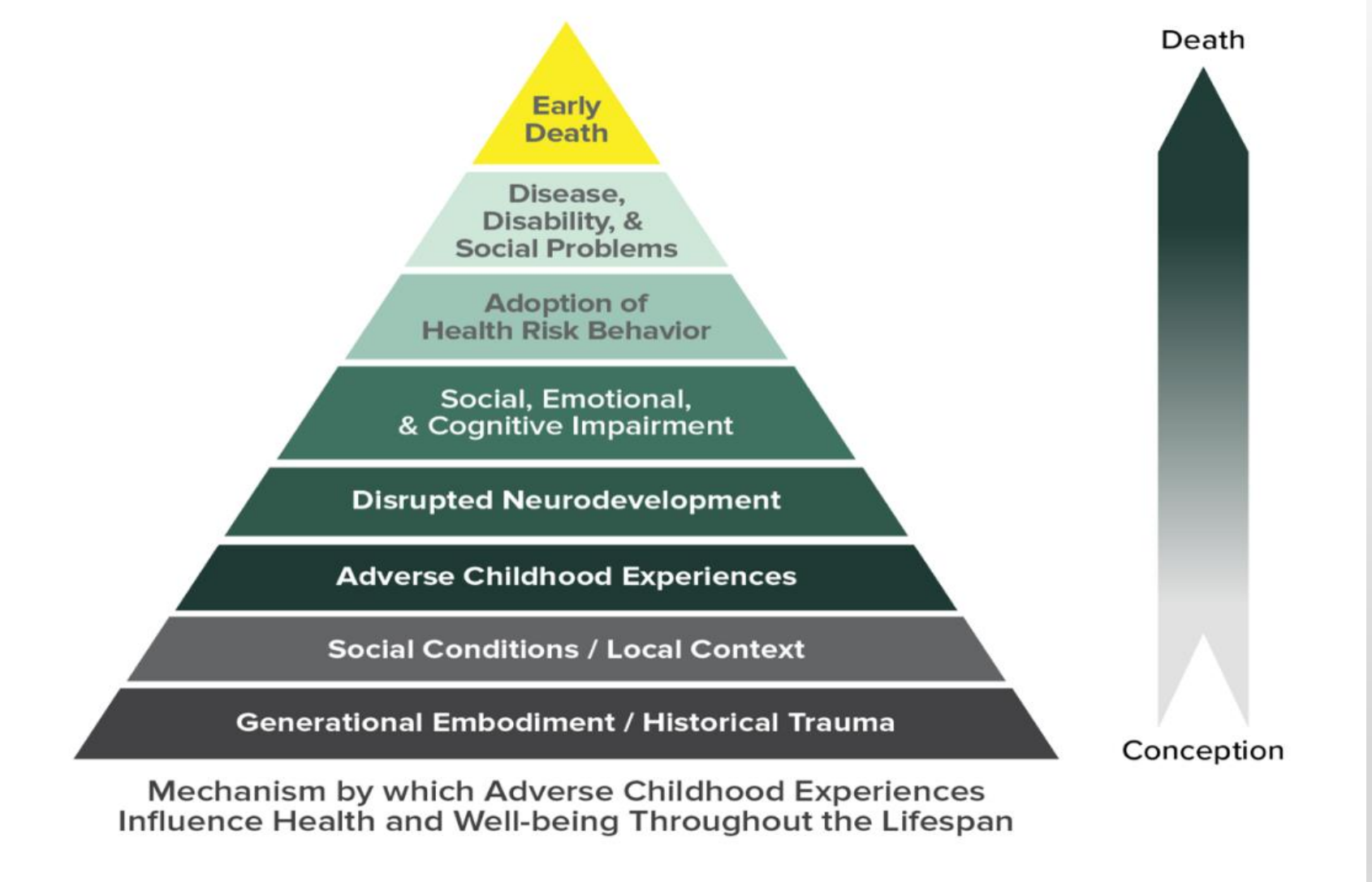
“Epigenetic Programming by Maternal Behavior in the Human Infant” (2018)

- Study substantiates findings from previous rodent studies
  - Infants who **experienced increased breastfeeding had decreased methylation** in the homologous region of the human gene
  - Decreased methylation of this gene in the human infants was associated with decreased cortisol stress reactivity

ADDRESSING ACE's IN CLINICAL PRACTICE

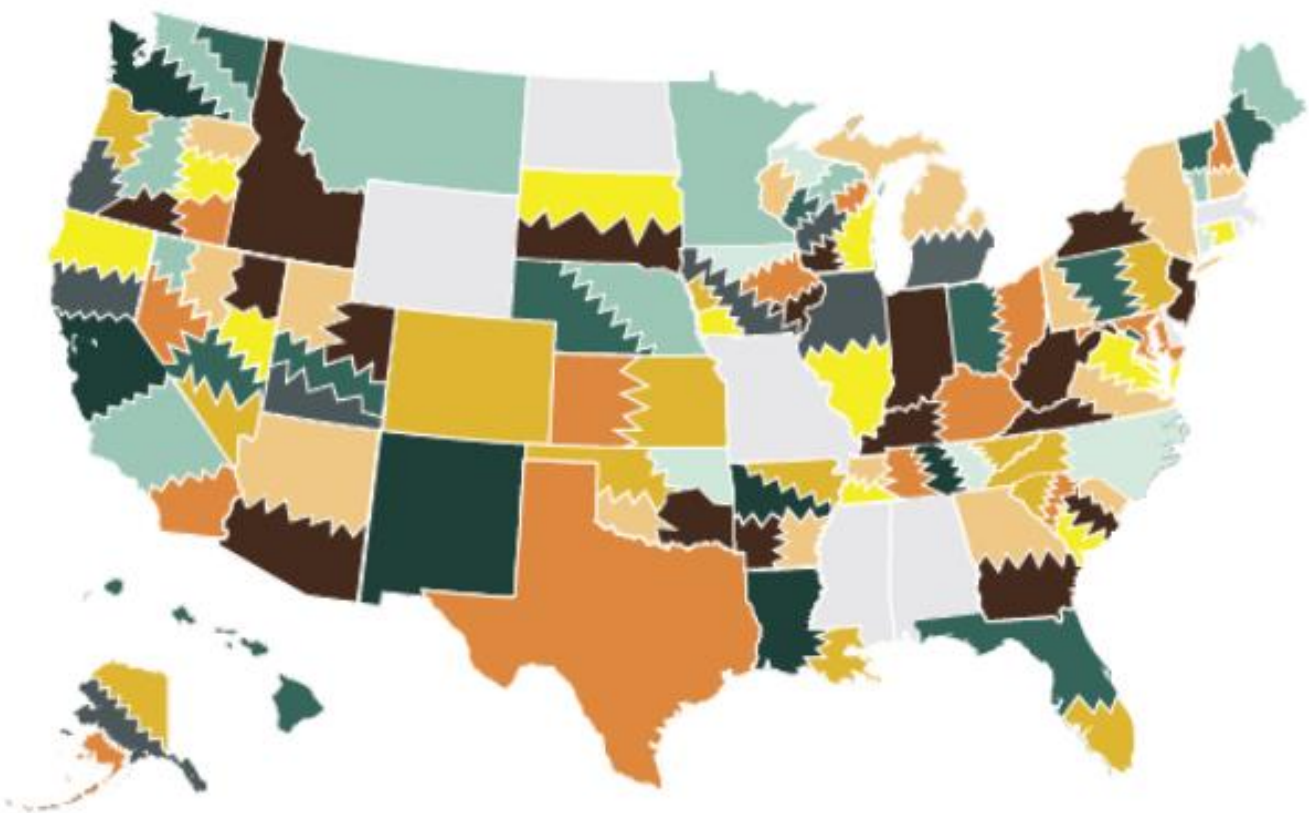
Should We Screen for ACE's?

