Death by Discrimination

Kara Caruthers, MSPAS, PA-C

Meharry Medical College

Susan LeLacheur, DrPH, PA-C

George Washington University

Howard Straker, PA-C, EdD, MPH

George Washington University

Land Acknowledgement

We acknowledge the Indigenous People of *the Karankawa, Akokisa, Atakapa, Tonkawa, Caddo, Apache and Comanche Nations on whose* lands we are on today. To recognize this is to honor and appreciate that this land has been protected and inhabited by Indigenous people since time immemorial. Our recognition is also a mode of taking responsibility for and acknowledging displacement that allows us to live, work and conference on this land today.

Please join in moment of reflection to acknowledge the harms and mistakes of the past and to consider how we are and can as a profession, as well as each in our own way, try to move forward in a spirit of reconciliation and collaboration.

No Disclosures

for Kara Caruthers, Susan LeLacheur or Howard Straker

Objectives

At the conclusion of this session, participants should be able to:

1. Discuss the concept of weathering as it relates to the more rapid onset of disability and death in communities suffering from discrimination
2. Describe the concept of social epigenetics and how it impacts specific patient populations
3. Given a clinical case, describe concrete measures a PA can take to partner with patients, their families and communities to mitigate the harm of social discrimination

In our every deliberation, we must consider the impact of our decisions on the next seven generations.

From the great law of the Haudenosaunee (Iroquois) Confederacy

Case

- JG is a 43 yo man who presents to ED via EMS, after a syncopal episode at work
- Per EMS, he was hesitant about coming to the hospital due to his lack of insurance, but decided to come as the paramedics noted concerning changes on his ECG
- At first glance, patient is diaphoretic and there are hyperacute T waves and ST elevation noted in multiple leads of the ECG

Case

- PMH: none
- PSH: appendectomy, childhood
- Medications: BC/Goody powder for headaches
- SH: Denies ETOH, tobacco, or drug use; manager at a local hardware store and works 50-60 hrs/wk; married to HS sweetheart and has 4 children (21, 17, 13, & 11)
- FH: Mother, 61, depression; Father, deceased at 41 from coal mining accident; two younger sisters 34 and 31 unsure of their health status

Case

- As you are awaiting cardiac enzyme results from the lab, JG admits that he has been having intermittent chest pain for ”a while”
- He has been under increased stress on his job and significant stress at home, as he and his wife are trying to get enough money together to get their oldest into a drug rehab program for her heroin addiction
- He has not seen a PCP since high school but “never gets sick”
- When you ask more information about his father’s death, he states that it was a “relief” to the family as his father was a “mean drunk” and abusive to everyone

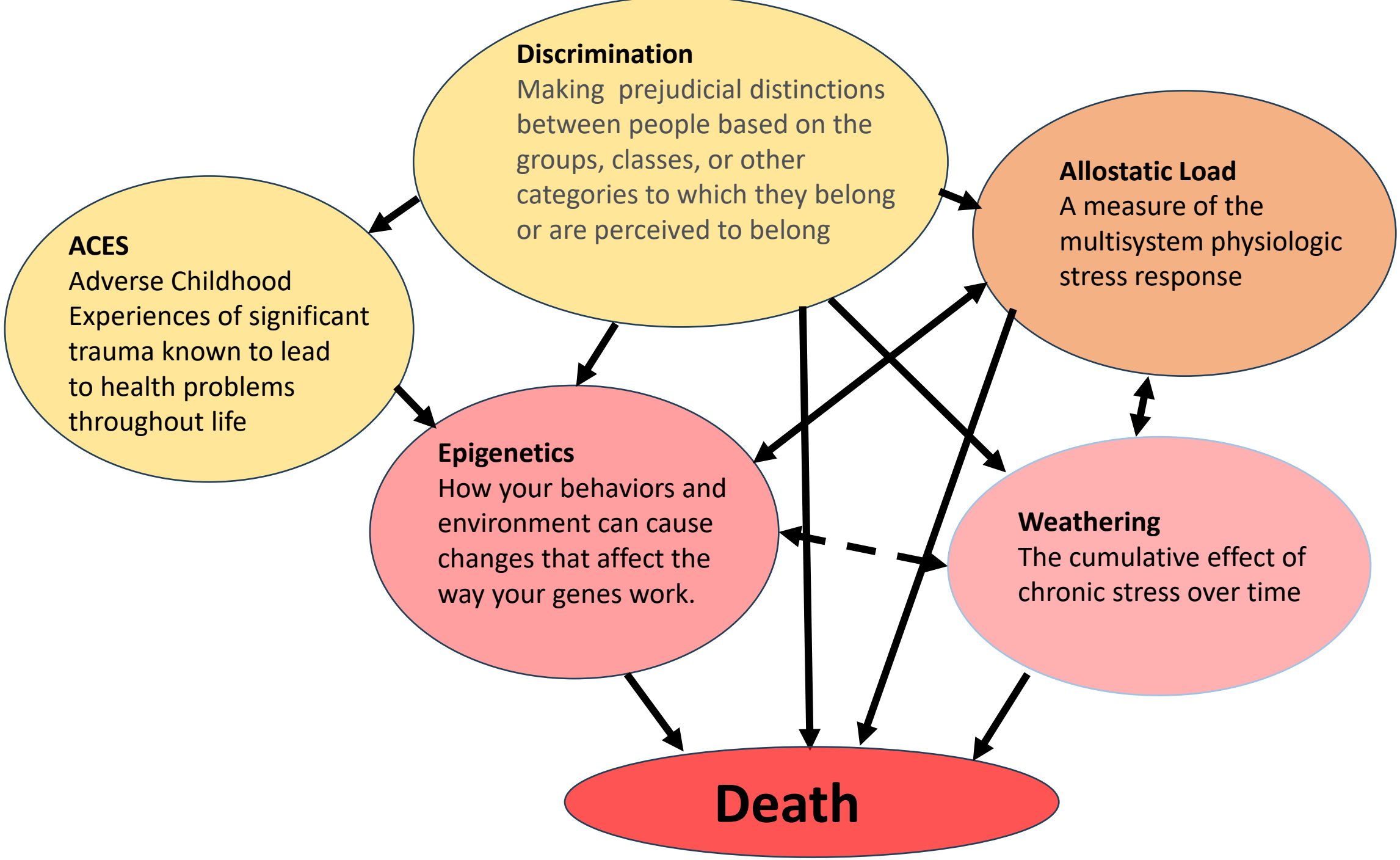
Case

- JG grew up in southern Indiana, in a coal mining county
- Generational poverty is noted on both sides of the family
- While he did graduate from high school, he had behavioral issues throughout which impacted his grades
- His mother’s depression worsened after his father’s death and he had to care for his younger siblings as his mother could not

How does this impact JG’s current medical situation?

