

The Neurobiology of Trauma: including Historic and Intergenerational Trauma on the Development of Addictions and Eating Disorders

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Disclosure Information (Required)

- ◆ Presenter 1: Carolyn Coker Ross, MD, MPH, CEDS
 - ◆ No Disclosures

For an adult, experiences may alter **behavior**; but for a child, experiences provide the **organizing framework of the brain**.

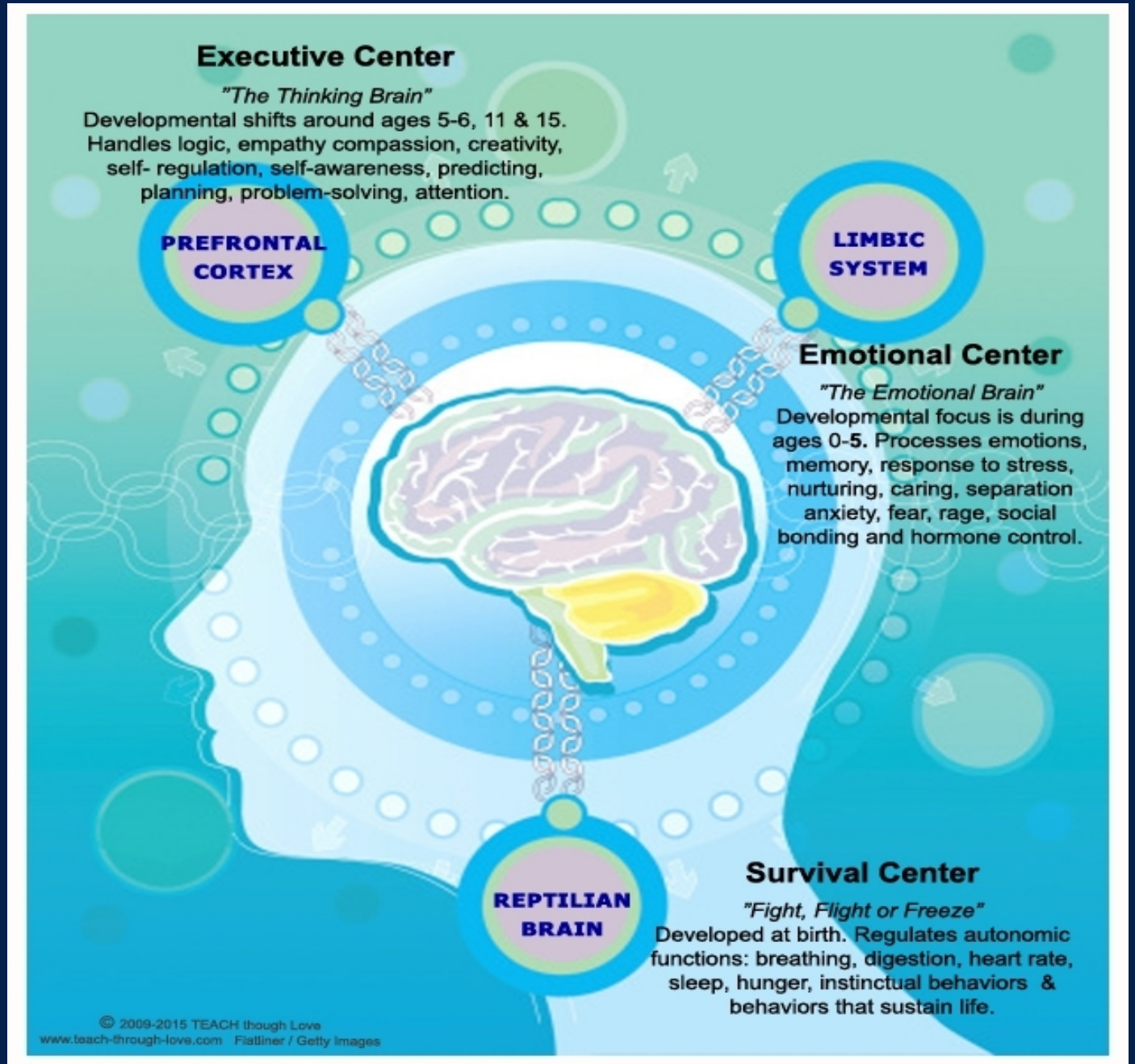
Perry, B 2009



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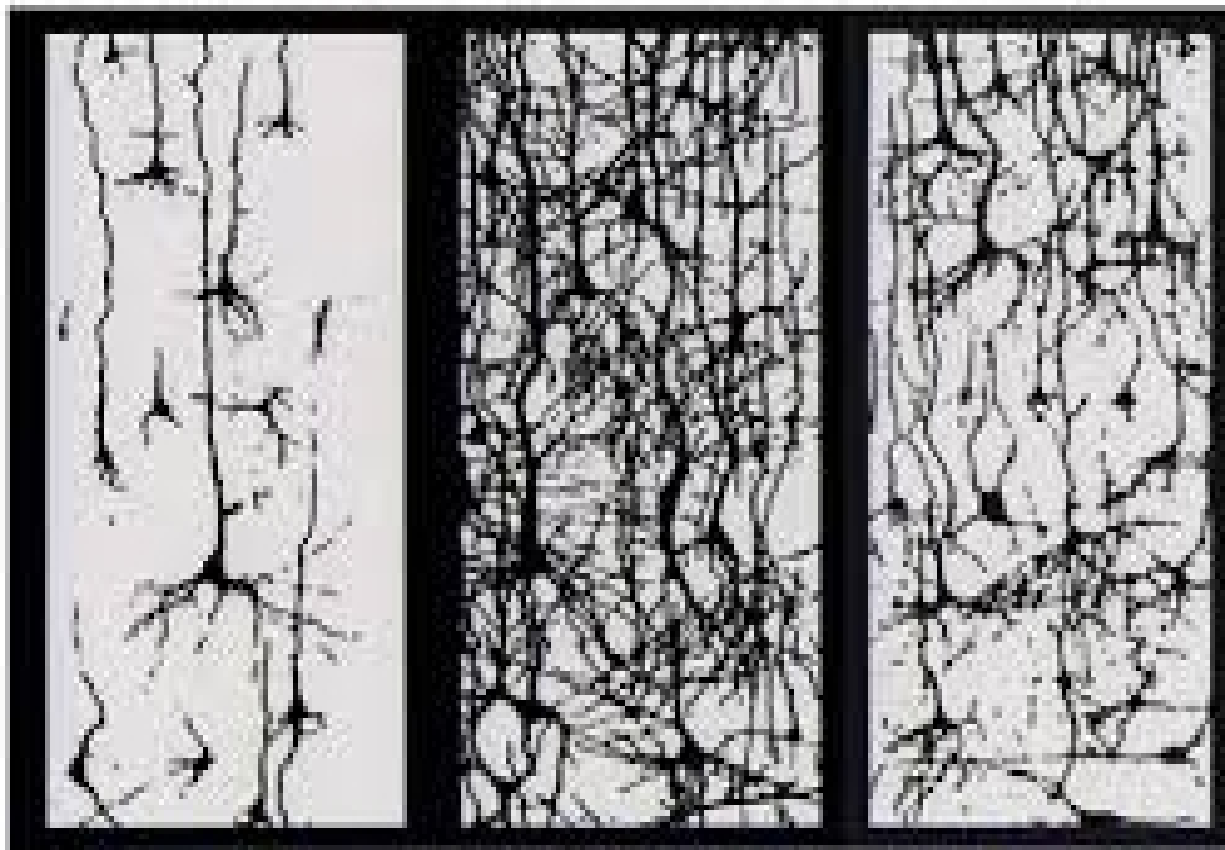
Brain Development

- ◆ Brain development is bottom up
- ◆ The organization of higher brain depends on input from the lower brain
- ◆ Use-dependent
- ◆ Timing is everything
- ◆ Model of brain recovery after stroke can be used for brain recovery after SUD



Petro L. Understanding Your Child's Brain Development. 2009-2015 [cited; Available from: <https://www.teach-through-love.com/child-brain-development.html>

Experience Shapes Brain Architecture by Over-Production of Connections Followed by Pruning



BIRTH

6 YEARS

14 YEARS

Brains and skills are built over time

- ◆ Experience shapes brain architecture
- ◆ Connections between neurons increase over time (not number)
- ◆ The connections that get used a lot strengthen & stay in place
- ◆ Connections that are not used frequently fade / are pruned
- ◆ USE IT OR LOSE IT
- ◆ TIMING IS EVERYTHING