How can we address ACE's and improve the health of our patients?



https://www.cdc.gov/violenceprevention/aces/resources.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fviolenceprevention%2Facestudy%2Fresources.html

Collecting BRFSS ACE Data by Year, 2009-2018



AR, CA, LA, NM, TN, WA
2009

DC, FL, HI, ME, NE, NV, OH, PA, UT, VT, WA, WI
2010

CA, ME, MN, MT, NE, NV, OR, VT, WA, WI
2011

CT, IA, NC, OK, TN, WI
2012

AK, CA, IL, IA, MI, OR, UT, WI
2013

AK, AZ, CO, FL, IA, KS, LA, NV, NC, OK, OR, PA, SC, TN, WI
2014

AK, CA, IA, KS, KY, LA, MD, NV, NH, OH, OR, SC, TN, TX, WI
2015

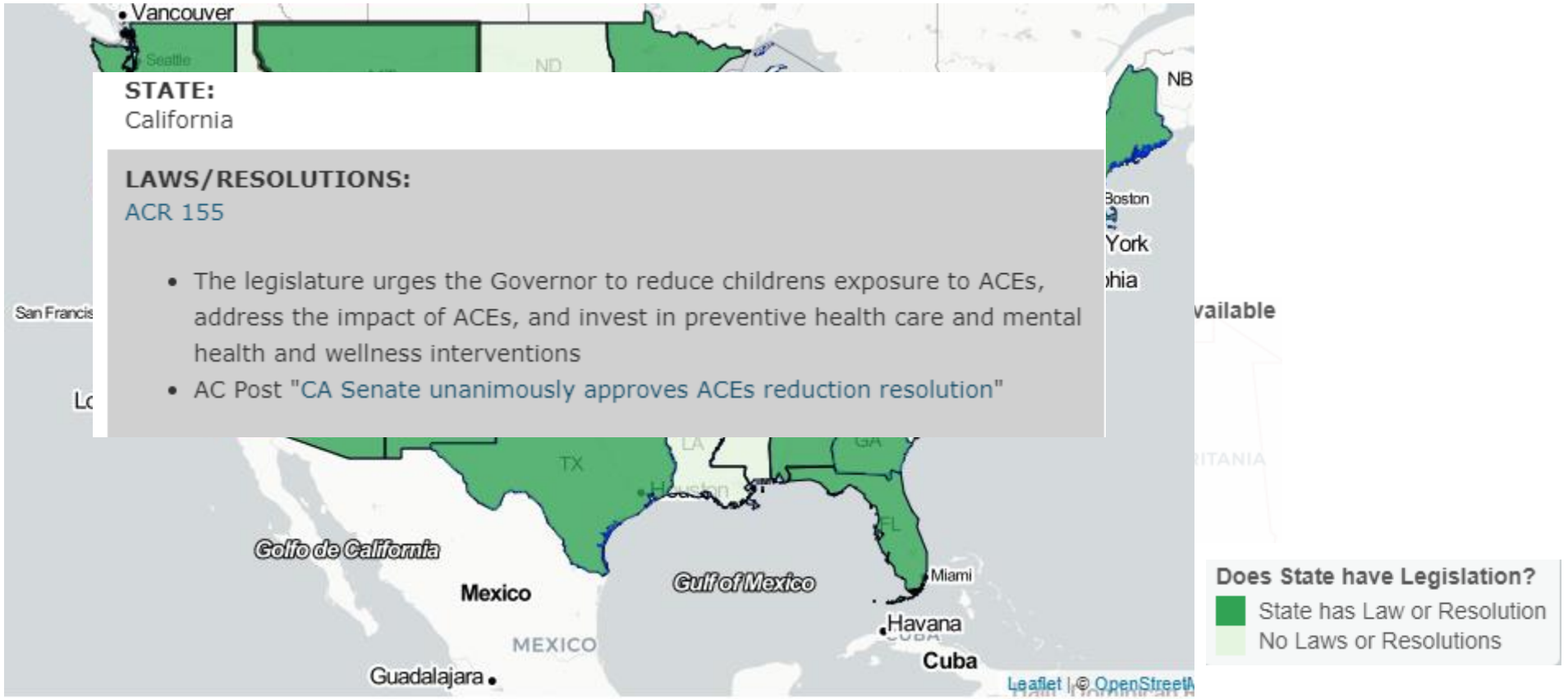
AZ, AR, GA, IA, LA, MI, NH, NV, NY, OK, OR, PA, SC, TN, UT, VA, WI
2016

CT, CA, IL, IA, NV, OR, SC, SD, TN, VA, WI
2017

AZ, AR, GA, ID, IN, IA, KY, NV, NJ, OK, OR, SC, SD, UT, VA, WV, WI
2018

Source: Centers for Disease Control and Prevention. *Behavioral Risk Factor Surveillance System Survey ACE Data, 2009-2018.* Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 2019.