ARS

- Name a factor in his history that might contribute to his current illness.


Discrimination
Making prejudicial distinctions between people based on the groups, classes, or other categories to which they belong or are perceived to belong
ACES
Adverse Childhood Experiences of significant trauma known to lead to health problems throughout life
Allostatic Load
A measure of the multisystem physiologic stress response
Epigenetics
How your behaviors and environment can cause changes that affect the way your genes work.
Weathering
The cumulative effect of chronic stress over time
Death

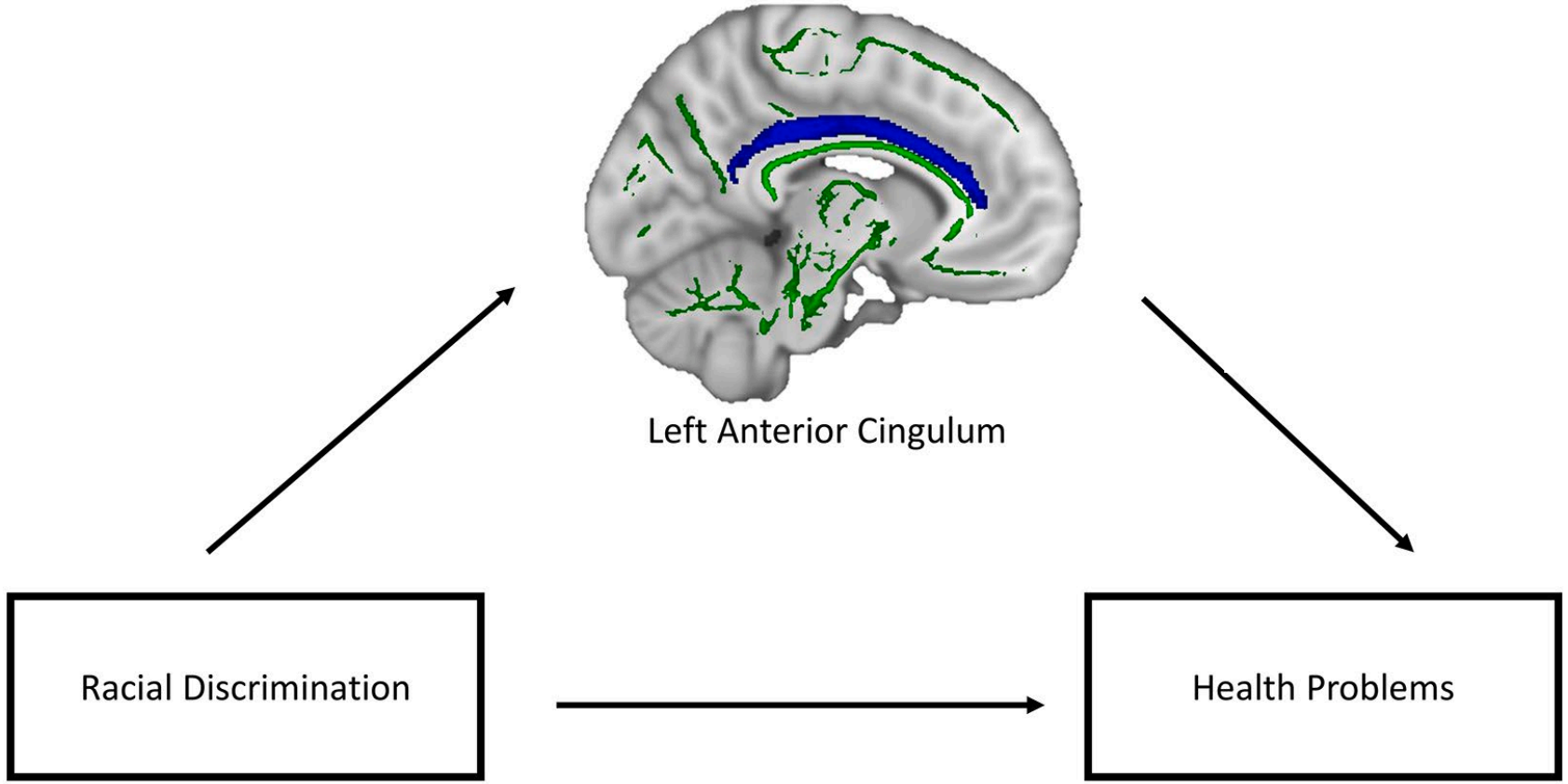
Discrimination

- Forms
    - Race
    - Gender
    - Economic status
    - Sexual/gender identity
    - Ability
- Structural
    - Structural barriers based on any/all of the above
- Personally mediated
    - Interpersonal discrimination based on any/all of the above
- Intrapersonal
    - Self-devaluation/questioning based on any/all of the above

