

Resilience: Science, Theory and Practice



Lawrence Rosen, MD
April 22, 2021



Hackensack Meridian
School of Medicine

KEEP GETTING BETTER

Learning Objectives

- Define Toxic Stress and ACEs
- List three health consequences of ACEs
- Identify one micro, one mezzo and one macro strategy to build resilience



Hackensack Meridian
School of Medicine

KEEP GETTING BETTER

Mindfulness Moment


Stop
Take a breath
Observe what's happening
Proceed

Source: <https://www.mindful.org/the-s-t-o-p-practice-creating-space-around-automatic-reactions>



Hackensack Meridian
School of Medicine
KEEP GETTING BETTER

Mental Health in Health Workers - 2020 MHA Survey

Mental Health America

About UsAnnual ConferenceCareer CenterCenter for Peer SupportAdvocacy NetworkShop

LEARN MORELIVE MENTALLY HEALTHYFIND HELPPUBLIC POLICYGET INVOLVEDDONATE

The Mental Health Of Healthcare Workers In COVID-19



If you are a healthcare worker and are concerned about your mental health, go to mhanational.org/frontline to be screened and find resources and support. If you are experiencing a mental health crisis, call 1-800-273-TALK (8255) to reach a 24-hour crisis center, or text MHA to 741741 to reach a trained Crisis Counselor 24/7.

Mental Health in Health Workers - 2020 MHA Survey

Work-Related Stressors

When asked to select their top three work-related stressors, 61 percent reported uncertainty about when things will settle down or return to normal, and 54 percent reported experiencing burnout. Nearly half (49 percent) also reported that their heavy or increased workload was a major stressor in the previous three months.

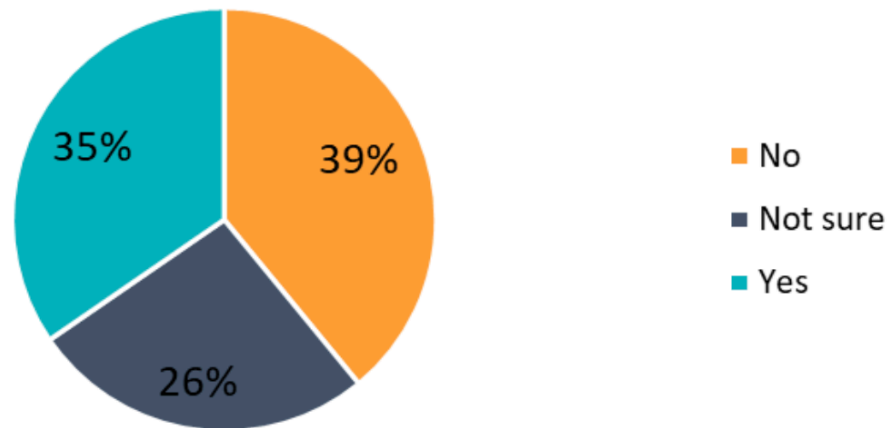
What are your top three work-related stressors over the last three months? Check all that apply.	Count	Percentage
Uncertainty about when things will settle down/return to normal	678	60.59%
Burnout	599	53.53%
Heavy/increased workload	544	48.61%
Concern of getting sick myself	484	43.25%

Mental Health in Health Workers - 2020 MHA Survey

Emotional Support For Healthcare Workers

When asked about emotional support, the largest group (39 percent) of healthcare workers indicated that they did not feel they had adequate emotional support. Another 26 percent were unsure if they were receiving adequate emotional support.

Do you feel like you have adequate emotional support?



What is stress?

BRITISH MEDICAL JOURNAL

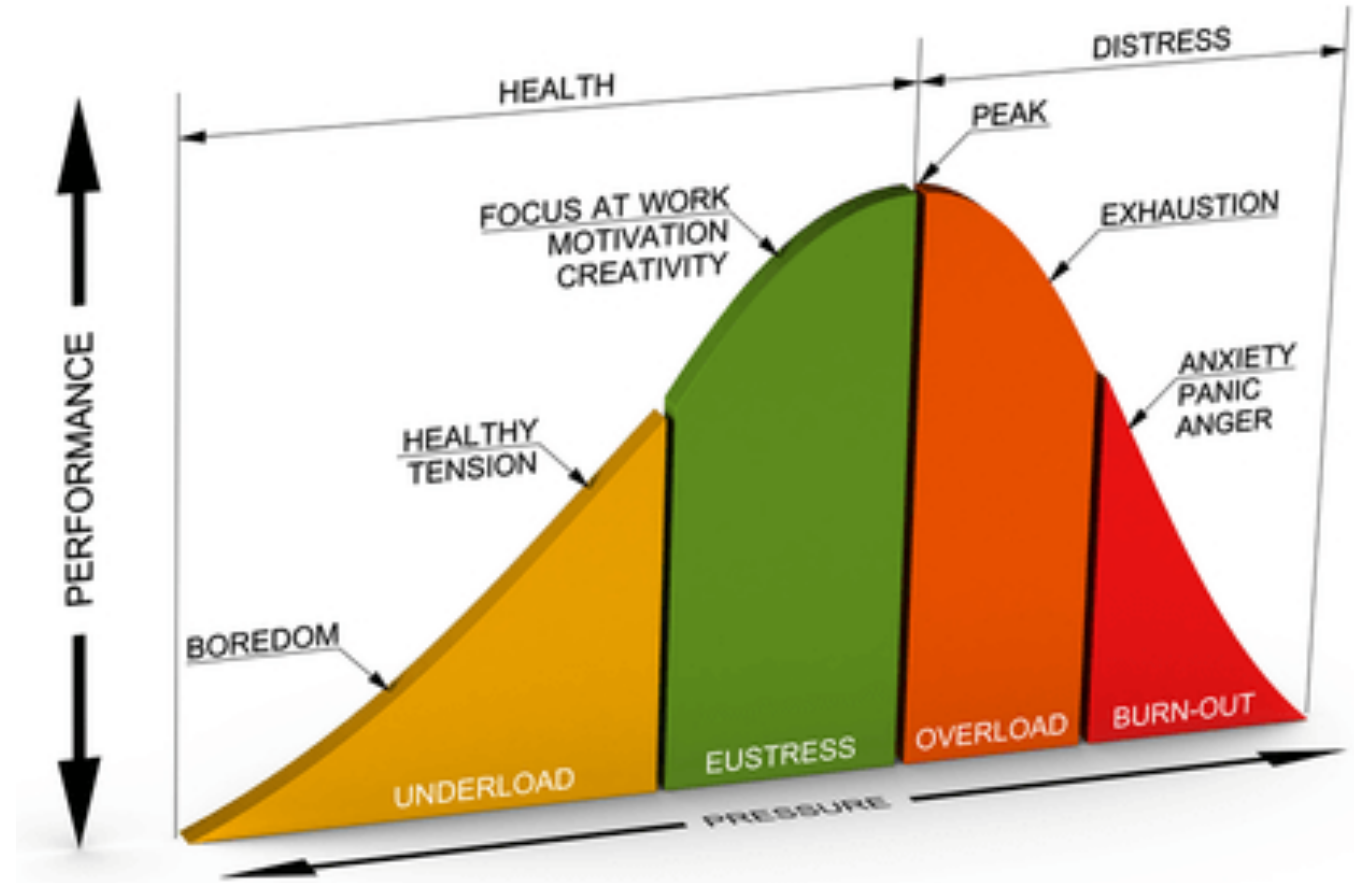
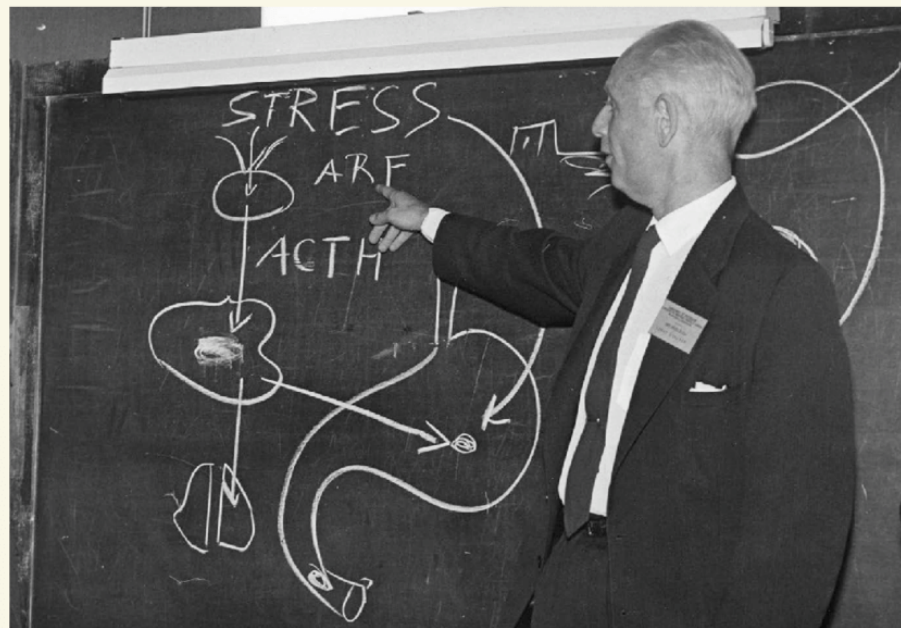
LONDON SATURDAY JUNE 17 1950

STRESS AND THE GENERAL ADAPTATION SYNDROME*

BY

HANS SELYE, M.D., Ph.D., D.Sc., F.R.S.C.