1 Child HCotD. Making the World a Better Place - One Child at a Time. 2014 [cited; Available from: <https://hollismontessori.org/blog/?offset=1413854654321>



The brain has plasticity but this is most available in younger ages

Neurodevelopment involves billions of interactions across multiple domains: multiple micro (synapse), macro domains (maternal-child interactions). These is what results in the dynamic expression of our genetic potential and the organization of nerve cells and synapses that make up the human brain. Maltreatment disrupts this process. **Trauma, neglect and other experiences of maltreatment (prenatal exposure to drugs or alcohol) or impaired early bonding all influence the human brain.**

- ◆ Perry B, 2009

Factors that affect brain



ACES AND THE
BRAIN



ATTACHMENT
DISORDERS



GENETICS



PERSONALITY



CULTURE AND
MEDIA



NUTRITION AND
BRAIN



ACTIVATION OF
THE STRESS
RESPONSE



SLEEP
DISRUPTION

Where does the problem begin?



- ◆ Mother's behaviors have important effects on the brain's growth and development
 - ◆ Prenatal nutrition
 - ◆ Prenatal Stress Exposure
 - ◆ Attachment
 - ◆ Stress in infancy, childhood
 - ◆ Schwarzenberg, 2018
 - ◆ Wachs, 2014
 - ◆ Scheinost, 2017

Nutrition is key in first 1000 days

- ◆ The brain is most vulnerable from last trimester of pregnancy to first two years of life.
- ◆ Gestational nutrition associated with neurodevelopment for single nutrients: iron, omega 3 fatty acids and folate.
- ◆ The diet of pregnant women, infants and children has lasting effects throughout lifetime
 - ◆ Wachs, 2014



Attachment and the Brain



- ◆ Early social environment directly impacts the limbic system, responsible for learning, memory and coping with stress
- ◆ Attachment insecurity mediates the relationship between childhood trauma and eating disorder and addiction psychopathology
 - ◆ (Tasca, et al., 2013)
- ◆ **Attachment insecurity can be seen as a general vulnerability to mental disorders**



Examples of Toxic Stress

- ◆ Child maltreatment
- ◆ Living in under-resourced or racially segregated neighborhoods
- ◆ Frequently moving,
- ◆ Experiencing food insecurity