Discrimination and Mortality

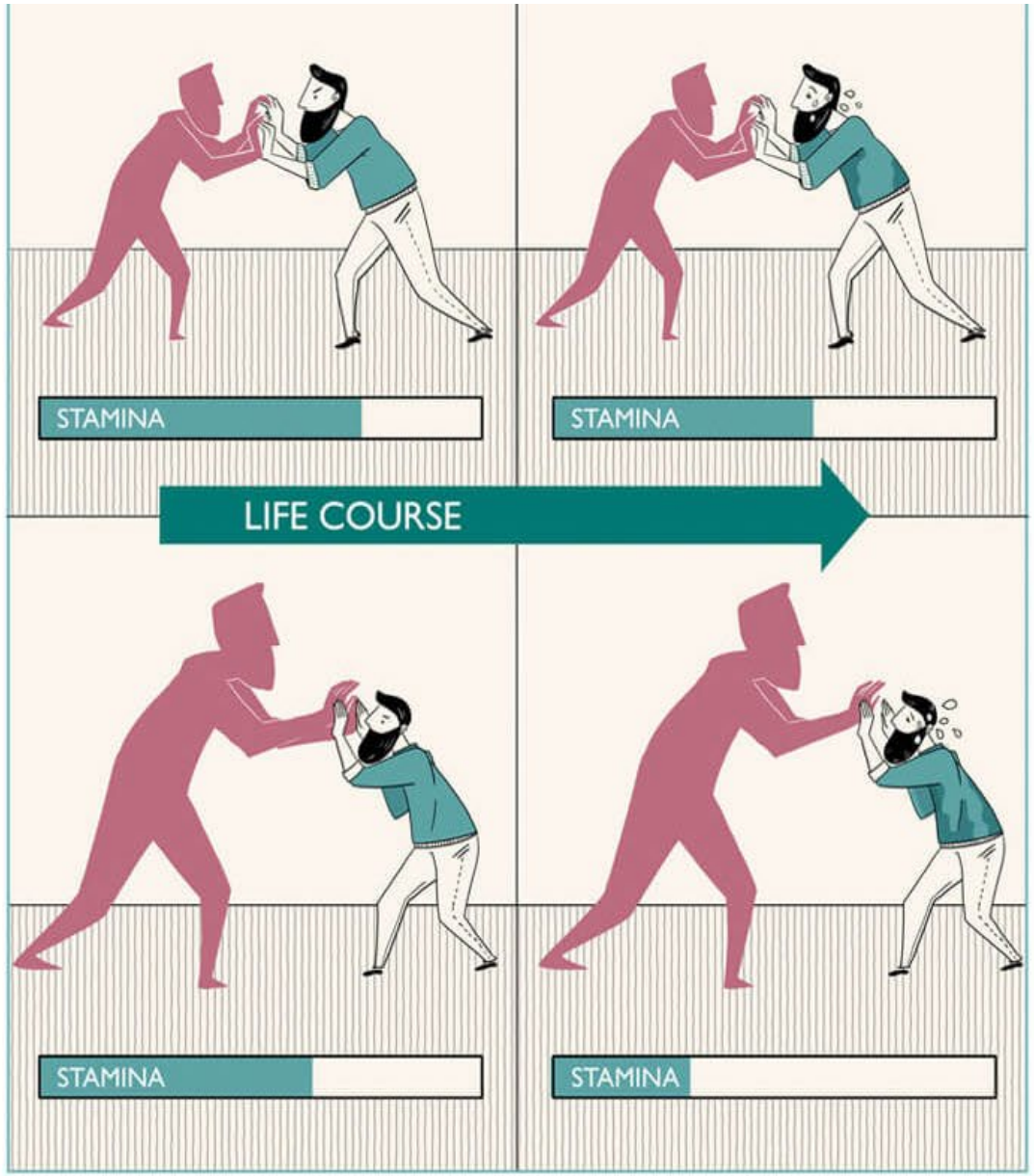
- Every unit increase in lifetime perceived discrimination was associated with a 9% increase in mortality
- Daily discrimination 3% increase chance in mortality
  - 11 forms of lifetime discrimination
- As residential segregation increased, Black COVID-19 mortality increased
  - Most segregated high Black population counties suffered 28% higher Black COVID mortality than least segregated counties with low Black populations

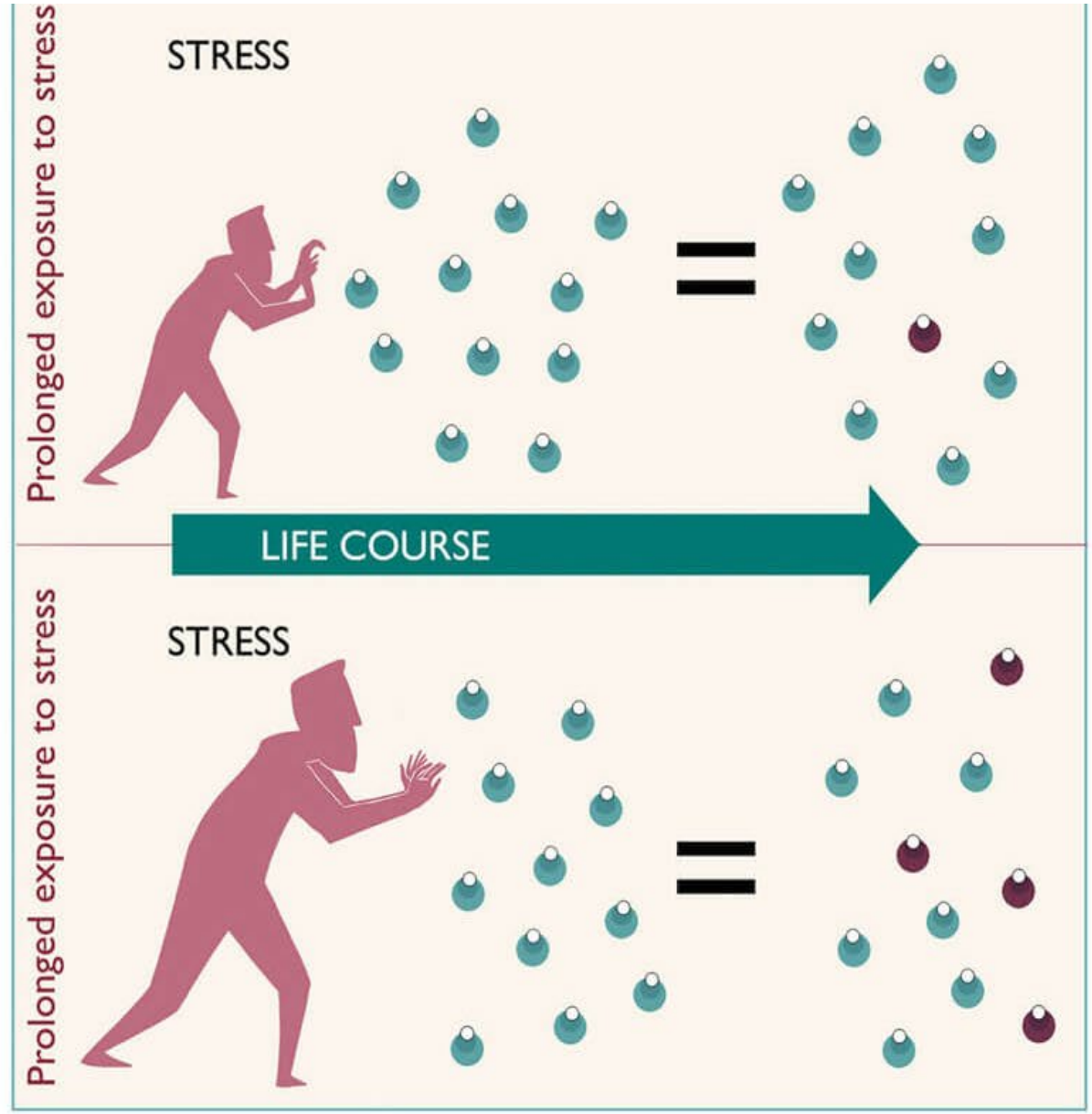
Indirect Effects of Racial Discrimination on Health Outcomes Through Prefrontal Cortical White Matter Integrity