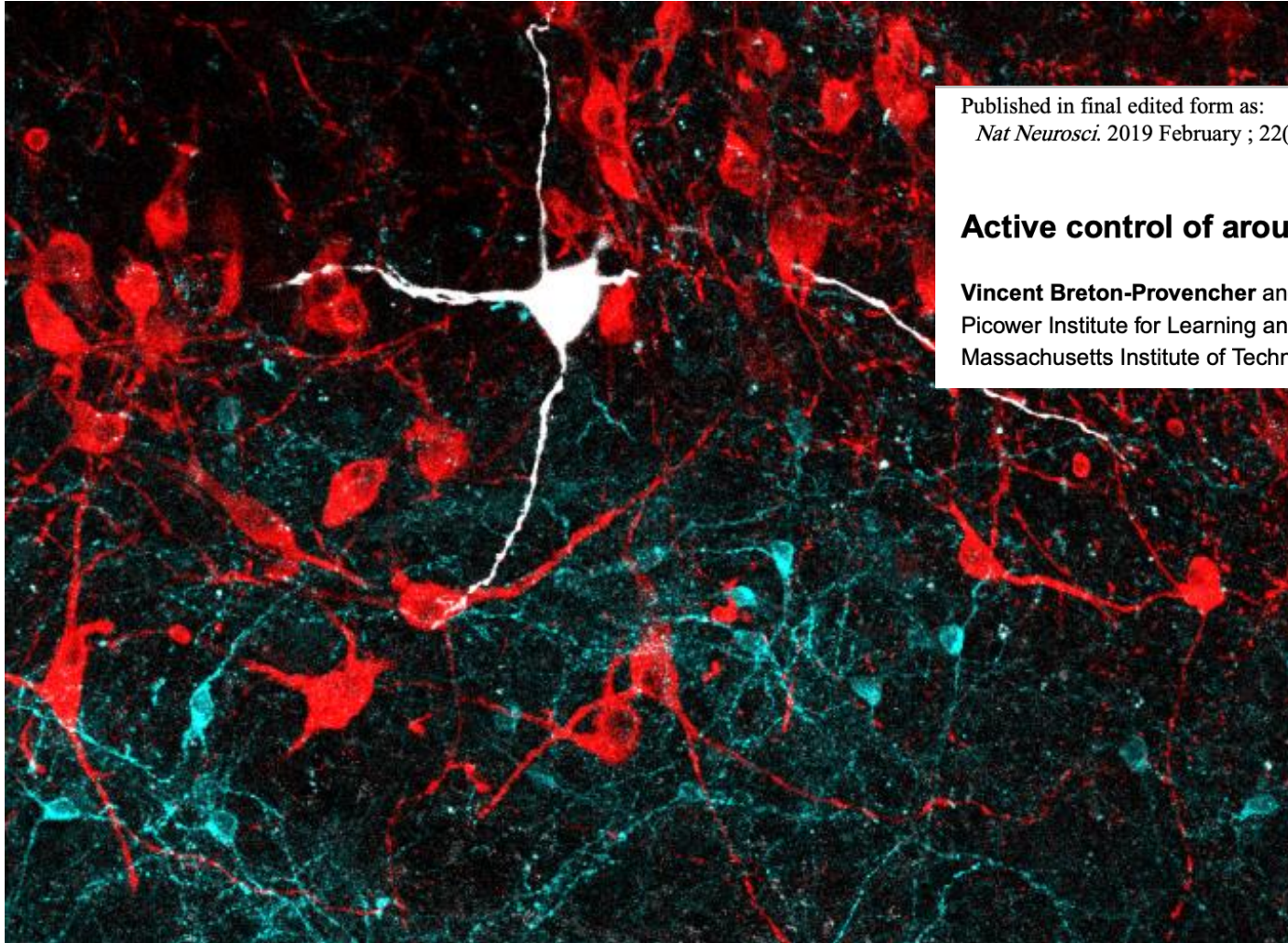
Professor and Director of the Institute of Experimental Medicine and Surgery, Université de Montréal, Montreal, Canada



Hackensack Meridian
School of Medicine

KEEP GETTING BETTER

What happens in the brain?



Published in final edited form as:
Nat Neurosci. 2019 February ; 22(2): 218–228. doi:10.1038/s41593-018-0305-z.

Active control of arousal by a locus coeruleus GABAergic circuit

Vincent Breton-Provencher and Mriganka Sur*

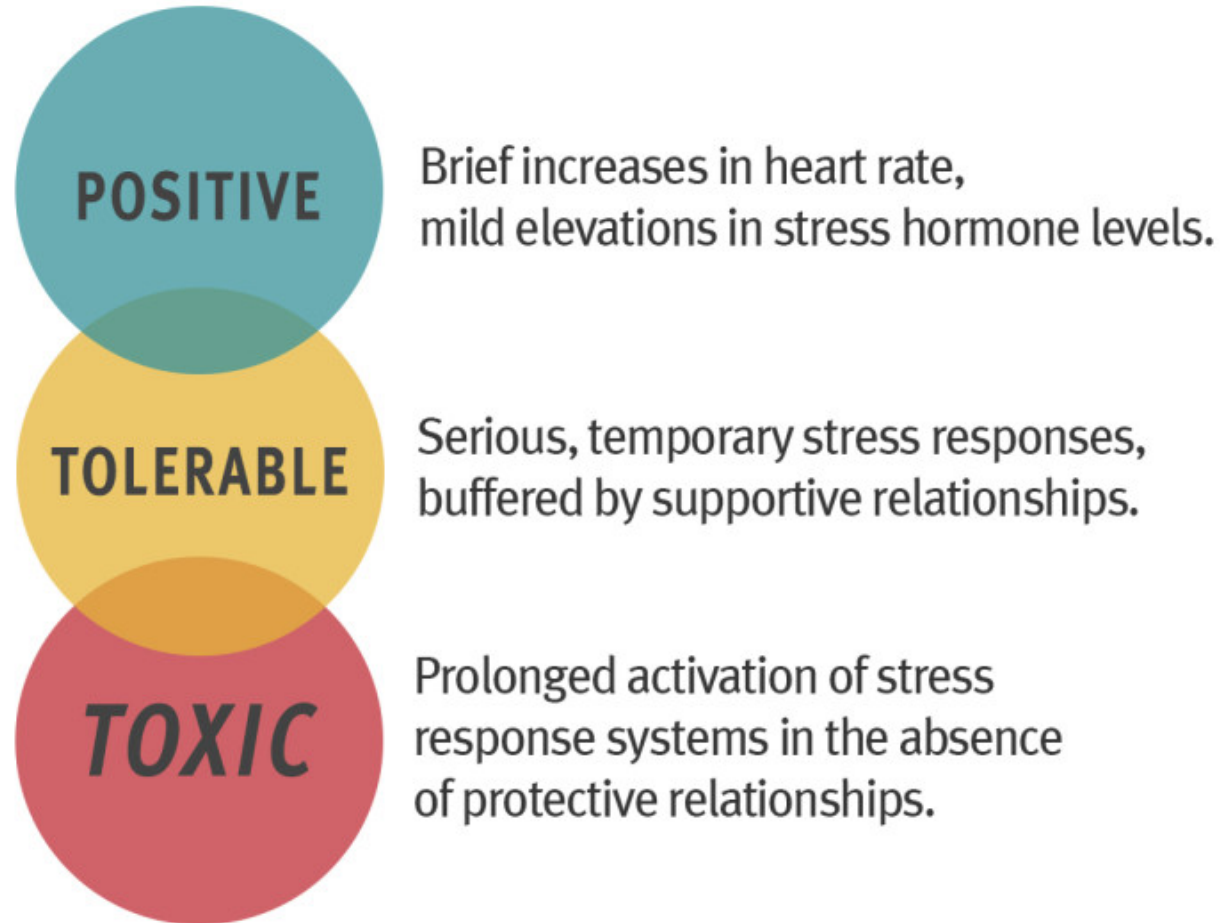
Picower Institute for Learning and Memory, Department of Brain and Cognitive Sciences,
Massachusetts Institute of Technology, Cambridge, Massachusetts, USA

source: <https://picower.mit.edu/news/study-finds-circuits-may-help-you-keep-your-cool>



Hackensack Meridian
School of Medicine
KEEP GETTING BETTER

Acute vs. Chronic (Toxic) Stress



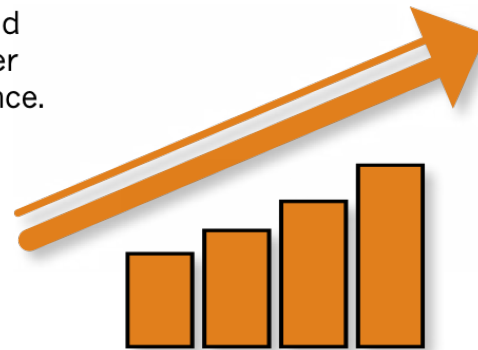
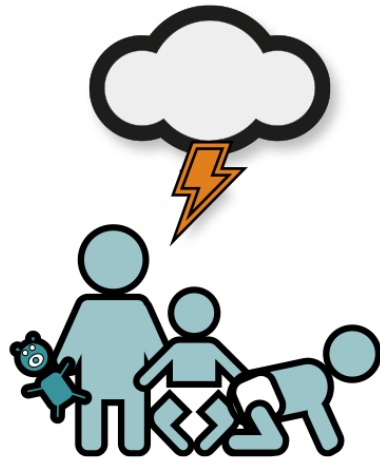
How is toxic stress related to trauma?

“Trauma refers to extreme stress that **overwhelms** an individual’s ability to cope. Individual trauma can result from an event, a series of events, or circumstances that an individual experiences as **physically or emotionally** harmful or threatening. It is not the objective facts of an event that determines whether that event is traumatic; it is the way in which each individual **internalizes the emotional experience** of the event. Traumatic events or circumstances often have **lasting adverse effects** on an individual’s basic sense of self, trust in others, physical, social, emotional, or spiritual well-being.”

WHAT ARE ACES?

AND HOW DO THEY RELATE TO TOXIC STRESS?

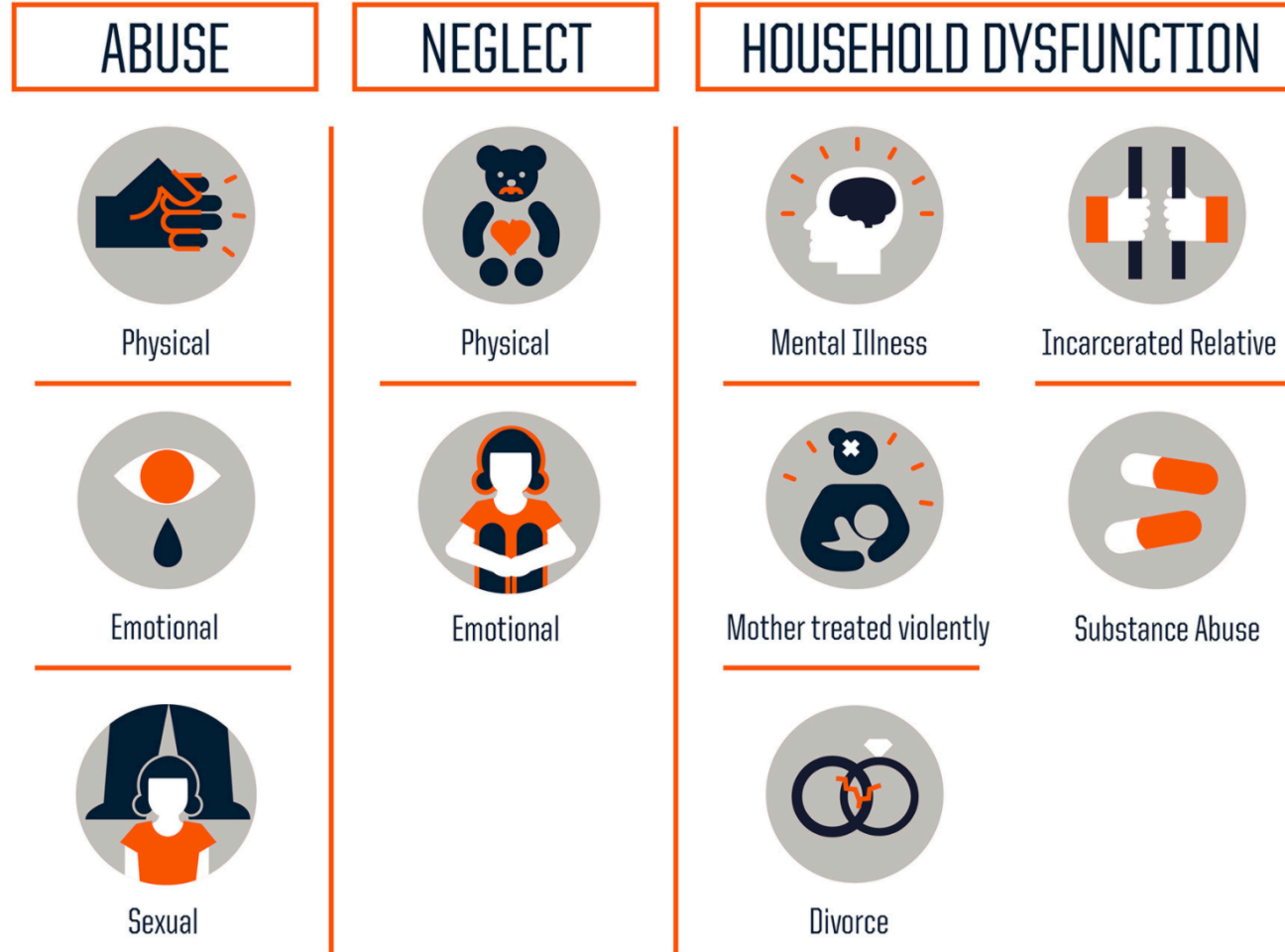
“ACEs” stands for “Adverse Childhood Experiences.” These experiences can include things like physical and emotional abuse, neglect, caregiver mental illness, and household violence.