ACEs and Trauma Informed Laws and Resolutions

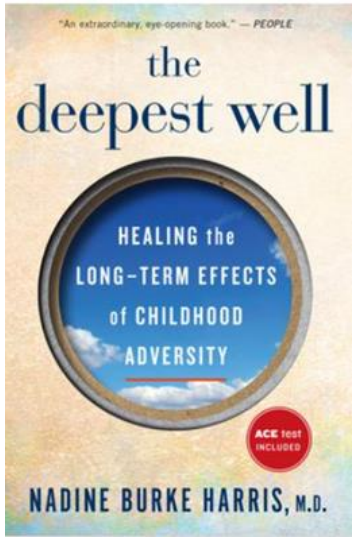


https://acesconnection.shinyapps.io/

"I am thrilled to share this report as a roadmap for prevention, early detection, and cross-sector, coordinated interventions to address ACEs and toxic stress in a systematic way. None of these strategies is sufficient alone and each extends the reach of others."

– Dr. Nadine Burke Harris,
California Surgeon General

Download *Roadmap for Resilience: The California Surgeon General's Report on Adverse Childhood Experiences, Toxic Stress, and Health* here: osg.ca.gov/sg-report



On Jan. 1, 2020, as an incentive to doctors who serve Californians in the state's Medicaid program, the state began offering supplemental payments of $29 to doctors for screening the estimated 12 million pediatric and adult patients for adverse childhood experiences (ACEs).

Pediatric ACEs and Related Life Events Screener (PEARLS)
PART 1

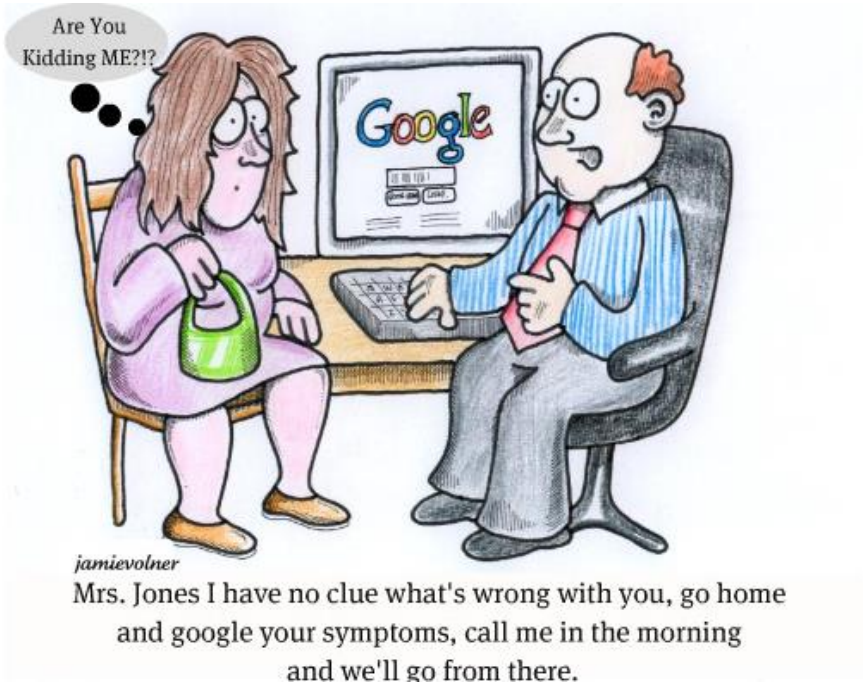
Has your child ever lived with a parent/caregiver who went to jail/prison?
Do you think your child ever felt unsupported, unloved and/or unprotected?
Has your child ever lived with a parent/caregiver who had mental health issues?
Has a parent/caregiver ever insulted, humiliated, or put down your child?
Has your child ever seen or heard a parent/caregiver being screamed at, sworn at, insulted or humiliated by another adult? Or has your child ever seen or heard a parent/caregiver being slapped, kicked, punched beaten up or hurt with a weapon?
Has your child ever lacked appropriate care by any caregiver?
Has your child ever seen or heard a parent/caregiver being screamed at, sworn at, insulted or humiliated by another adult? Or has your child ever seen or heard a parent/caregiver being slapped, kicked, punched beaten up or hurt with a weapon?
Has any adult in the household often or very often pushed, grabbed, slapped or thrown something at your child? Or has any adult in the household ever hit your child so hard that your child had marks or was injured? Or has any adult in the household ever threatened your child or acted in a way that made your child afraid that they might be hurt?
Have there ever been significant changes in the relationship status of the child's caregiver(s)?

Pediatric ACEs and Related Life Events Screener (PEARLS)
PART 2

Has your child ever seen, heard, or been a victim of violence in your neighborhood, community or school?
Has your child experienced discrimination?
Has your child ever had problems with housing?
Have you ever worried that your child did not have enough food to eat or that the food for your child would run out before you could buy more?
Has your child ever lived with a parent/caregiver who had a serious physical illness or disability?
Has your child ever been separated from their parent or caregiver due to foster care, or immigration?
Has your child ever lived with a parent or caregiver who died?

SCREENING FOR ACE's??

- Screening for adverse childhood experiences has been met with growing concern among health researchers and child welfare experts in the U.S. and abroad
  - Strain doctor-patient trust?
  - Providers unfamiliar with trauma may inadvertently harm patients by the very nature of the questions, and their sensitivity
  - Patient or care-giver may not answer truthfully
  - Resources not available (over-burdened mental health system)
  - May Trigger Health Care Providers who have high ACE scores



https://shadowsoffibromyalgia.wordpress.com/tag/funny-doctor-cartoon/

“Lesson learned integrating ACEs science into health clinics: Staff first, THEN patients”

- LifeLong Clinics’ in California decided to move forward on integrating ACEs science and trauma-informed practices into its clinics
  - LifeLong Clinics joined a two-year learning collaborative known as the Resilient Beginnings Collaborative (RBC)
  - Brainstorming around workflow was provided for staff at the LifeLong Howard Daniel Health Center in Oakland, CA, in February 2019
  - Four months into that training, in June 2019, LifeLong Clinics “had to put on the brakes”
    - **“A lot of the staff were uncomfortable because they themselves had similar instances that they personally were triggered by as they read the [ACE] questions themselves”**

https://acestoohigh.com/2020/02/16/lesson-learned-integrating-aces-science-into-health-clinics-staff-first-then-patients/

JAMA Pediatrics

View Article

JAMA Pediatr. 2021 Jan 25 : e205602.

doi: 10.1001/jamapediatrics.2020.5602 [Epub ahead of print]

PMCID: PMC7835926

PMID: 33492366

Population vs Individual Prediction of Poor Health From Results of Adverse Childhood Experiences Screening