Okeke O, Elbasheir A, Carter SE, et al. Indirect Effects of Racial Discrimination on Health Outcomes Through Prefrontal Cortical White Matter Integrity. *Biological psychiatry : cognitive neuroscience and neuroimaging*. 2023;8(7):741-749. doi:10.1016/j.bpsc.2022.05.004

Allostatic load explanation pic





Stress becomes chronic → ALLOSTATIC LOAD → Higher risk of health decline

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Weathering

Weathering

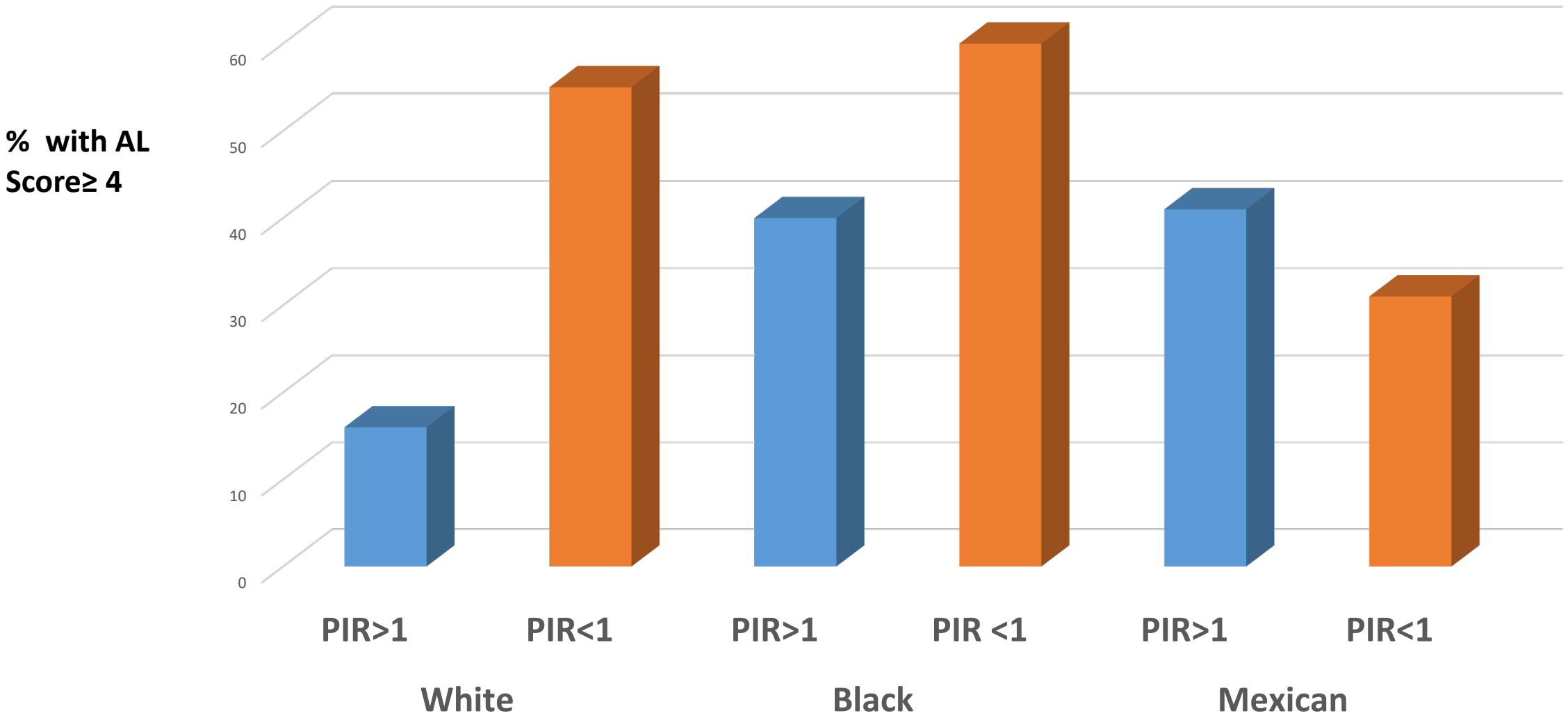
Weathering – Arline Geronimus

Table 1. Rates (per 100) and rate ratios of low birthweight and very low birthweight by maternal age, African American and white singleton first births, Michigan, 1989

	N		LBW rates and rate ratios			VLBW rates and rate ratios		
Maternal age	Black	White	Black	White	Black/white	Black	White	Black/white
15–19	5244	8992	11.6	6.3	1.8	2.7	1.2	2.3
20–24	3384	14415	12.4	5.0	2.5	2.9	0.8	3.6
25–29	1482	14541	14.0	4.9	2.9	3.6	0.6	6.0
30–34	608	6172	17.8	6.2	2.9	6.1	1.2	5.1
Total	10718	44120	12.5	5.4	2.3	3.1	0.9	3.4

Geronimus AT. Black/white differences in the relationship of maternal age to birthweight: A population-based test of the weathering hypothesis. *Soc Sci Med*. 1996;42(4):589-597. https://www.sciencedirect.com/science/article/pii/027795369500159X. doi: 10.1016/0277-9536(95)00159-X.

Mean Allostatic Load by Race/Ethnicity & Poverty Status



GERONIMUS AT, et al. Weathering in Detroit: Place, Race, Ethnicity, and Poverty as Conceptually Fluctuating Social Constructs Shaping Variation in Allostatic Load. *The Milbank Quarterly*. 2020;98(4):1171-1218. doi:10.1111/1468-0009.12484