The more ACEs a child experiences, the more likely he or she is to suffer from things like heart disease and diabetes, poor academic achievement, and substance abuse later in life.



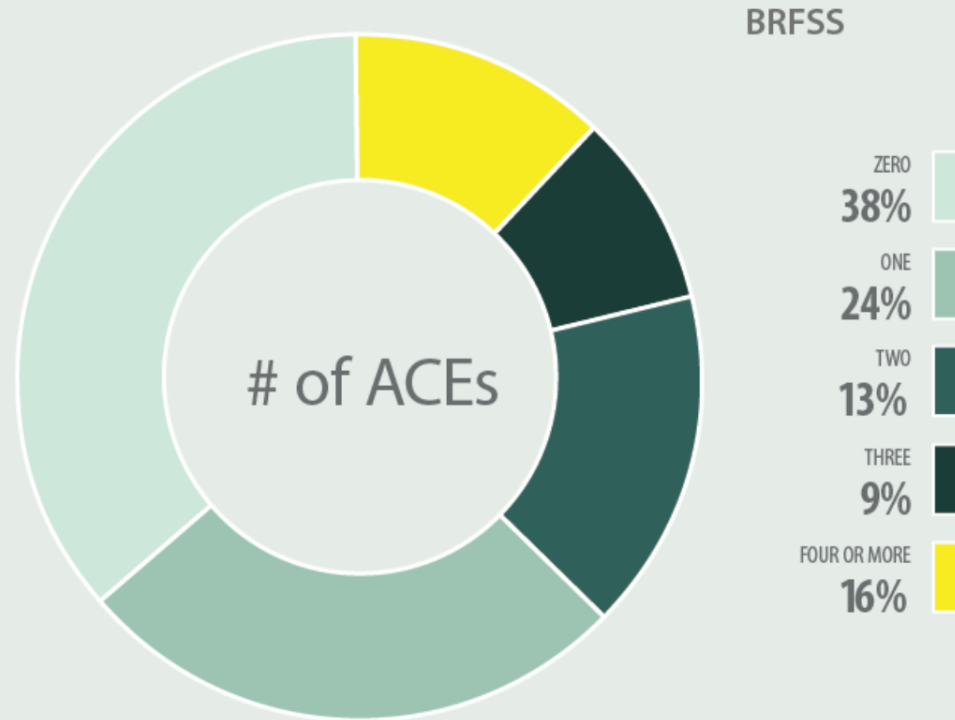
Childhood Trauma: The Original 10 ACEs



Source: Centers for Disease Control and Prevention
Credit: Robert Wood Johnson Foundation

How Common are ACEs?

ACE Score Prevalence for Participants
Completing the ACE Module from the 2011-2014 BRFSS



Note: Reports and articles that use data from other years and/or other states may contain different estimates.

Source: Merrick, M.T., Ford, D.C., Ports, K. A., Guinn, A. S. (2018). Prevalence of Adverse Childhood Experiences From the 2011-2014 Behavioral Risk Factor Surveillance System in 23 States. JAMA Pediatrics, 172(11), 1038-1044.



Hackensack Meridian
School of Medicine
KEEP GETTING BETTER

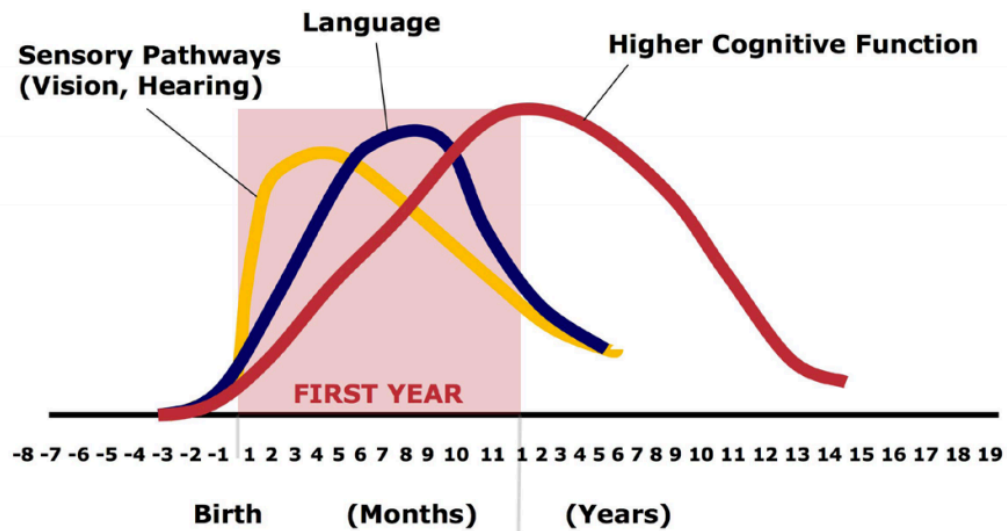
Impact on Brain Development



Center on the Developing Child
HARVARD UNIVERSITY

Human Brain Development

Neural Connections for Different Functions Develop Sequentially

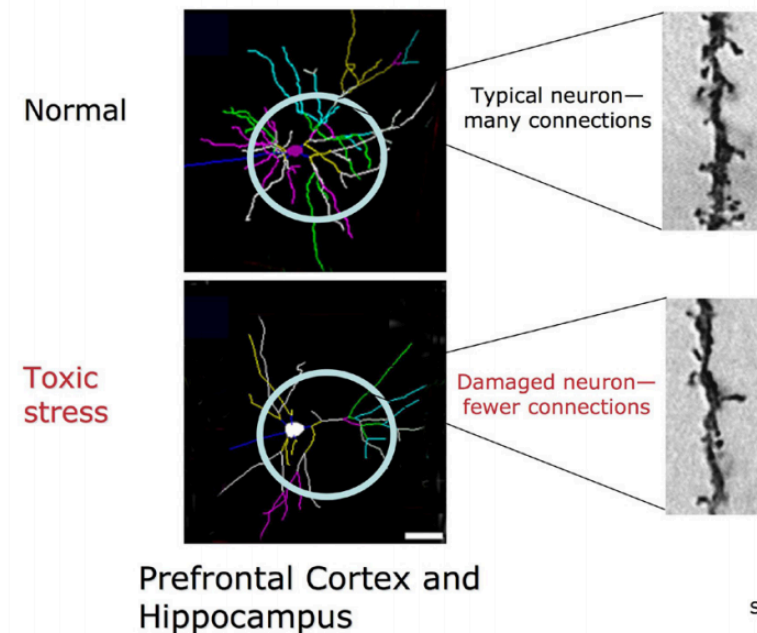


Source: C.A. Nelson (2000)



Center on the Developing Child
HARVARD UNIVERSITY

Persistent Stress Changes Brain Architecture



Sources: Radley et al. (2004)
Bock et al. (2005)

<https://developingchild.harvard.edu/resources/inbrief-science-of-eed/>



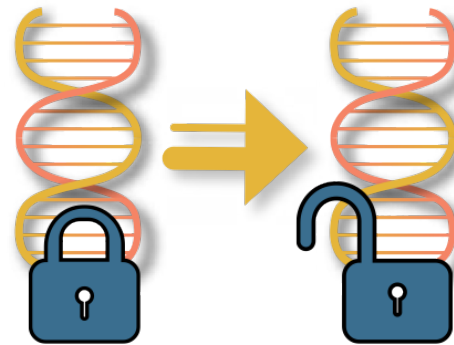
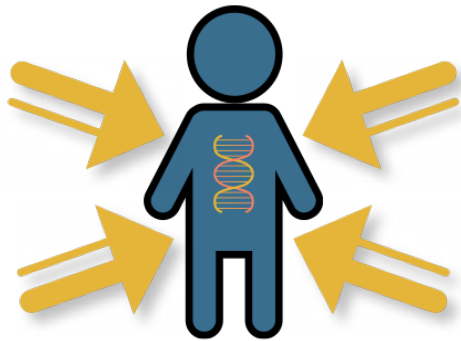
Hackensack Meridian
School of Medicine
KEEP GETTING BETTER

WHAT IS EPIGENETICS?



AND HOW DOES IT RELATE TO CHILD DEVELOPMENT?

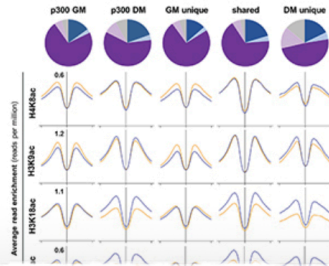
“Epigenetics” is an emerging area of scientific research that shows how environmental influences—children’s experiences—actually affect the expression of their genes.



This means the old idea that genes are “set in stone” has been disproven. Nature vs. Nurture is no longer a debate. It’s nearly always both!

During development, the DNA that makes up our genes accumulates chemical marks that determine how much or little of the genes is expressed. This collection of chemical marks is known as the “epigenome.” The different experiences children have rearrange those chemical marks. This explains why genetically identical twins can exhibit different behaviors, skills, health, and achievement.