Jessie R. Baldwin, PhD,[1,2] Avshalom Caspi, PhD,[2,3,4,5] Alan J. Meehan, PhD,[2] Antony Ambler, MSc,[6] Louise Arseneault, PhD,[2] Helen L. Fisher, PhD,[2,7] HonaLee Harrington, BA,[3] Timothy Matthews, PhD,[2] Candice L. Odgers, PhD,[5,8] Richie Poulton, PhD,[9] Sandhya Ramrakha, PhD,[9] Terrie E. Moffitt, PhD,[2,3,4,5] and Andrea Danese, MD, PhD[2,10,11]

▸ Author information ▸ Article notes ▸ Copyright and License information Disclaimer

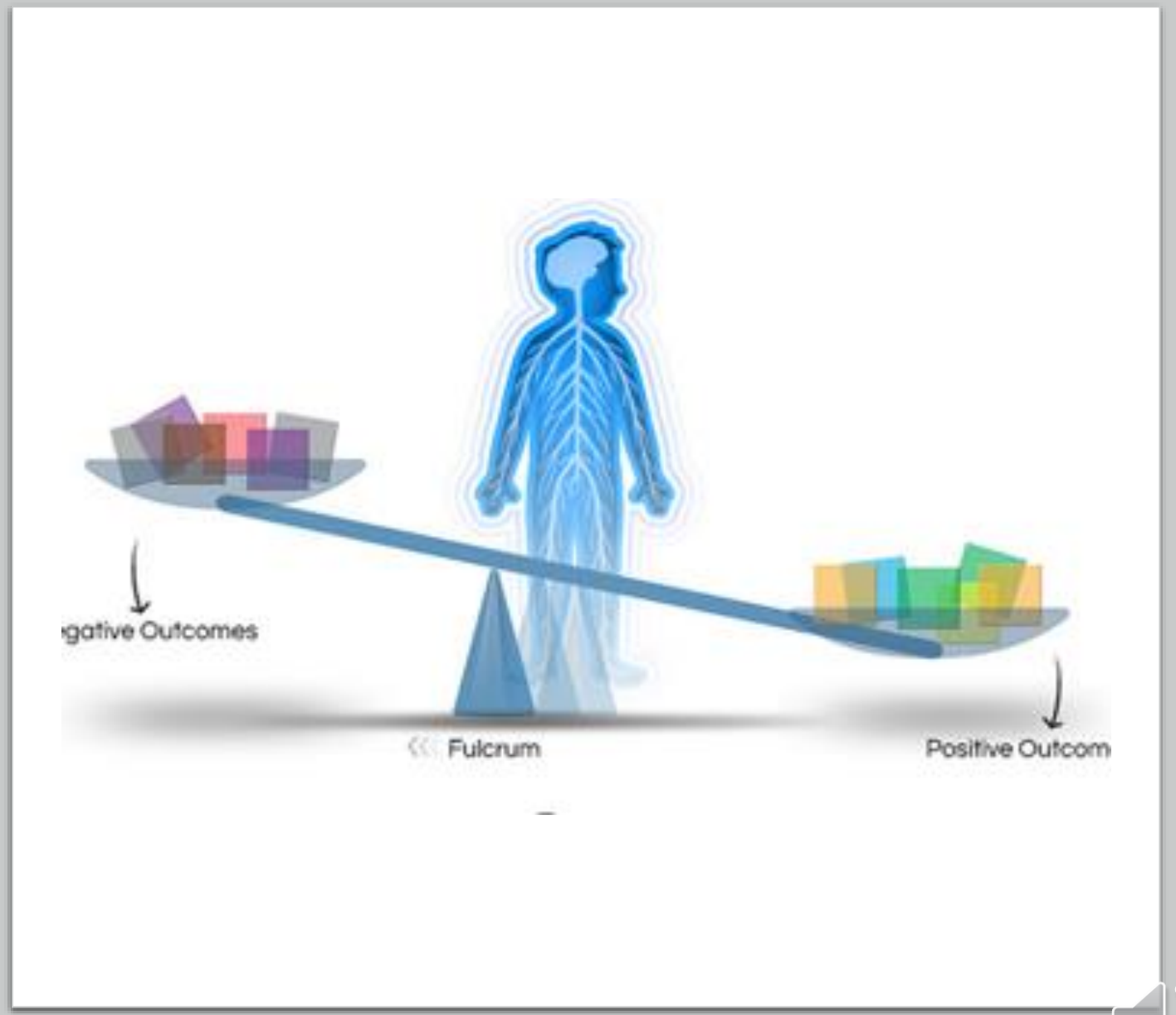
"Population vs Individual Prediction of Poor Health From Results of Adverse Childhood Experiences Screening" (2021)

- High ACE scores can identify **groups of individuals** at heightened mean risk of poor health later in life, independent of other clinical risk factors
- ACE scores alone do not accurately discriminate between individuals with or without health problems in later life
  - **Caution against the deterministic use of ACE scores in disease prediction and clinical decision-making**
  - More research is needed to establish whether ACE scores can be used alongside other clinically available information to accurately predict individual poor health outcomes

“The ACE score is neither a diagnostic tool nor is it predictive at the individual level.” -Robert Anda, MD

Screening for ACE's may oversimplify human experience

- Not weighted differently for different exposures
- Does not measure chronicity of abuse
- Does not consider individual biologic differences
- Does not consider all forms/causes of abuse and neglect
- Does not consider the difference in resiliency amongst patients