Weathering & Allostatic Load

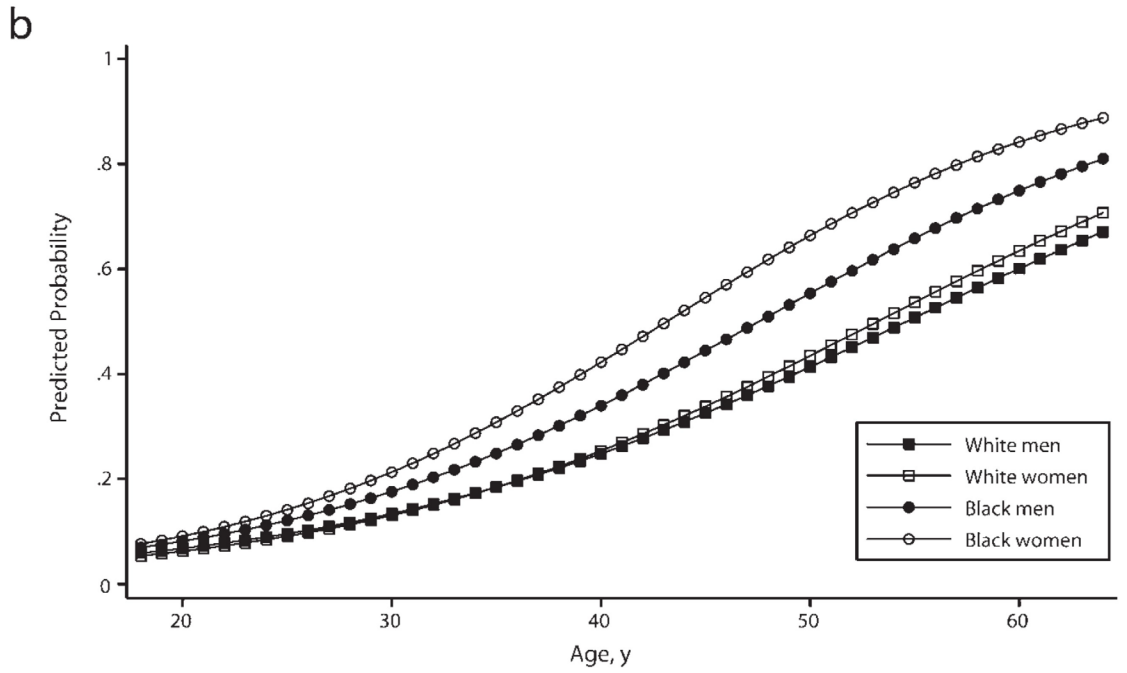


FIGURE 1—Probability of having an allostatic load of 4 or higher, as predicted by race (a) and race and gender (b).

Geronimus AT, Hicken M, Keene D, Bound J. "Weathering" and Age Patterns of Allostatic Load Scores Among Blacks and Whites in the United States. *American journal of public health (1971)*. 2006;96(5):826-833. doi:10.2105/AJPH.2004.060749

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ACEs

For each “yes” answer, add 1. The total number at the end is your cumulative number of ACEs. Before 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?
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?
3. Did an adult or person at least 5 years older than you ever… T**ouch 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?
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?
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?
6. Were your parents ever **separated or divorced?**
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?
8. Did you live with anyone who was a **problem drinker or alcoholic, or who used street drugs?**
9. **Was a household member depressed or mentally ill, or did a household member attempt suicide?**
10. **Did a household member go to prison?**

ACEs and Health Behaviors & Outcomes

Risky behaviors and health outcome	Emotional neglect	Emotional abuse	Physical abuse	Physical neglect	Sexual abuse	Domestic violence	Witness of community violence	Collective violence
Drinking-current	1.04 (0.77,1.39)	1.23 (0.90,1.69)	1.17 (0.84,1.62)	1.04 (0.73,1.48)	0.85 (0.45,1.63)	**1.68*** **(1.13,2.50)**	1.20 (0.82,1.76)	1.18 (0.43,3.23)
Smoking-current	0.95 (0.64,1.41)	1.03 (0.68,1.54)	**1.66*** **(1.10,2.48)**	**2.04**** **(1.28,3.26)**	**2.78*** **(1.26,6.12)**	1.25 (0.77,2.04)	1.53 (0.95,2.46)	0.96 (0.25,3.75)
Chronic diseases	0.87 (0.62,1.22)	**1.65**** **(1.18,2.31)**	**1.81**** **(1.28,2.56)**	0.98 (0.66,1.46)	0.77 (0.36,1.65)	1.48 (0.97,2.26)	**1.77**** **(1.19,2.64)**	1.39 (0.50,3.82)
Depression	**1.76***** **(1.35,2.39)**	**1.98***** **(1.50,2.63)**	**1.37*** **(1.02,1.86)**	**1.99***** **(1.48,2.70)**	**3.05***** **(1.82,5.12)**	**1.80**** **(1.26,2.56)**	**1.95***** **(1.40,2.70)**	1.38 (0.60,3.19)
PTSD	**1.32*** **(1.04,1.67)**	**1.92***** **(1.49,2.47)**	**1.33*** **(1.01,1.73)**	**1.82***** **(1.38,2.38)**	**2.84***** **(1.71,4.73)**	**2.52***** **(1.83,3.45)**	**1.45* (1.07,1.96)**	1.27 (0.60,2.72)

Note: Boldface indicates statistical significance (*$P<0.05$; **$P<0.01$; ***$P<0.001$)