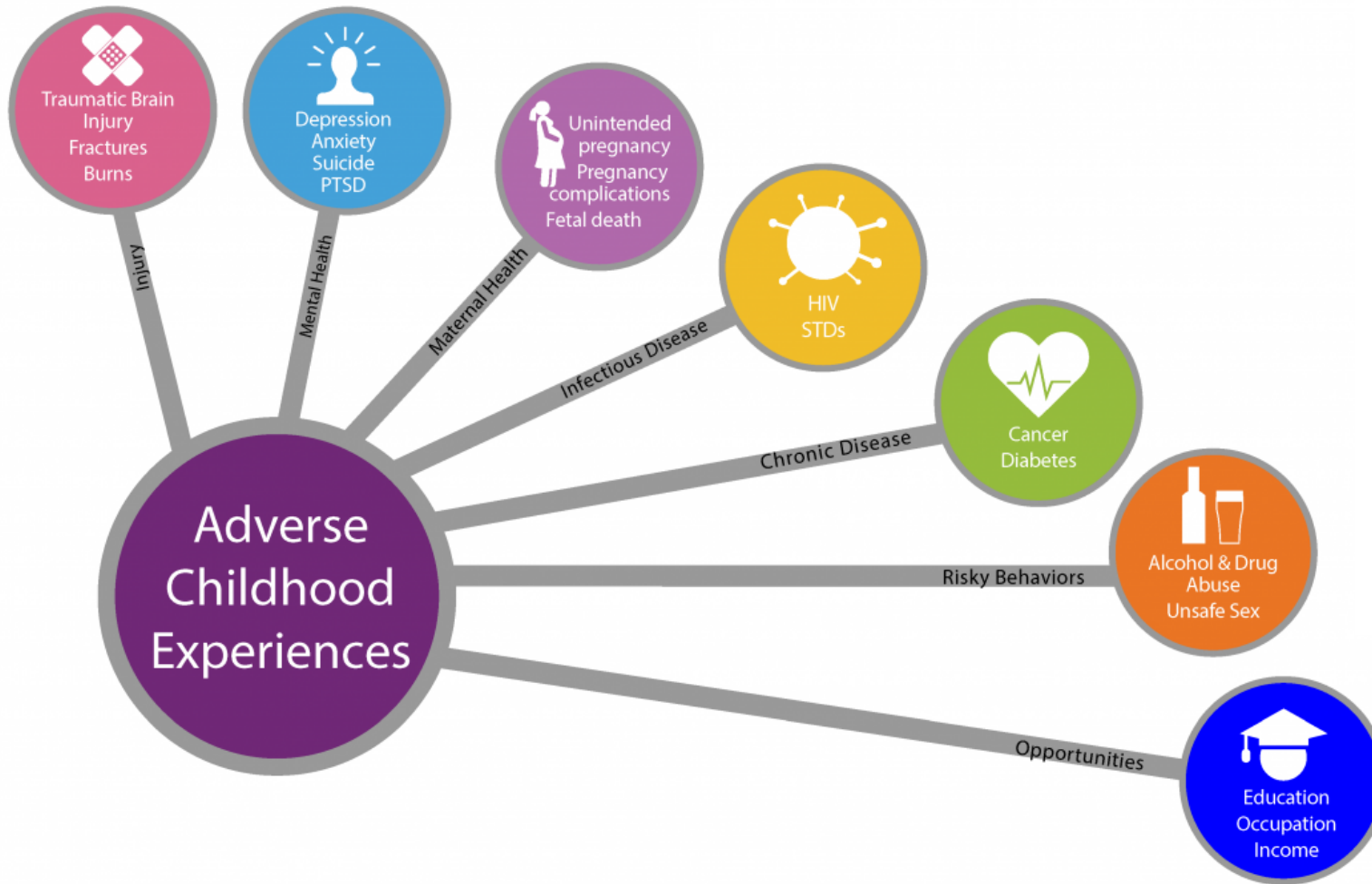
Cumulative lifetime maternal stress and epigenome-wide placental DNA methylation in the PRISM cohort

Kelly J. Brunst, Nicole Tignor, Allan Just, Zhonghua Liu, Xihong Lin, Michele R. Hacker, Michelle Bosquet Enlow, Robert O. Wright, Pei Wang, Andrea A. Baccarelli & Rosalind J. Wright

To cite this article: Kelly J. Brunst, Nicole Tignor, Allan Just, Zhonghua Liu, Xihong Lin, Michele R. Hacker, Michelle Bosquet Enlow, Robert O. Wright, Pei Wang, Andrea A. Baccarelli & Rosalind J. Wright (2018) Cumulative lifetime maternal stress and epigenome-wide placental DNA methylation in the PRISM cohort, Epigenetics, 13:6, 665-681, DOI: [10.1080/15592294.2018.1497387](https://doi.org/10.1080/15592294.2018.1497387)

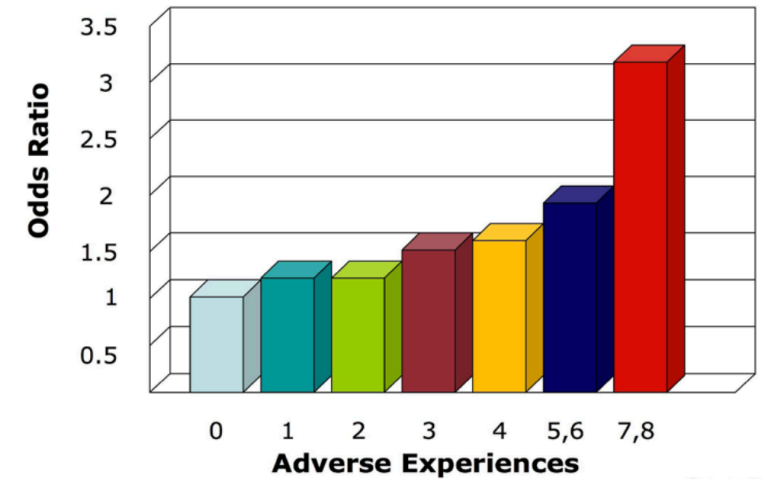


ACEs have consequences



Center on the Developing Child
HARVARD UNIVERSITY

Risk Factors for Adult Heart Disease are Embedded in Adverse Childhood Experiences