RESILENCE QUESTIONNAIRE

1. I believe that my mother loved me when I was little.

Definitely true Probably true Not sure Probably Not True Definitely Not True

2. I believe that my father loved me when I was little.

Definitely true Probably true Not sure Probably Not True Definitely Not True

3. When I was little, other people helped my mother and father take care of me and they seemed to love me.

Definitely true Probably true Not sure Probably Not True Definitely Not True

4. I've heard that when I was an infant someone in my family enjoyed playing with me, and I enjoyed it, too.

Definitely true Probably true Not sure Probably Not True Definitely Not True

5. When I was a child, there were relatives in my family who made me feel better if I was sad or worried.

Definitely true Probably true Not sure Probably Not True Definitely Not True

6. When I was a child, neighbors or my friends' parents seemed to like me.

Definitely true Probably true Not sure Probably Not True Definitely Not True

7. When I was a child, teachers, coaches, youth leaders or ministers were there to help me.

Definitely true Probably true Not sure Probably Not True Definitely Not True

8. Someone in my family cared about how I was doing in school.

Definitely true Probably true Not sure Probably Not True Definitely Not True

9. My family, neighbors and friends talked often about making our lives better.

Definitely true Probably true Not sure Probably Not True Definitely Not True

10. We had rules in our house and were expected to keep them.

Definitely true Probably true Not sure Probably Not True Definitely Not True

11. When I felt really bad, I could almost always find someone I trusted to talk to.

Definitely true Probably true Not sure Probably Not True Definitely Not True

12. As a youth, people noticed that I was capable and could get things done.

Definitely true Probably true Not sure Probably Not True Definitely Not True

13. I was independent and a go-getter.

Definitely true Probably true Not sure Probably Not True Definitely Not True

14. I believed that life is what you make it.

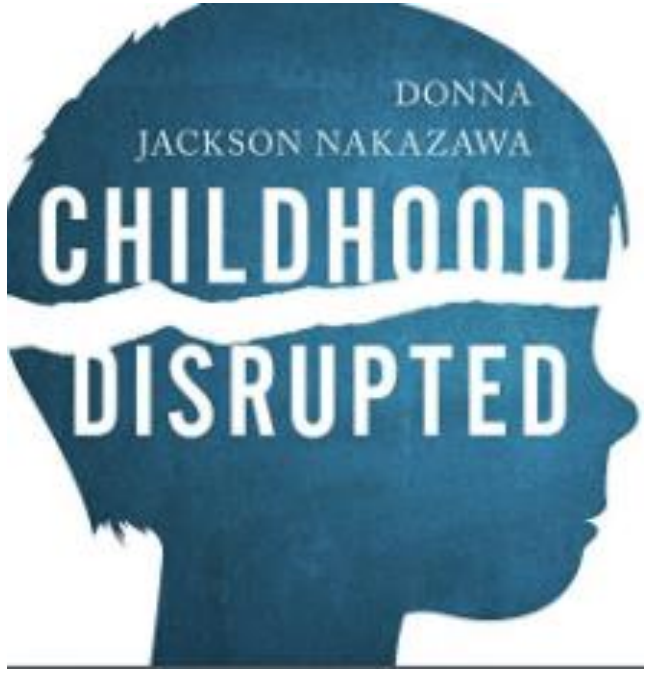
Definitely true Probably true Not sure Probably Not True Definitely Not True

http://www.traumainformedcareproject.org/resources/resilience_questionnaire.pdf

Having Discussion about ACE's with Adult Patients Can be Beneficial

- *"Indeed, there appears to be a direct health benefit for adult patients when they are helped to recognize and discuss the potential link between their childhood experiences and adult health problems.*

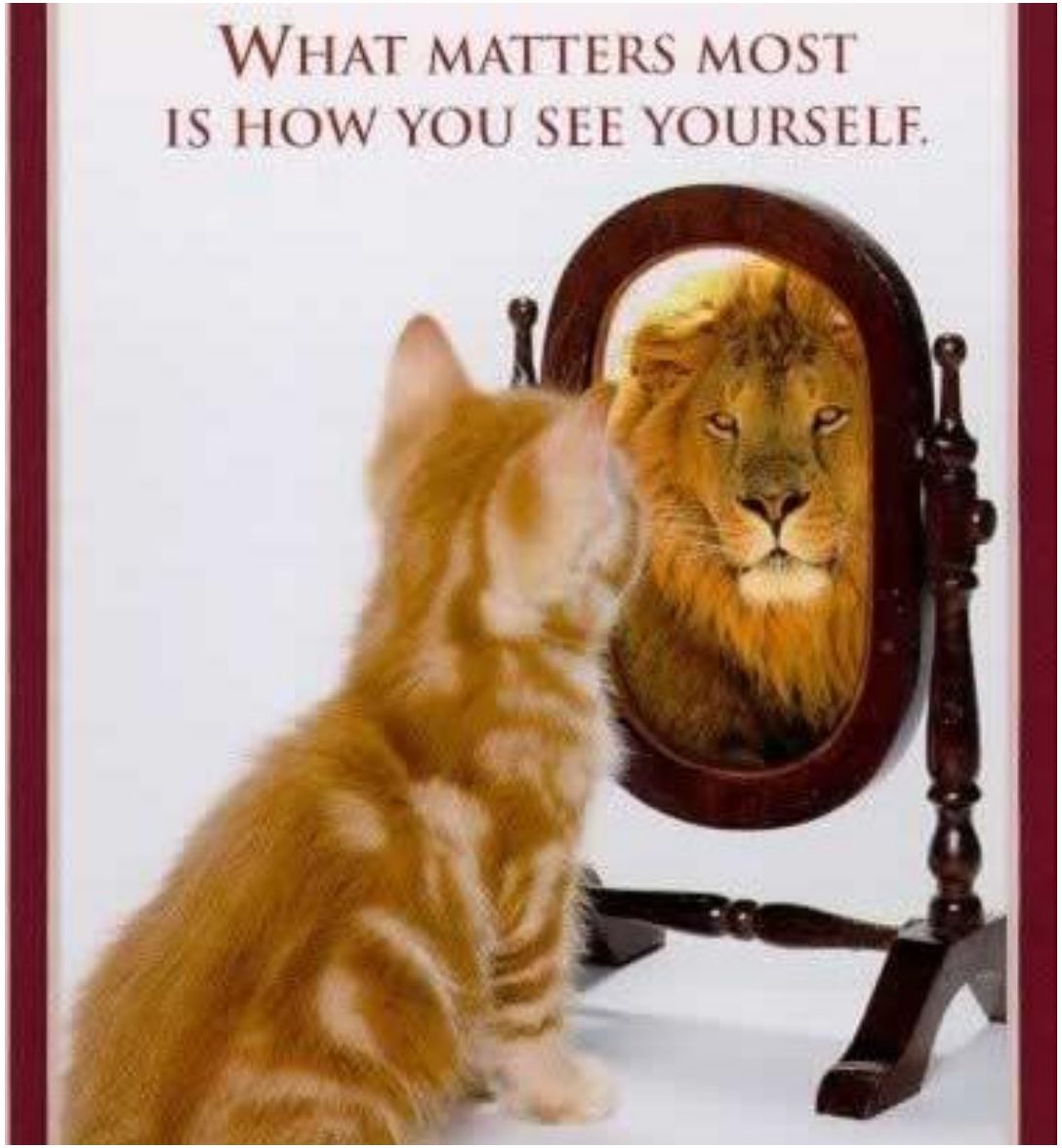
- Study of 125,000 patients, Felitti found that those who took the ACE Study questionnaire as part of their medical history **AND who discussed their ACE Scores with their doctors had over the course of the following yr:**
  - ***35 % reduction in office visits***
  - ***11 % reduction in ER visits***



Having Discussion about ACE's with Adult Patients Can be Beneficial

- After learning about ACE's patients can:
  - Foster forgiveness for themselves
  - Understand that they coped appropriately
  - Understand that they weren't born bad
  - Understand why they are triggered and learn to handle stress in a better way
  - Understand they can change

https://www.elevatecorporatetraining.com.au/2019/07/04/building-resilience-in-sales-embracing-the-no/


WHAT MATTERS MOST
IS HOW YOU SEE YOURSELF.