https://doi.org/10.1371/journal.pone.0211850.t004

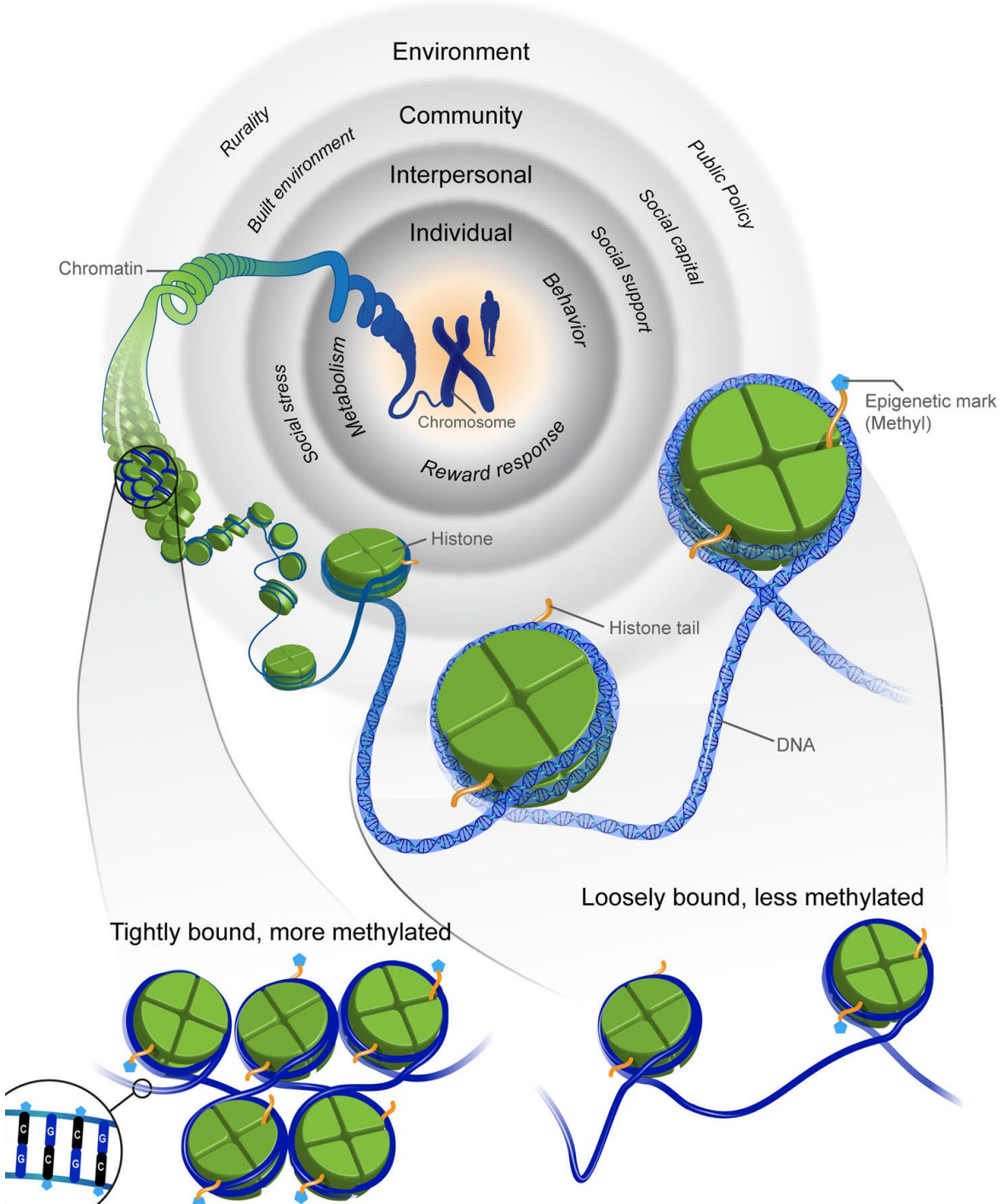
Odds ratios – 1501 adults, 18-59 y/o - Average ACE scores compared between groups with and without health related risky behaviors and health outcomes.

Chang X, Jiang X, Mkandarwire T, Shen M (2019) Associations between adverse childhood experiences and health outcomes in adults aged 18–59 years. PLoS ONE 14(2): e0211850. https://doi.org/10.1371/journal.pone.0211850

IMPACT of ACE's Exposure and health concerns

- Maternal ACEs are associated with child inattention, impulsivity, aggression AND childhood depression and anxiety[1]
- Infant DNA methylation patterns were associated with intergenerational trauma[2]
- There was an 18% increase in risk for suspected developmental delay with each maternal ACE and 34% increase in risk with each paternal ACE exposure; Maternal ACES >3 significant increased risk[3]

1. Cooke JE, Racine N, Pador P, Madigan S. Maternal Adverse Childhood Experiences and Child Behavior Problems: A Systematic Review. Pediatrics. 2021 Sep;148(3):e2020044131. doi: 10.1542/peds.2020-044131. Epub 2021 Aug 19. PMID: 34413250.
2. Moore SR, Merrill SM, Sekhon B, MacIsaac JL, Kobor MS, Giesbrecht GF, Letourneau N; APrON Team. Infant DNA methylation: an early indicator of intergenerational trauma? Early Hum Dev. 2022 Jan;164:105519. doi: 10.1016/j.earlhumdev.2021.105519. Epub 2021 Nov 29. PMID: 34890904.
3. Folger AT, Eismann EA, Stephenson NB, Shapiro RA, Macaluso M, Brownrigg ME, Gillespie RJ. Parental Adverse Childhood Experiences and Offspring Development at 2 Years of Age. Pediatrics. 2018 Apr;141(4):e20172826. doi: 10.1542/peds.2017-2826. PMID: 29563236.



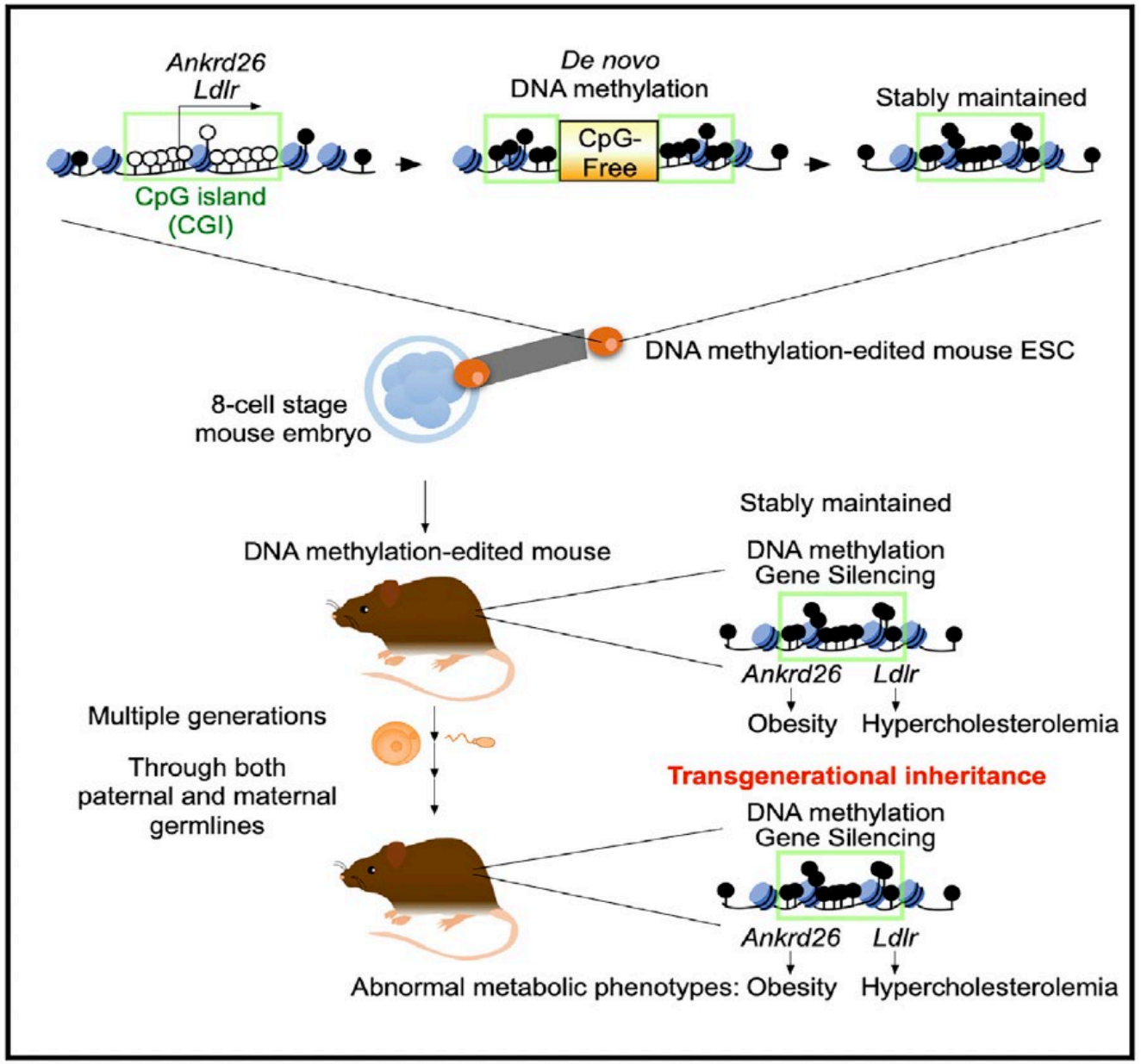
Epigenetic pressures may increase methylation, tightening bonds and "turning off" gene expression
OR may increase methylation "Turning on" gene expression