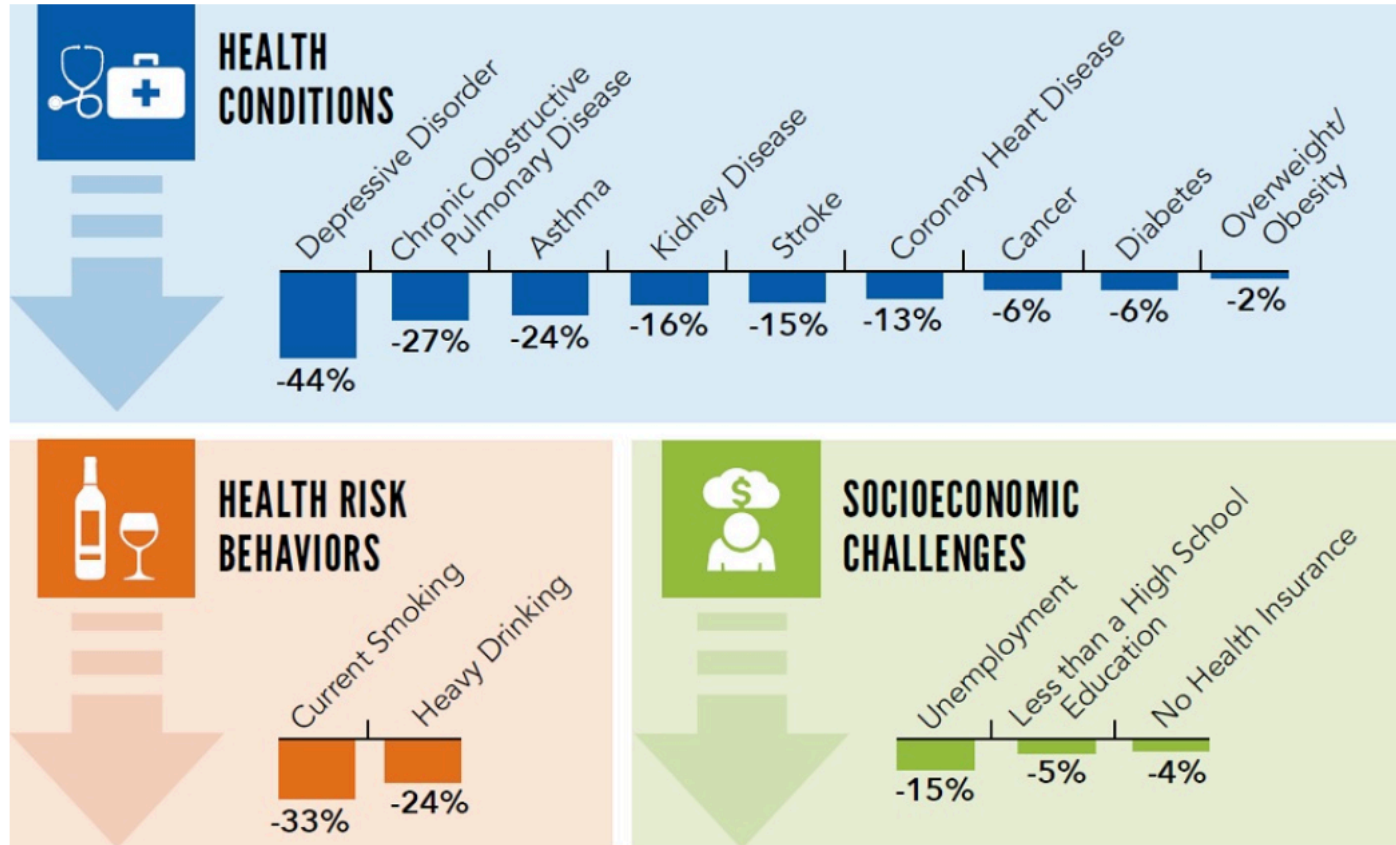


Source: Dong et al, 2004



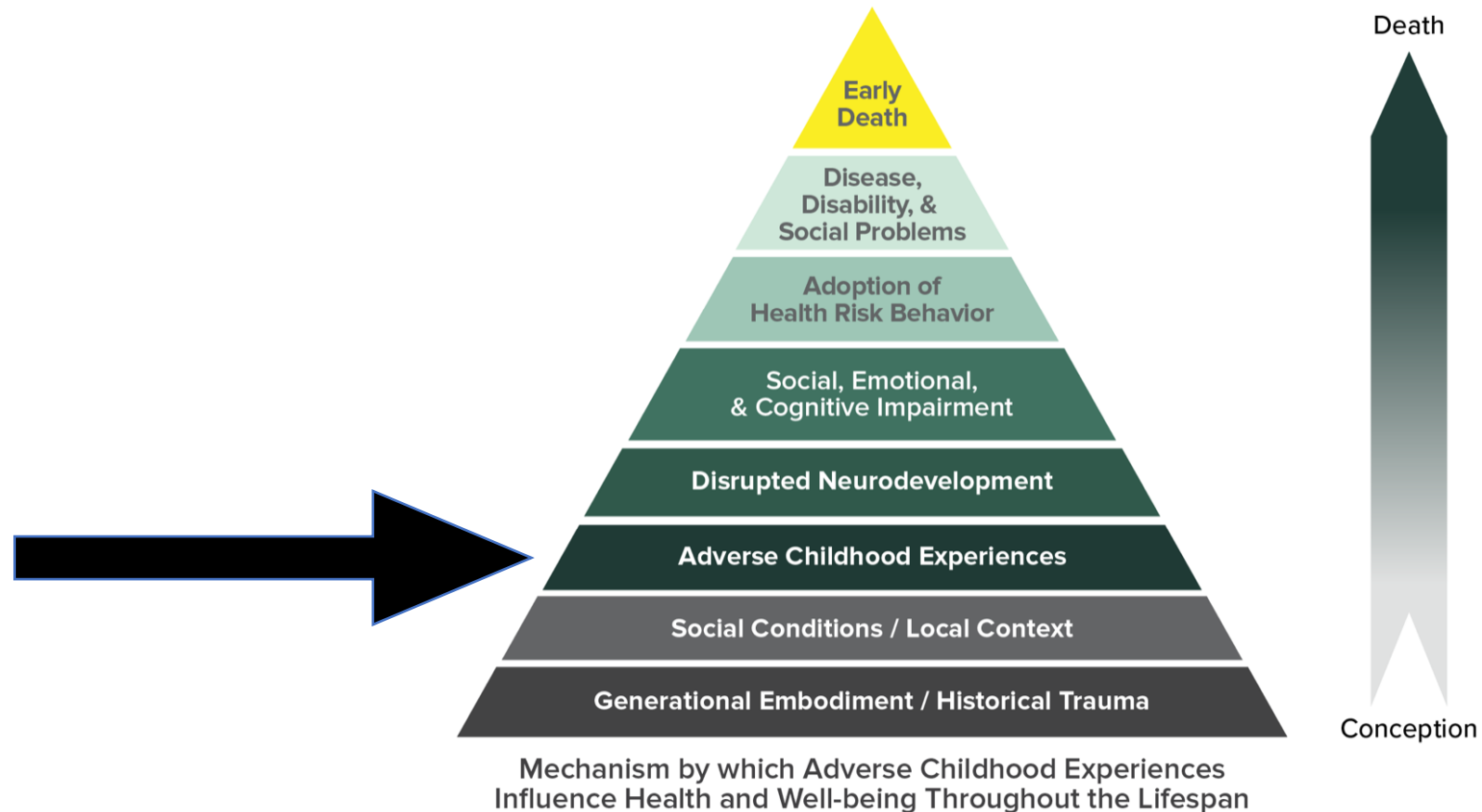
Hackensack Meridian
School of Medicine
KEEP GETTING BETTER

Potential reduction of negative outcomes in adulthood



SOURCE: BRFSS 2015-2017, 25 states, CDC Vital Signs, November 2019.

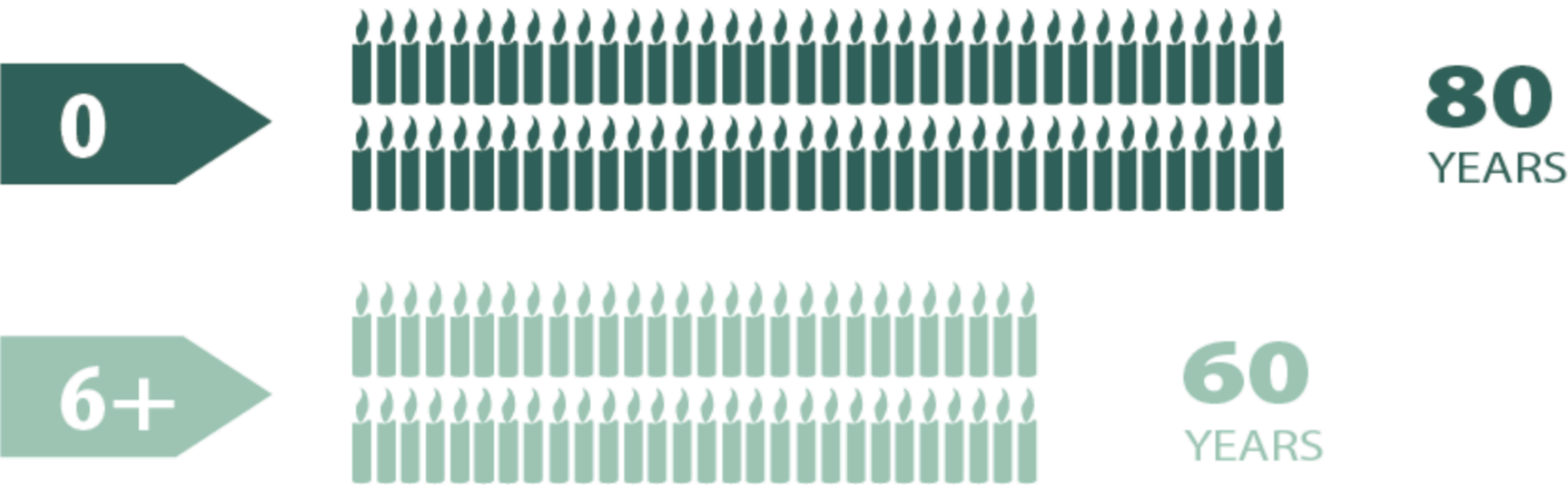
How do ACEs impact health?



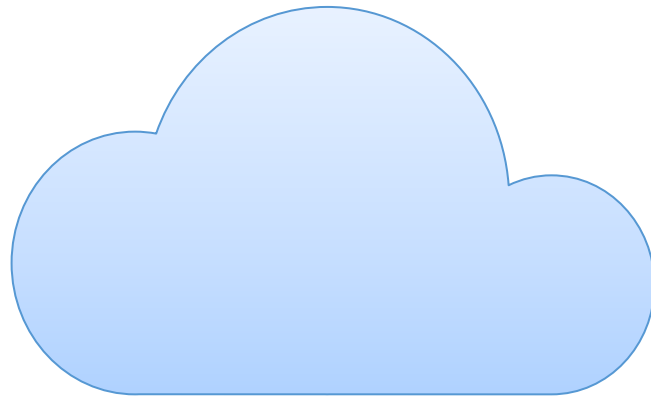
The bottom line

LIFE EXPECTANCY

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



What comes to mind when you think of RESILIENCE?