In addition to lowering ACE Score…We Need to Foster Resilience

Seven Core Ideas to Foster Resilience in Children

- **Competence**
- **Confidence**
- **Connection**
- **Character**
- **Contribution**
- **Coping**
- **Control**

http://www.fosteringresilience.com/7cs.php

We:
Provide education and opportunity for dialogue to a broad cross-section of residents and professionals to build common language and common understanding about how experience affects wellbeing.

So that: Community residents and professionals are surrounded by people who are knowledgeable about ACE concepts and have skills for recognizing what's helping or hurting, and for engaging people most affected by ACEs in hope-filled action.

So that:
We reach a tipping point in communities where it is usual for people to:

1. Have opportunity for a change moment: feel seen, understood, and accepted.
2. Develop compassion for self, make meaning from experiences, and build on core gifts.
3. Know the most powerful determinant of health: ACEs.
4. Make decisions and take actions to build adults' capacities to protect and respond to child needs.

So that:
Children reach their full potential by growing and developing in relationships that are healthy and protective.

&

ACE Scores are reduced in the next generations.

We:
Provide education and opportunity for dialogue to a broad cross-section of residents and professionals to build common language and common understanding about how experience affects wellbeing.

"When people are behaving in apparently self-destructive ways, it's time to stop asking what's wrong with them, and time to start asking what happened to them." – Dr. Robert Anda and Dr. Vincent Felitti

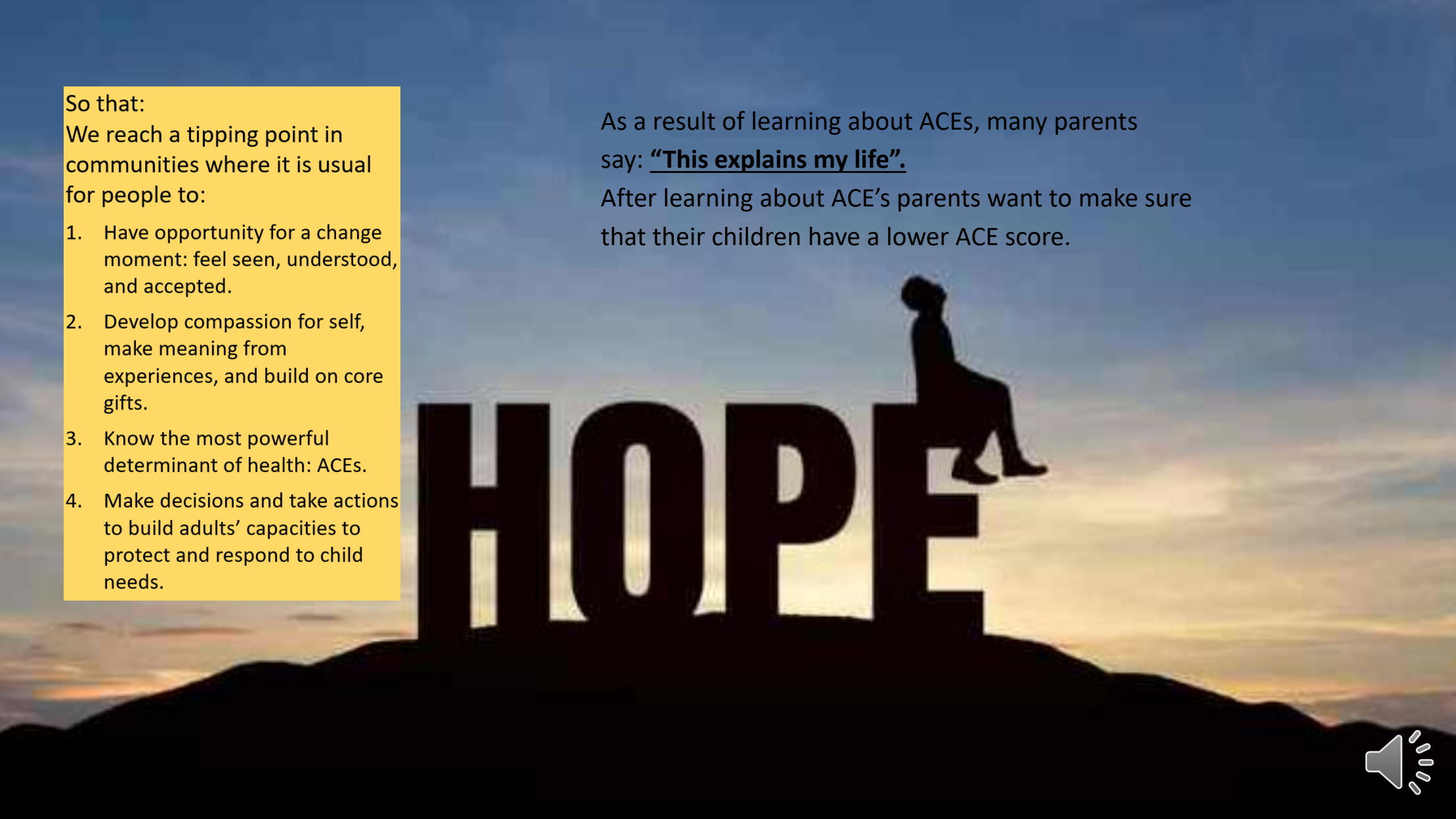
So that: Community residents and professionals are surrounded by people who are knowledgeable about ACE concepts and have skills for recognizing what's helping or hurting, and for engaging people most affected by ACEs in hope-filled action.

So that:
We reach a tipping point in communities where it is usual for people to:

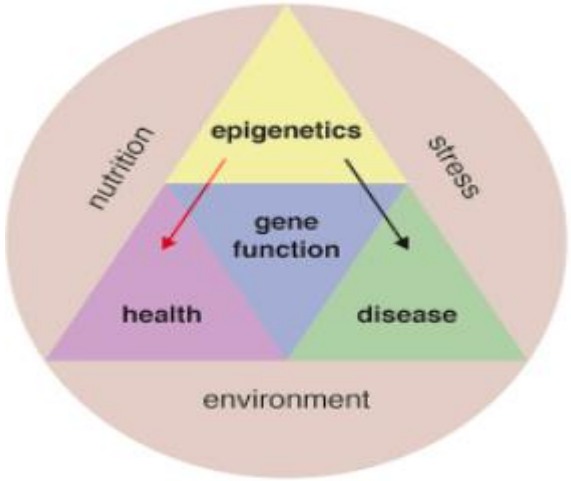
1. Have opportunity for a change moment: feel seen, understood, and accepted.
2. Develop compassion for self, make meaning from experiences, and build on core gifts.
3. Know the most powerful determinant of health: ACEs.
4. Make decisions and take actions to build adults' capacities to protect and respond to child needs.