McBride CM & Koely LM, Imagining roles for epigenetics in health promotion research. J Behav Med (2017) 40:229-238

EPIGENETICS & Aging

- DNA Methylation and Demethylation
  - **Adding or subtracting a chemical group** to DNA. Typically, methylation turns genes “off” and demethylation turns genes “on.”
- Histone modification
  - DNA wraps around histones. When histones are tightly packed together, proteins that ‘read’ the gene cannot access the DNA as easily, so the gene is turned “off.” When histones are loosely packed, more DNA is exposed or not wrapped around a histone and can be accessed by proteins that ‘read’ the gene, so the gene is turned “on.”
- Non-coding RNA
  - Helps control gene expression by attaching to coding RNA, along with certain proteins, to break down the coding RNA so that it cannot be used to make proteins. Non-coding RNA may also recruit proteins to modify histones to turn genes “on” or “off.”
- DNA methylation level increased with age.
- Some epigenetic changes can be added or removed in response to changes in behavior or environment.

Intergenerational EpiGenetic Transfer



Takahashi Y, Morales Valencia M, Yu Y, et al. Transgenerational inheritance of acquired epigenetic signatures at CpG islands in mice. *Cell.* . 2023;186(4):715-731.e19. doi:10.1016/j.cell.2022.12.047

With thanks to Mary Warner, DBH, PA-C

Societal Implications of DNA Methylation

Impact of Intergenerational exposure to violence and poverty

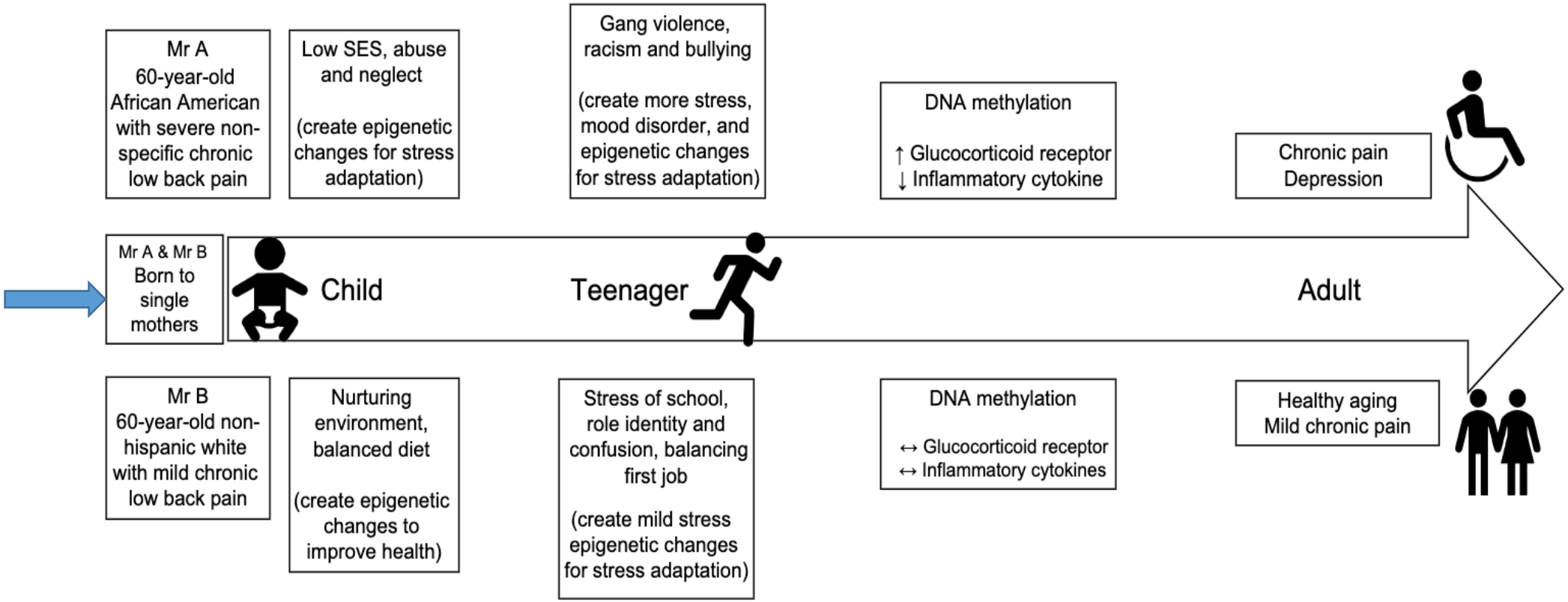


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Illustration of Dr. J. Marion Sims with Anarcha by Robert Thom. Courtesy of Southern Illinois University School of Medicine, Pearson Museum. Pearson Museum, Southern Illinois University School of Medicine

A rally advocating for the removal of statue of J. Marion Sims in Manhattan, Central Park, New York, 2017. Visual: Howard Simmons/NY Daily News Archive via Getty Images

Spenser Platt, Getty Images, USA Today June 19, 2020

Case wrap up

- i-Stat Troponin was 0.45 ng/mL and JG was rushed to the cath lab
- A blockage in one of his coronary arteries was opened, but multiple other partial blockages were noted
- What role does JG's history play into his health status?