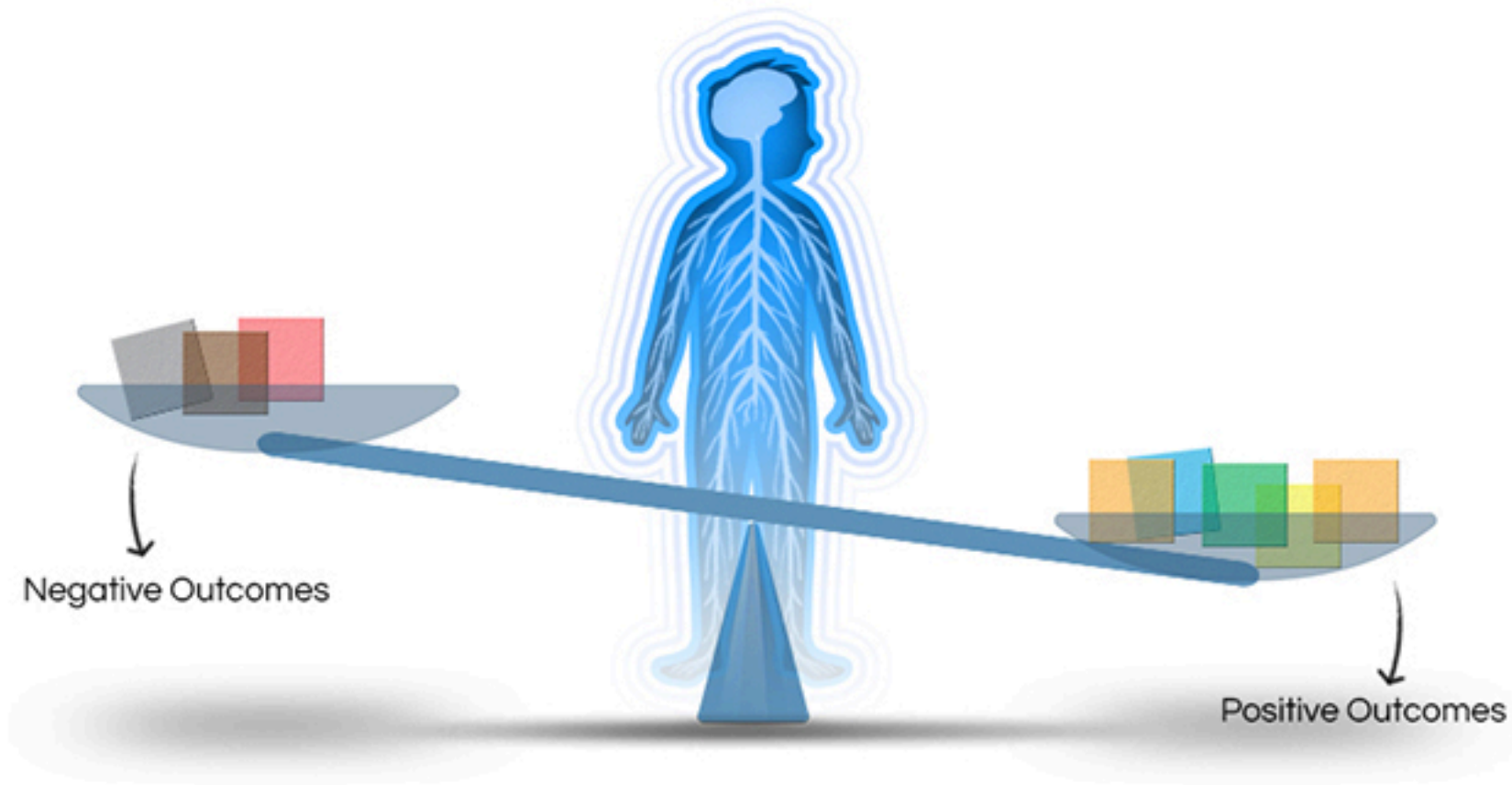


Defining Resilience

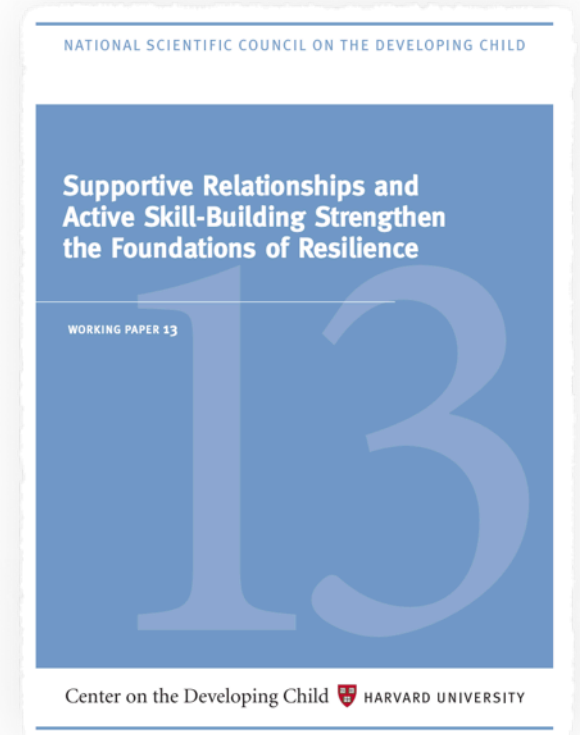
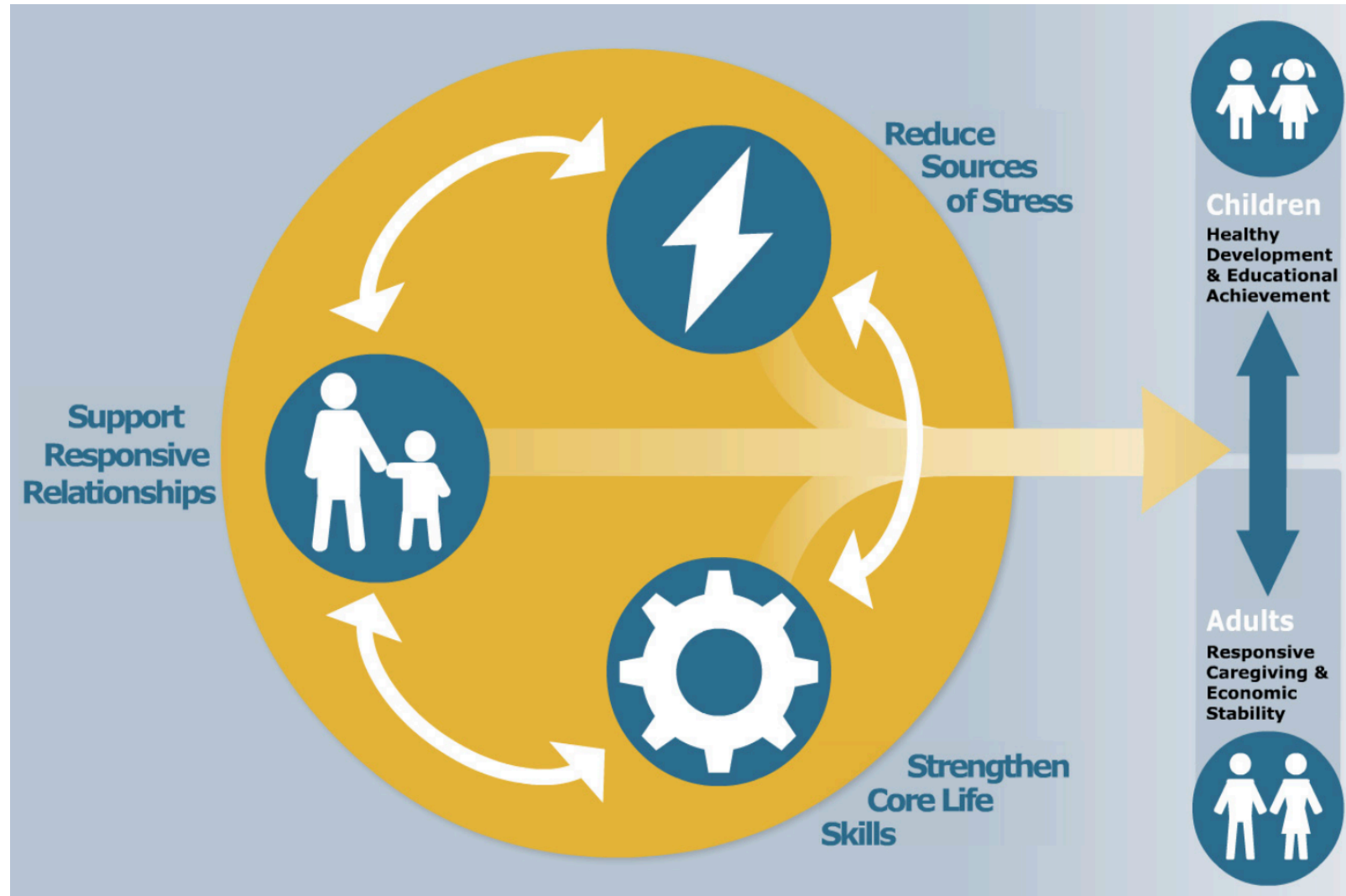


- Computing: 'the ability of the network to provide and maintain an acceptable level of service in the face of various faults and challenges to normal operation'
- Engineering: 'the ability to return to the steady-state following a perturbation'
- Business: 'the ability of a system to return to its original state or move to a new, more desirable state after being disturbed'
- Ecology: 'capacity of an ecosystem to resist disturbance and still maintain a specified state'
- Physical health: 'achieve equilibrium or re-establish homeostasis following a provocation'
- **Mental health: 'the positive capacity of people to cope with stress and adversity'**

Building Resilience: How do we get there?



Micro, Mezzo, Macro: How do we build resilience?



Micro: Strengthen Core Life Skills

Positive Psychology

An Introduction

Martin E. P. Seligman
Mihaly Csikszentmihalyi

University of Pennsylvania
Claremont Graduate University

A science of positive subjective experience, positive individual traits, and positive institutions promises to improve quality of life and prevent the pathologies that arise when life is barren and meaningless. The exclusive focus on pathology that has dominated so much of our discipline results in a model of the human being lacking the positive features that make life worth living. Hope, wisdom, creativity, future mindedness, courage, spirituality, responsibility, and perseverance are ignored or explained as transformations of more authentic negative impulses. The 15 articles in this millennial issue of the American Psychologist discuss such issues as what enables happiness, the effects of autonomy and self-regulation, how optimism and hope affect health, what constitutes wisdom, and how talent and creativity come to fruition. The authors outline a framework for a science of positive psychology, point to gaps in our knowledge, and predict that the next century will see a science and profession that will come to understand and build the factors that allow individuals, communities, and societies to flourish.

Entering a new millennium, Americans face a historical choice. Left alone on the pinnacle of economic and political leadership, the United States can continue to increase its material wealth while ignoring the human needs of its people and those of the rest of the planet. Such a course is likely to lead to increasing selfishness, to alienation between the more and the less fortunate, and eventually to chaos and despair.

At this juncture, the social and behavioral sciences can play an enormously important role. They can articulate a vision of the good life that is empirically sound while being understandable and attractive. They can show what actions lead to well-being, to positive individuals, and to thriving communities. Psychology should be able to help document what kinds of families result in children who flourish, what work settings support the greatest satisfaction among workers, what policies result in the strongest civic engagement, and how people's lives can be most worth living.

Yet psychologists have scant knowledge of what makes life worth living. They have come to understand quite a bit about how people survive and endure under conditions of adversity. (For recent surveys of the history of psychology, see, e.g., Benjamin, 1992; Koch & Leary, 1985; and Smith, 1997.) However, psychologists know very little about how normal people flourish under more benign conditions. Psychology has, since World War II,

become a science largely about healing. It concentrates on repairing damage within a disease model of human functioning. This almost exclusive attention to pathology neglects the fulfilled individual and the thriving community.

The aim of positive psychology change in the focus of psychology with repairing the worst things: positive qualities. The field of positive psychology is about valued subjective experience, and satisfaction (in the (for the future); and flow and happiness (at the individual level, it is about potential capacity for love and vocation, aesthetic sensibility, perseverance, future mindedness, spirituality, hope, the group level, it is about the conditions that move individuals to responsibility, nurturance, altruism, tolerance, and work ethic.

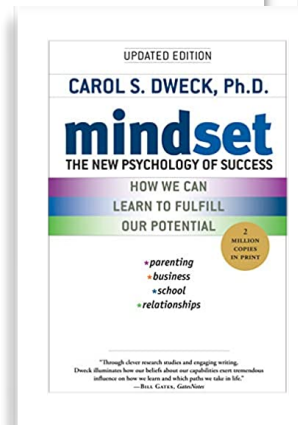
Two personal stories, one of how we arrived at the conviction that positive psychology was needed. of the *American Psychologist* call Seligman, it began at a moment being elected president of the Association.

The moment took place in wedding with my five-year-old daughter. I confess that even though I write really not all that good with children and time urgent, and when I'm actually trying to get the wedding was throwing weeds into the air around, I yelled at her. She walked away, looking sad, and said,

Editor's note. Martin E. P. Seligman and Mihaly Csikszentmihalyi served as guest editors for this special issue.

Author's note. Martin E. P. Seligman, Department of Psychology, University of Pennsylvania; Mihaly Csikszentmihalyi, Department of Psychology, Claremont Graduate University.