As a result of learning about ACEs, many parents say: **"This explains my life".**

After learning about ACE's parents want to make sure that their children have a lower ACE score.



Promote Healthy Behaviors to Repair Epigenetic Damage



- Healthy Diet
- Exercise
- Stress Management
  - Mindfulness/Meditation
  - Yoga
  - Alternating Nostril Breathing
  - Emotional Freedom Techniques
- Sleep Hygiene
- 4. Make decisions and take actions to build adults' capacities to protect and respond to child needs.

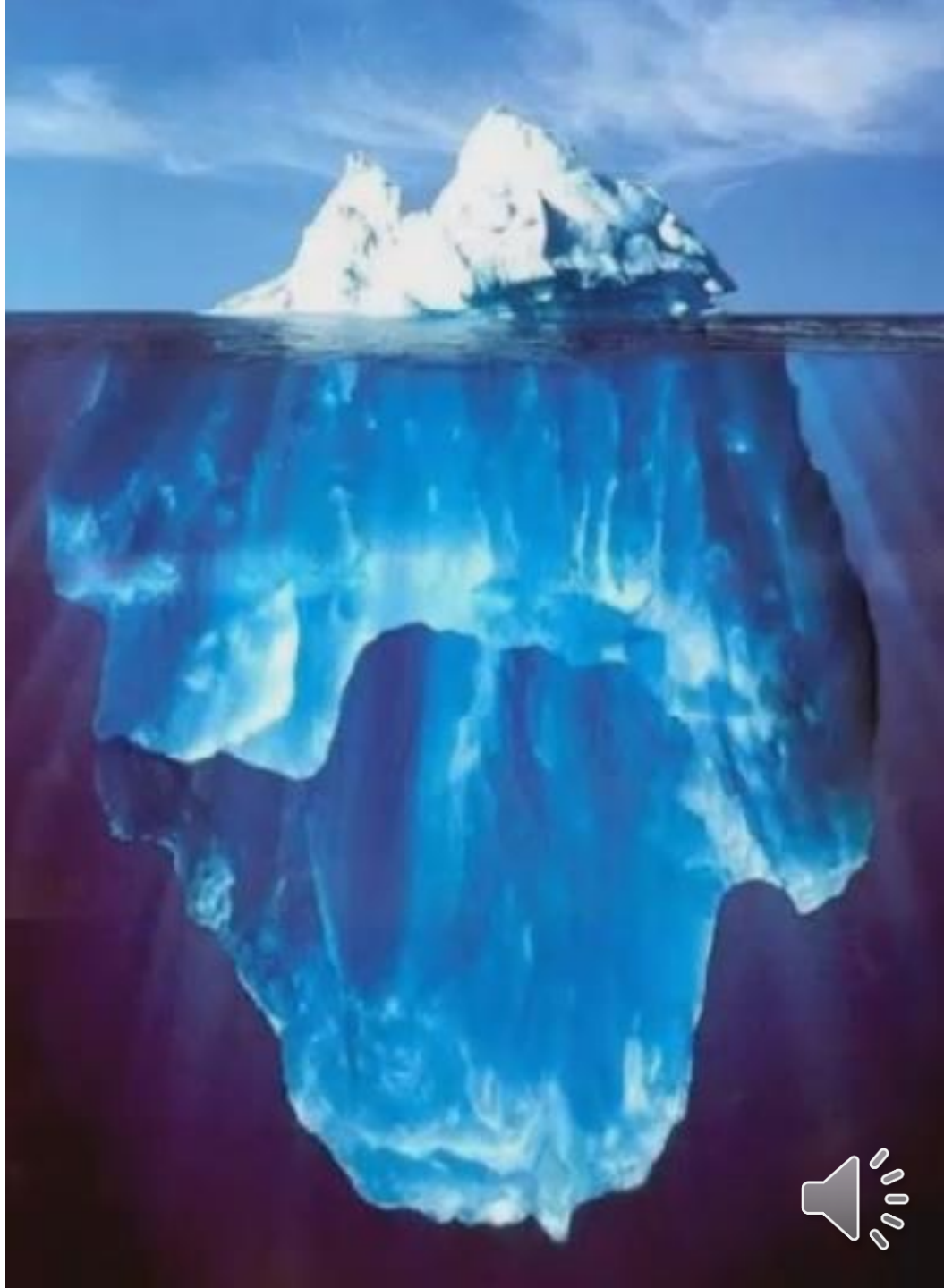
So that:
Children reach their full potential by growing and developing in relationships that are healthy and protective.

&

ACE Scores are reduced in the next generations.

Take Home Points

- ACE's are common and have a dose-response relationship to various chronic diseases (heart disease, cancer, liver disease, depression, etc)
- ACE's cause toxic stress which can impact neurological development
  - Change dialogue from "What's wrong with you?" to "What happened to you?"
- Toxic Stress can cause epigenetic changes which may be passed down to future generations
  - A supportive, nurturing environment can override epigenetics (cross-fostering study)
  - Epigenetic changes are not a "point of no return"-people can learn methods to self-regulate to control stress response and repair epigenetic damage
- Foster Resilience "What matters most is how you see yourself"!
- Be a Leader and a Resource for patients and community
  - If a child has one healthy stable relationship with an adult this can make all the difference in the future of that child



REFERENCES

- https://www.acesconnection.com/blog/got-your-ace-resilience-scores
- https://docmuscles.files.wordpress.com/2014/06/bear-rund.png
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6857662/
- https://www.opencirclehealing.com/blog/
- https://media1.kaboom.org/app/assets/resources/000/000/598/original/stress_responses.png
- Nakazawa, Donna. *Childhood Disrupted*. New York, Atria, 2015.