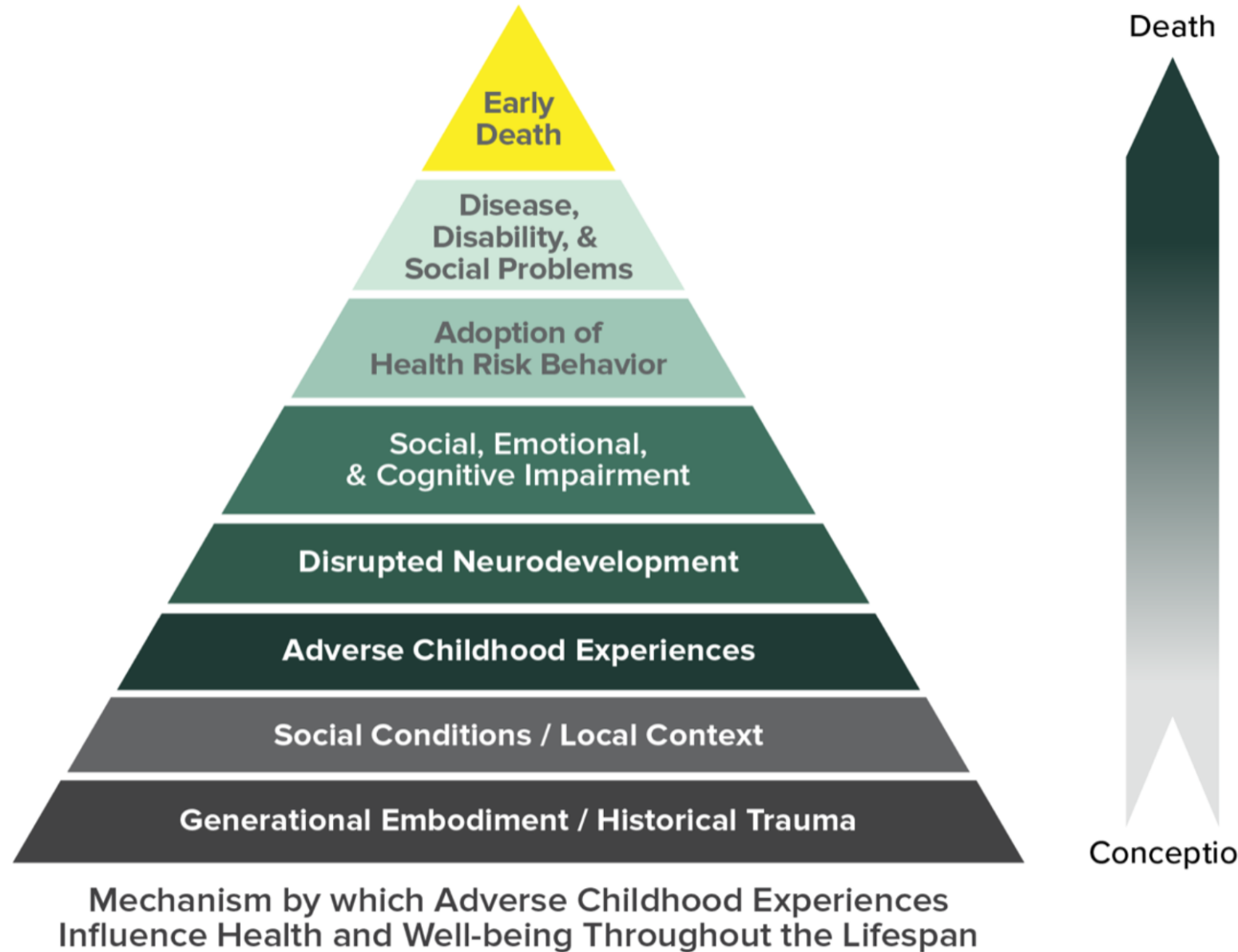


<https://www.earlychildhoodcoalitioncentraltexas.org/>

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Trauma

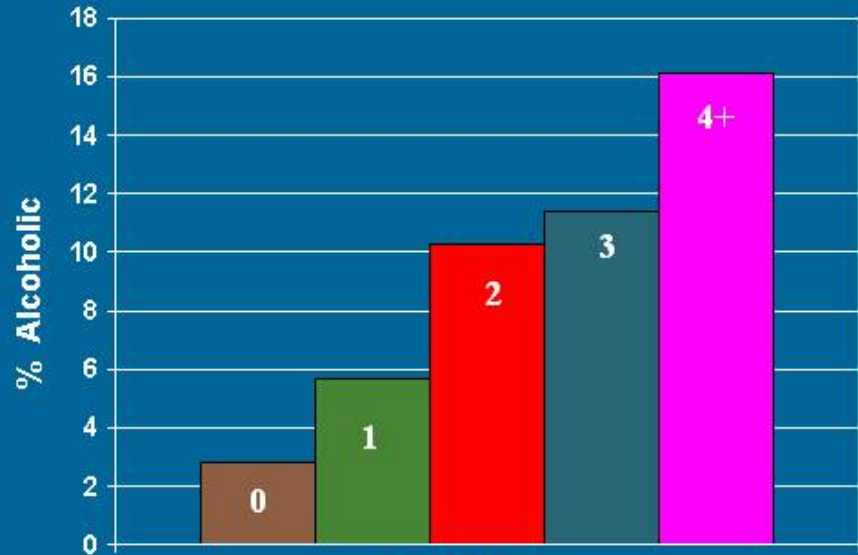
- ◆ Addiction has its' roots in childhood trauma
- ◆ Trauma is defined as the **loss of some essential part of yourself**, like a sense of peace, vitality or presence. (or safety or trust)
 - ◆ Gabor Mate'