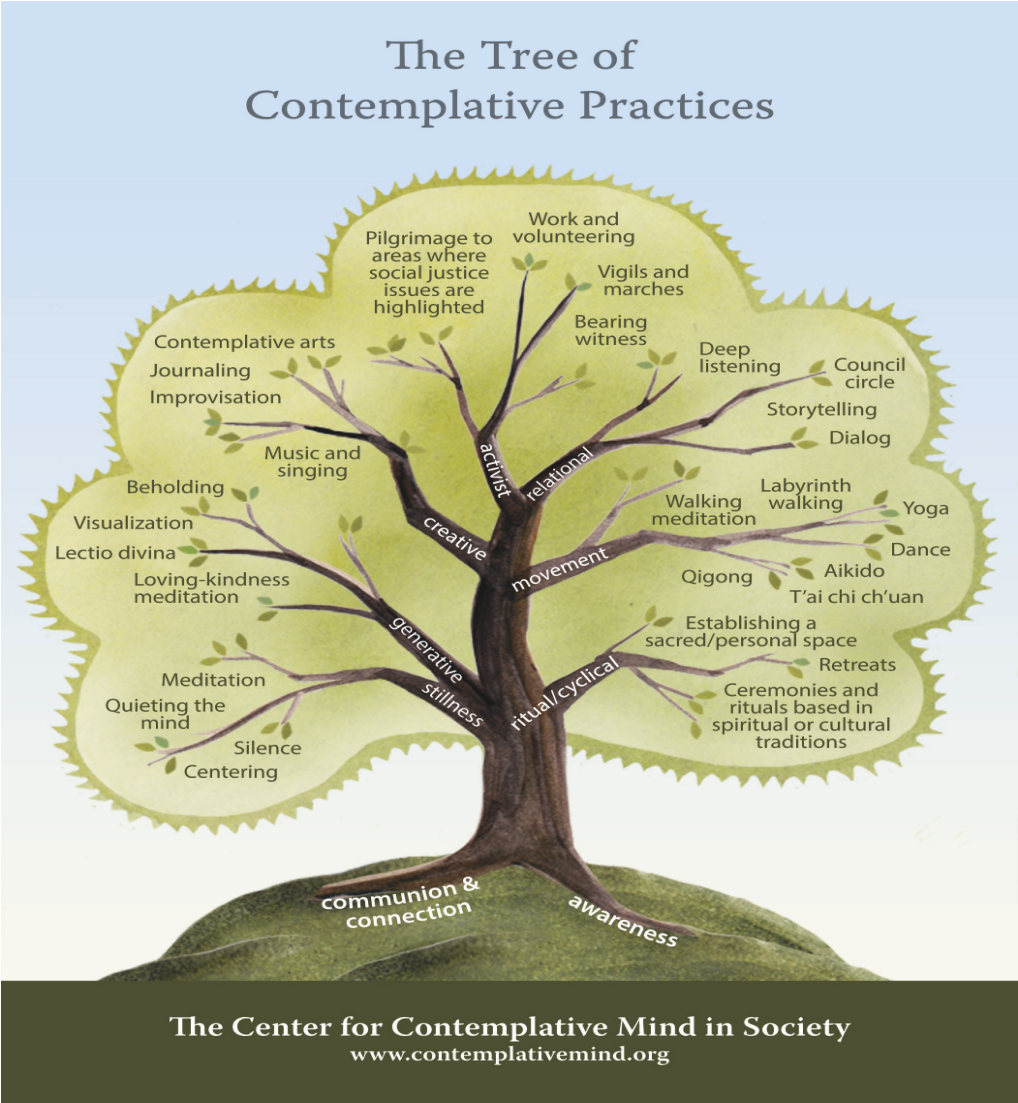
Correspondence concerning this article should be addressed to Martin E. P. Seligman, Department of Psychology, University of Pennsylvania, 3815 Walnut Street, Philadelphia, PA 19104-3604. Electronic mail may be sent to seligman@candell.psych.upenn.edu.



Shift mindset from...

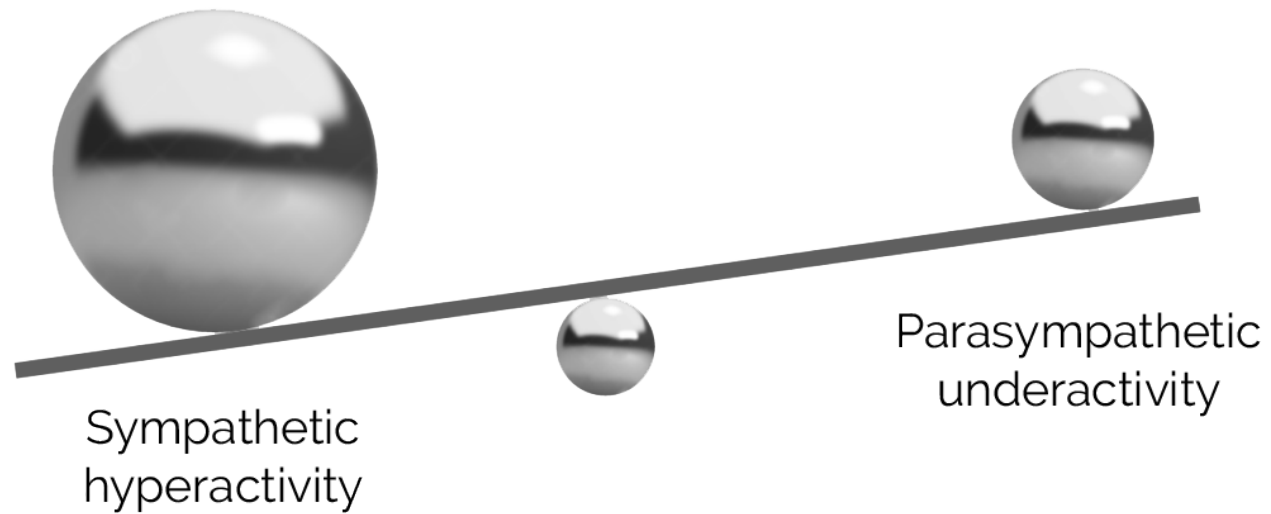
- Internal → External (“Bad events aren’t my fault.”)
- Global → Specific (“This is one narrow thing, rather than a massive indication that something is wrong with my life.”)
- Permanent → Impermanent (“I can change the situation, rather than assuming it’s fixed.”)

Mindfulness Practices

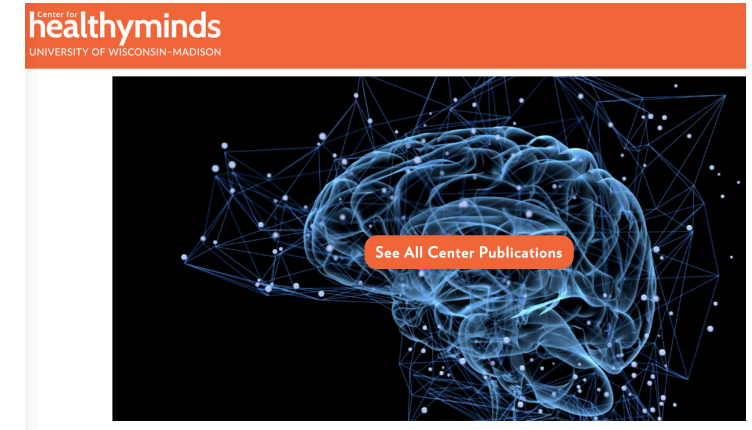
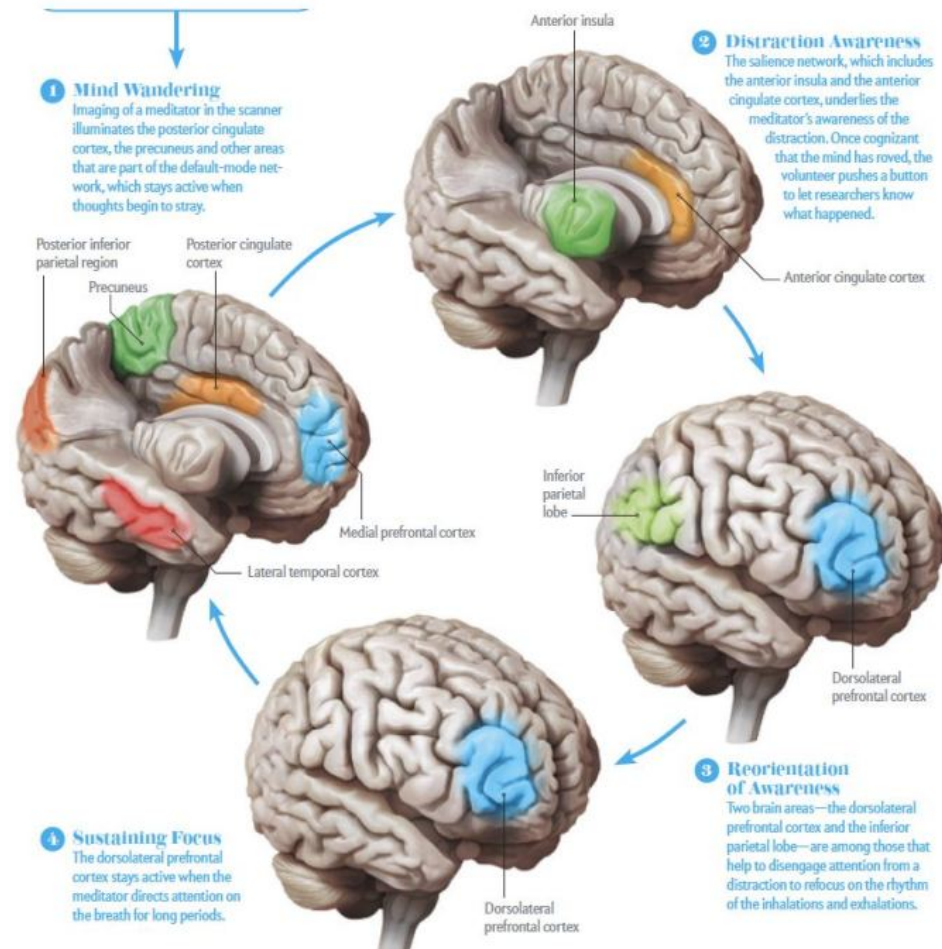


How does it work?

AUTONOMIC IMBALANCE



This is your brain on meditation



source: <https://contemplativemind.wordpress.com/2014/10/17/the-mind-of-the-meditator/>



Hackensack Meridian
School of Medicine
KEEP GETTING BETTER

Neuroplasticity: Creating new habits

S.M.A.R.T. GOALS

SPECIFIC

MEASURABLE

ATTAINABLE

REALISTIC

TIMELY



PNAS Proceedings of the National Academy of Sciences of the United States of America

Keyword, ,

Home Articles Front Matter News Podcasts Autho

NEW RESEARCH IN Physical Sciences Social Sciences

PERSPECTIVE

The plasticity of well-being: A training-based framework for the cultivation of human flourishing

 Cortland J. Dahl,  Christine D. Wilson-Mendenhall, and Richard J. Davidson

PNAS December 22, 2020 117 (51) 32197-32206; first published December 7, 2020;
<https://doi.org/10.1073/pnas.2014859117>



Reciprocal Resilience

The Reciprocal Domains of Physician Well-Being

Chart illustrating the 3 domains of physician well-being, with each domain reciprocally influencing the others.



“We need comprehensive, systematic, and sustained efforts to improve physician well-being. These efforts will be most effective when they address drivers of physician well-being from each of the three reciprocally related domains of practice efficiency, a culture of wellness, and personal resilience.”