REFERENCES

- https://salud-america.org/state-latino-early-childhood-development-research-review/
- https://www.startingblocks.gov.au/other-resources/factsheets/brain-development-in-children/
- https://www.lcsun-news.com/story/news/local/new-mexico/2018/01/21/severe-childhood-trauma-alter-developing-brain-create-lifetime-risk/1039104001/
- https://en.wikipedia.org/wiki/Epigenetics#/media/File:Epigenetic_mechanisms.jpg

REFERENCES

- V. Cunliffe. “The epigenetic impacts of social stress: how does social adversity become biologically embedded?”*Epigenomics* 8, no. 12 (Dec 2016), 1653-1669.
- I. Weaver, N. Cervoni, F. Champagne, et. al. “Epigenetic programming by maternal behavior” *Nature Neuroscience* 7, (2004), 847-854.
- B. Dias and K. Ressler. “Parental olfactory experience influences behavior and neural structure in subsequent generations” *Nature Neuroscience* 17, no. 1 (2014), 89-96.
- R. Yehuda, N. Daskalakis, L. Bierer, et. al. “Holocaust Exposure Induced Intergenerational Effects on FKBP5 Methylation” *Biological Psychiatry* 80, no. 5 (Sept 2016), 372-380.
- B. Lester, E. Conradt, L. LaGasse, et. al. “Epigenetic Programming by Maternal Behavior in the Human Infant” *Pediatrics* 142, no. 4 (Oct 2018).

REFERENCES

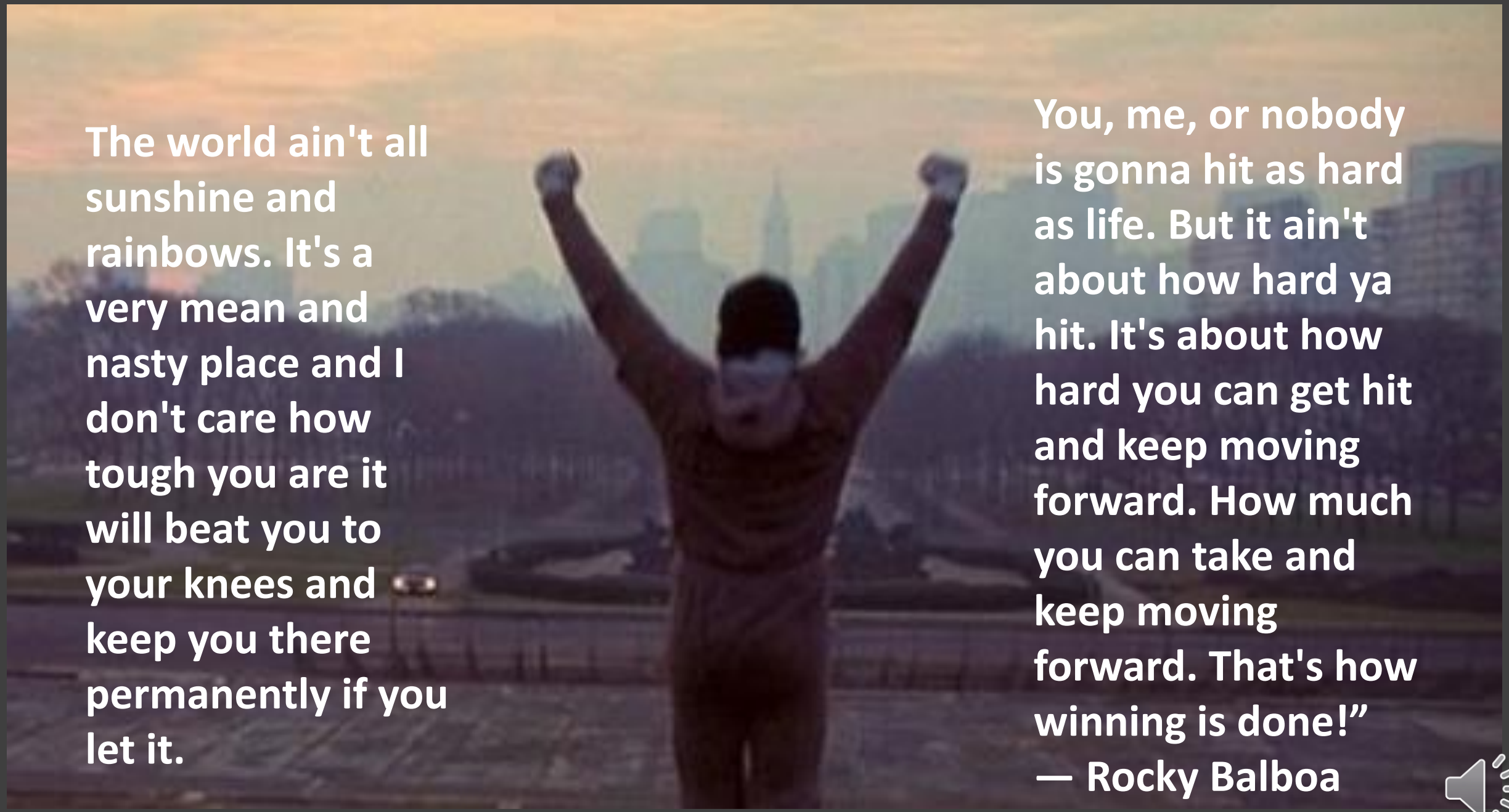
- https://www.cdc.gov/violenceprevention/aces/resources.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fviolenceprevention%2Facestudy%2Fresources.html
- https://acesconnection.shinyapps.io/
- https://shadowsoffibromyalgia.wordpress.com/tag/funny-doctor-cartoon/
- https://acestoohigh.com/2020/02/16/lesson-learned-integrating-aces-science-into-health-clinics-staff-first-then-patients/
- J. Baldwin, A. Caspi, A. Meehan, et. al. “Population vs. Individual Prediction of Poor Health From Results of Adverse Childhood Experiences Screening” *JAMA Pediatrics* (Jan 2021).

REFERENCES

- http://www.traumainformedcareproject.org/resources/resilience_questionnaire.pdf
- https://www.elevatecorporatetraining.com.au/2019/07/04/building-resilience-in-sales-embracing-the-no/
- http://www.fosteringresilience.com/7cs.php

Feel free to email me with any questions:
nsmith14@hfhs.org
nlajones@umich.edu

For more information about ACE's and how you can be involved visit:
www.miace.org
www.acesconnection.com


The world ain't all sunshine and rainbows. It's a very mean and nasty place and I don't care how tough you are it will beat you to your knees and keep you there permanently if you let it.
You, me, or nobody is gonna hit as hard as life. But it ain't about how hard ya hit. It's about how hard you can get hit and keep moving forward. How much you can take and keep moving forward. That's how winning is done!”
— Rocky Balboa