ARS

- Name a factor in his history that might contribute to his current illness.

What if?

What can PAs do?

- Clinical encounter
- Outside clinical encounter
  - In the clinical practice
  - In the community

Clinical Encounter

- Intense social history
- Screening tools
  - Social determinants of health
  - ACEs
- Check bias & stigma
- Prescribe support resources
- Be a reliable resource – build trust, acknowledge daily stress
- Write letters, sign benefit forms
- Document

Screening Tools

- Social Determinants of Health– general and specific
  - Violence, financial instability, food insecurity, abuse
  - PRAPARE
  - CLEAR
  - Poverty Tool
- ACEs – children and adults
  - PEARLS
  - ACE Questionnaire for Adults
  - ACE Score
- Screenings result in higher referral rates

Case wrap up 2

- Screening
  - ACE score: 5
    - Score ≥4 “high risk” for toxic stress physiology
- What we know
  - CDC Website, updated September 2023
    - “Low socioeconomic status is associated with higher risk of developing and dying from cardiovascular disease (CVD). Specifically, the American Heart Association notes that income level, educational attainment, and employment status at the individual ***and*** neighborhood level are ***consistently*** associated with CVD in high-income countries. Socioeconomic factors can affect health status..”
    - “…lower levels of education are associated with a greater risk of CVD than higher levels of education are.”
    - “Individuals with lower incomes…higher circulating levels of catecholamines, higher cortisol levels, and increased blood pressure, which are all risk factors for CVD.”

Outside Encounter

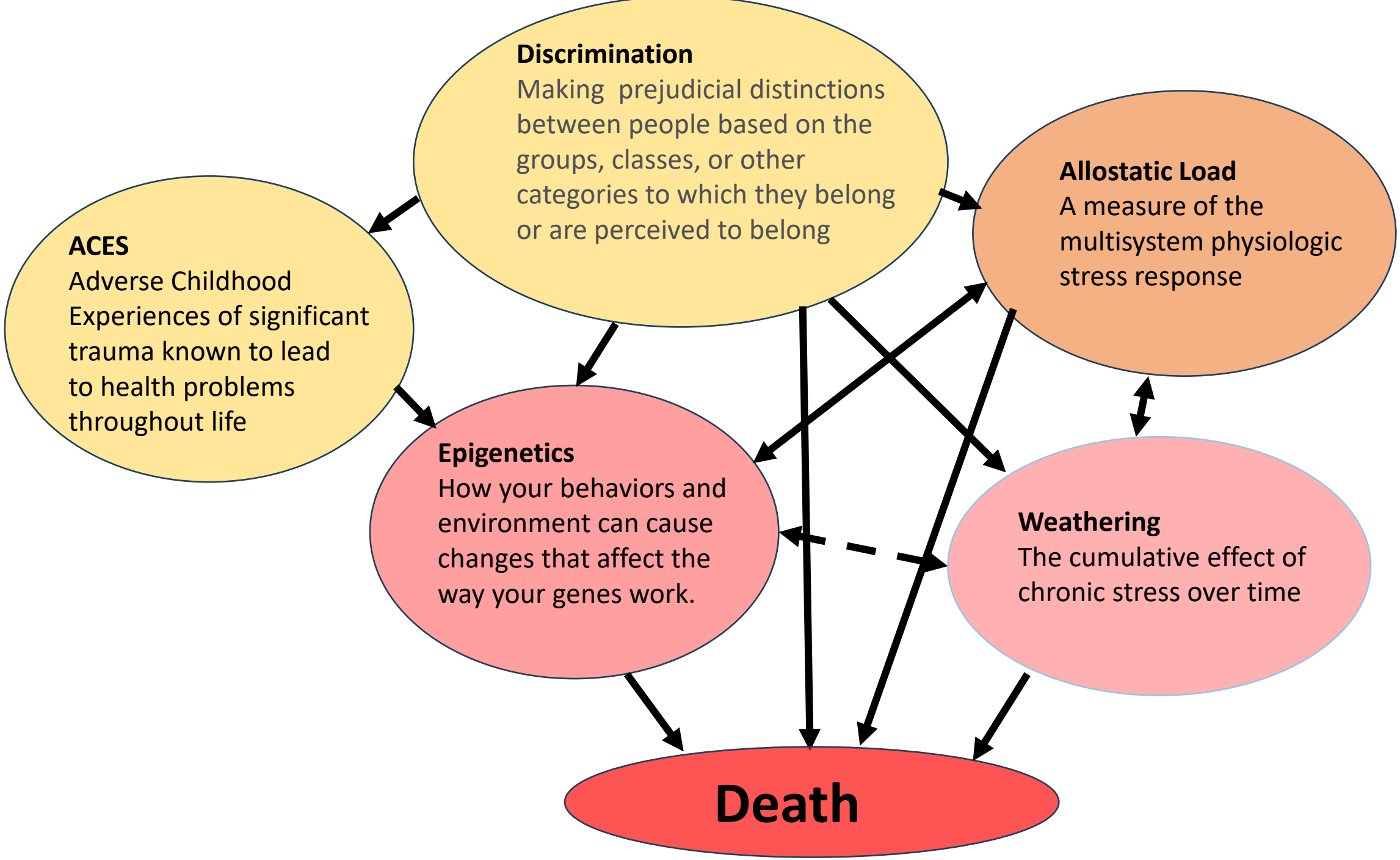
- Clinical Practice
  - Improve access – evening & weekend hours, bus fare, childcare
  - Build a referral support system
  - Social support navigators
  - Create safe inclusive clinic – build trust
  - Extra time for complex health/social needs

Community Level - Outside of Practice

- Advocacy
  - Partnerships with public health, community org & local leaders
  - Document clinical experience as evidence for advocacy
  - Community needs assessment & health planning
  - Clinical expert testimony - legislative bodies
  - Media

Key Points

- Health is multi-factorial
- Social impact on health comes from our culture, history, genetics-epigenetics, generational experiences and community interactions
- Discrimination engenders harsh consequences - personally, interpersonally, intergenerationally, and socially
- 3 dimensional approaches are required to partner with patients and optimize patient’s health outcomes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