Source: Patty Purpur de Vries

©2016 Board of Trustees of the Leland Stanford Junior University. All Rights Reserved

NEJM Catalyst (catalyst.nejm.org) © Massachusetts Medical Society

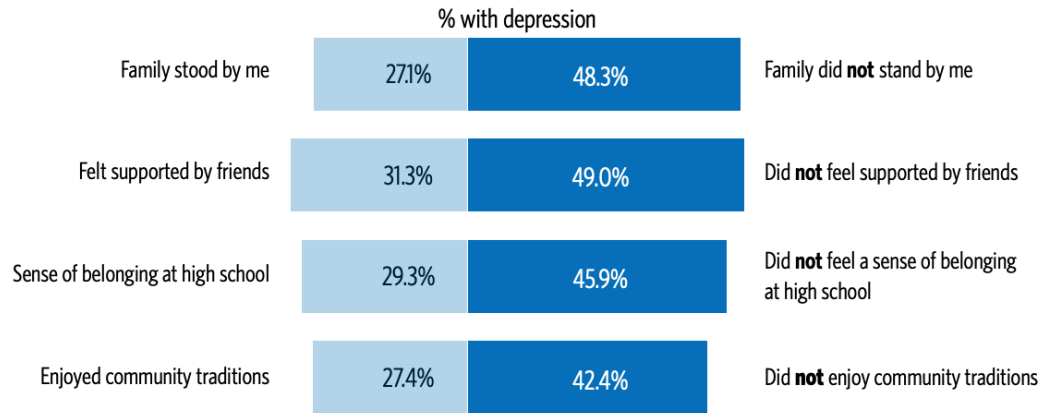


Hackensack Meridian
School of Medicine

KEEP GETTING BETTER

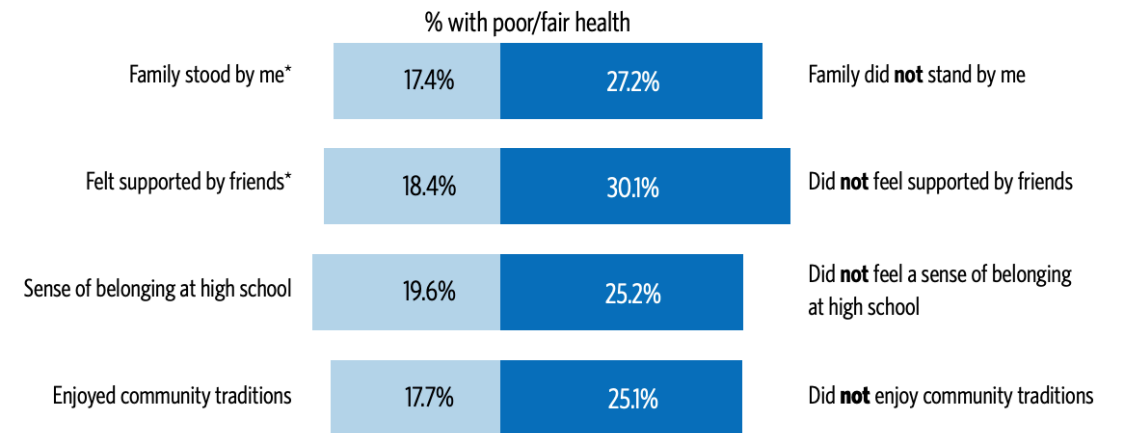
Mezzo: Support Responsive Relationships

Adults with >3 ACEs AND selected positive childhood experiences had **lower rates of depression**. (all $p < 0.05$)



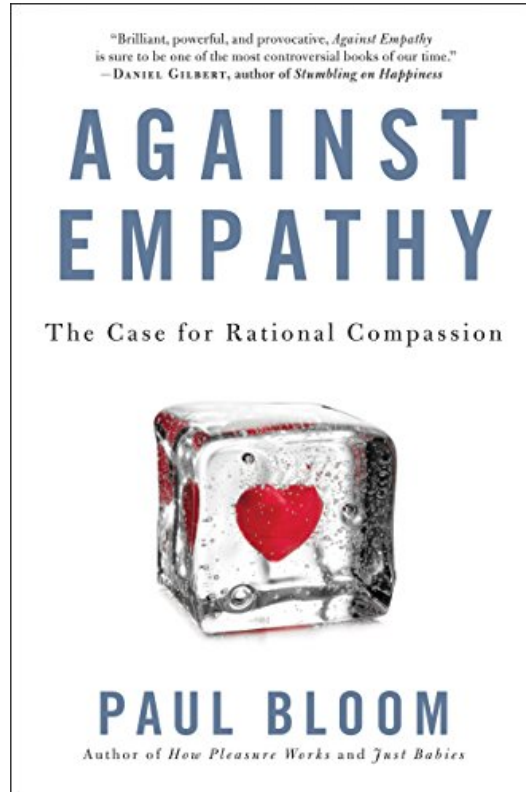
Source: Jones, J., Bethell, C.D., Linkenbach, J. & Sege, R. (2017). Health effects of ACEs mitigated by positive childhood experiences.(manuscript in preparation).¹⁴

Adults with >3 ACEs AND selected positive childhood experiences had **lower rates of poor/fair health**. (*= $p < 0.05$)



Source: Jones, J., Bethell, C.D., Linkenbach, J. & Sege, R. (2017). Health effects of ACEs mitigated by positive childhood experiences.(manuscript in preparation).¹⁴

Compassion and Connection



Weingartner et al. *BMC Medical Education* (2019) 19:139
<https://doi.org/10.1186/s12909-019-1546-6>

BMC Medical Education

RESEARCH ARTICLE

Open Access

Compassion cultivation training promotes medical student wellness and enhanced clinical care



Laura A. Weingartner^{1*} , Susan Sawning¹, M. Ann Shaw^{1,2} and Jon B. Klein²

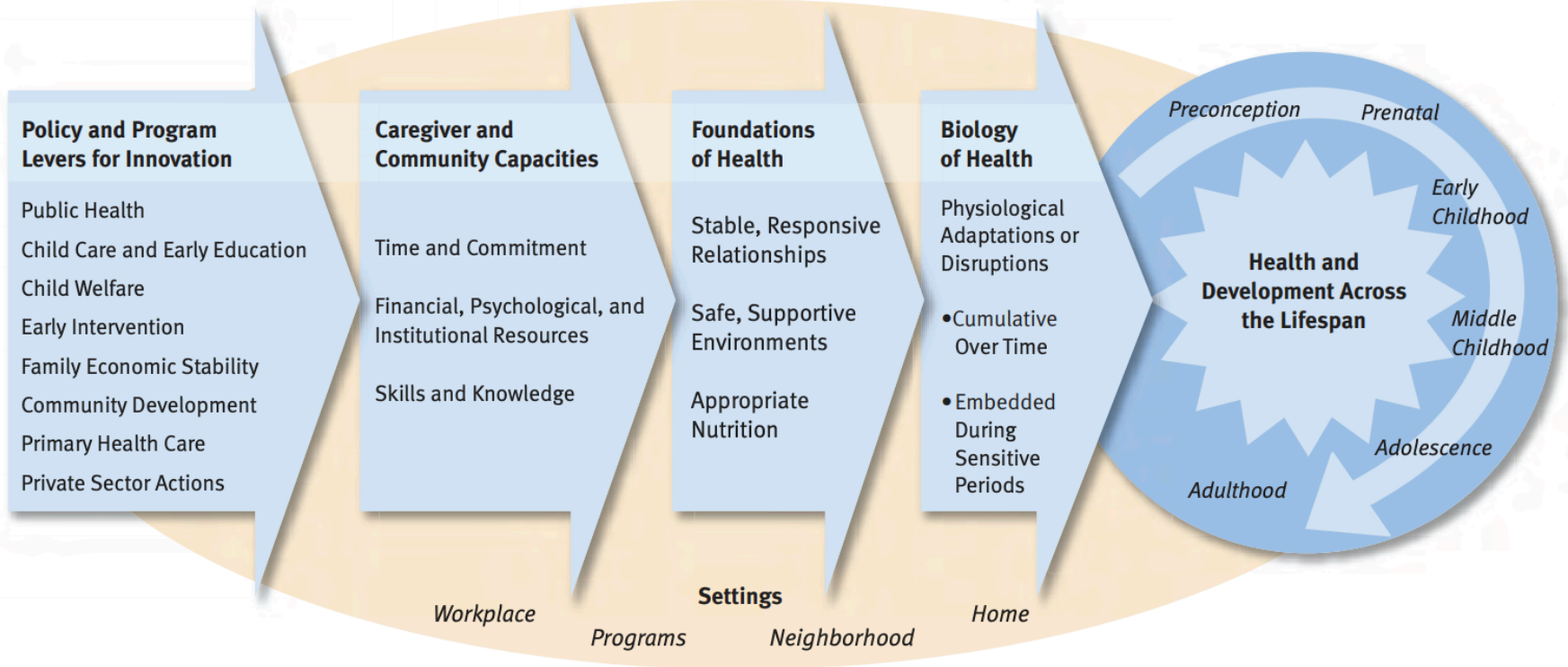
“Modeling compassion cultivation and mindfulness skills in the context of patient interactions may address student empathy erosion more directly than stress management training alone. This pilot study shows compassion training could be an attractive, efficient option to address burnout by simultaneously promoting student wellness and enhanced patient interactions.”



Hackensack Meridian
School of Medicine
KEEP GETTING BETTER


Macro: Reduce Sources of Stress

A Framework for Reconceptualizing Early Childhood Policies and Programs to Strengthen Lifelong Health



Example


Explore 16 (2020) 271–273



Contents lists available at [ScienceDirect](#)

Explore

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



Health and the Environment


Whole health learning: The revolutionary child of integrative health and education

Lawrence D. Rosen*, Kate Tumelty Felice, Taylor Walsh

EXPLORE's "Health and the Environment" column seeks to highlight areas of intersection between environmental issues and integrative health and healing.

*"You say you want a revolution -
Well, you know...
We all want to change the world."*
- John Lennon/Paul McCartney

engage in health-risk behaviors.¹¹ Compounding the above challenges, ACEs via toxic stress pathways also lead to widening health disparities.¹² ACEs are common, with nearly 2/3 of adults reporting at least one type of ACE in childhood and approximately 1/4 reporting experiencing at least three types,¹³ and they are costly: the estimated price to families, communities, and society exceeds hundreds of billions of dollars annually.¹⁴



“Establishing a national public wellness infrastructure to foster health-education partnerships nurturing whole-health-promoting habits throughout the lifespan, must be a priority.”

Example



“Pediatricians must examine and acknowledge their own biases and embrace and advocate for innovative policies and cross-sector partnerships designed to improve medical, economic, environmental, housing, judicial, and educational equity for optimal child, adolescent, and emerging adult developmental outcomes.”

<https://pediatrics.aappublications.org/content/144/2/e20191765>



Hackensack Meridian
School of Medicine
KEEP GETTING BETTER

Final words



"The more we study the major problems of our time, the more we come to realise that they cannot be understood in isolation. They are systemic problems, which means that they are interconnected and interdependent... **The more complex the network is, the more complex its pattern of interconnections, the more resilient it will be.**"

- Fritjof Capra, "The Web of Life: A New Scientific Understanding of Living Systems" (1996)