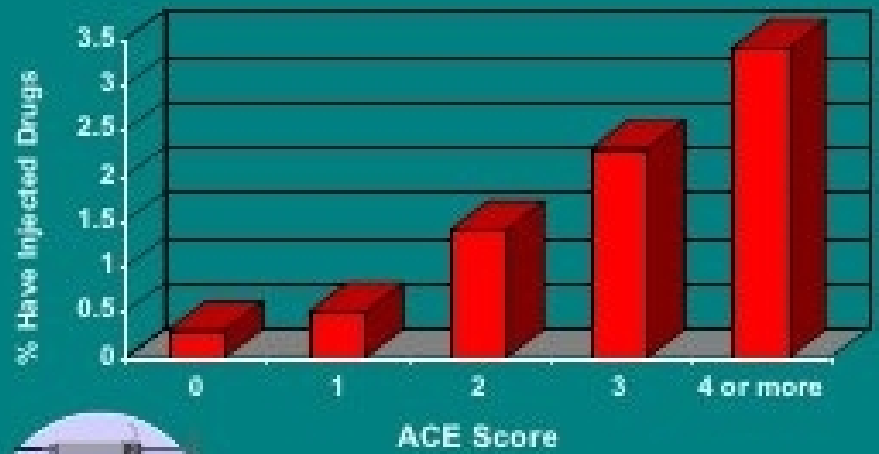
Giovanelli A, Mondri CF, Reynolds AJ, Ou S-R. Adverse childhood experiences: Mechanisms of risk and resilience in a longitudinal urban cohort. *Development and psychopathology*. 2020;32(4):1418-39.

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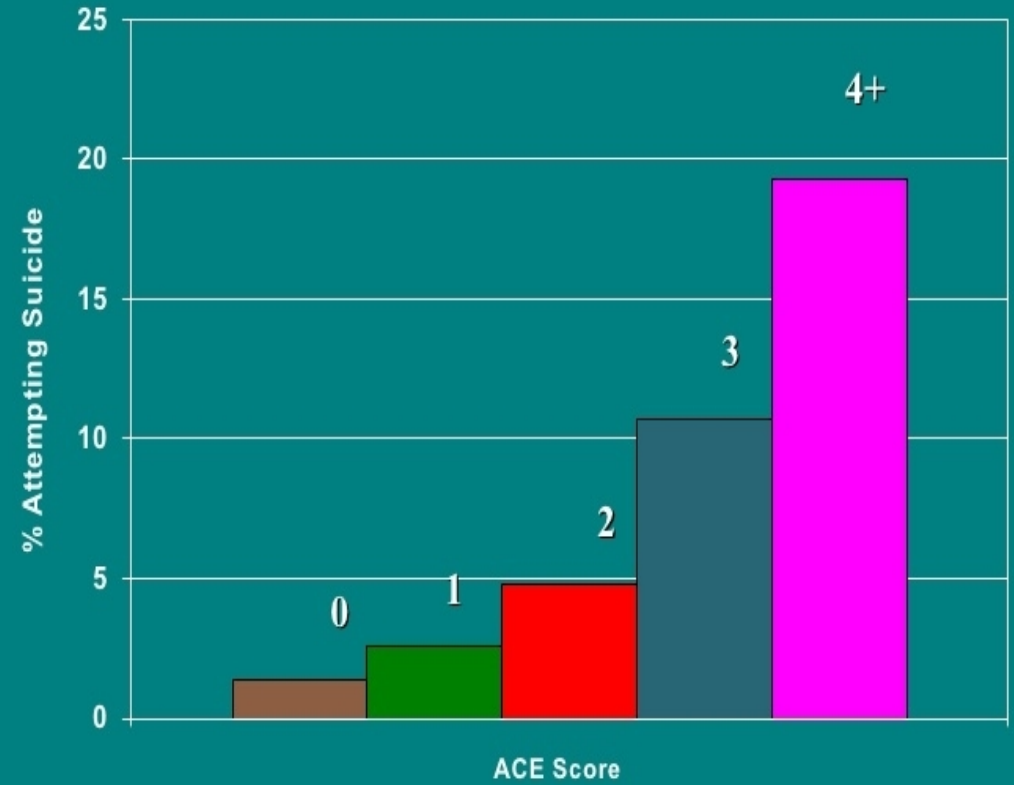
Adult Alcoholism



ACE Score and Intravenous Drug Use



Childhood Experiences Underlie Suicide



Larkin DH. ACES Implications. 2009 [cited; Available from: <https://www.slideshare.net/NYSPEP/aces-implications>]

BEHAVIOR



of physical activity



Smoking



Alcoholism



Drug use



Missed work

PHYSICAL & MENTAL HEALTH



Severe obesity



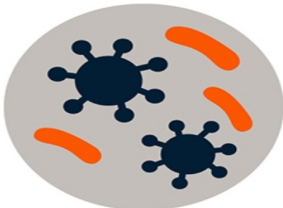
Diabetes



Depression



Suicide attempts



STDs



Heart disease



Cancer



Stroke



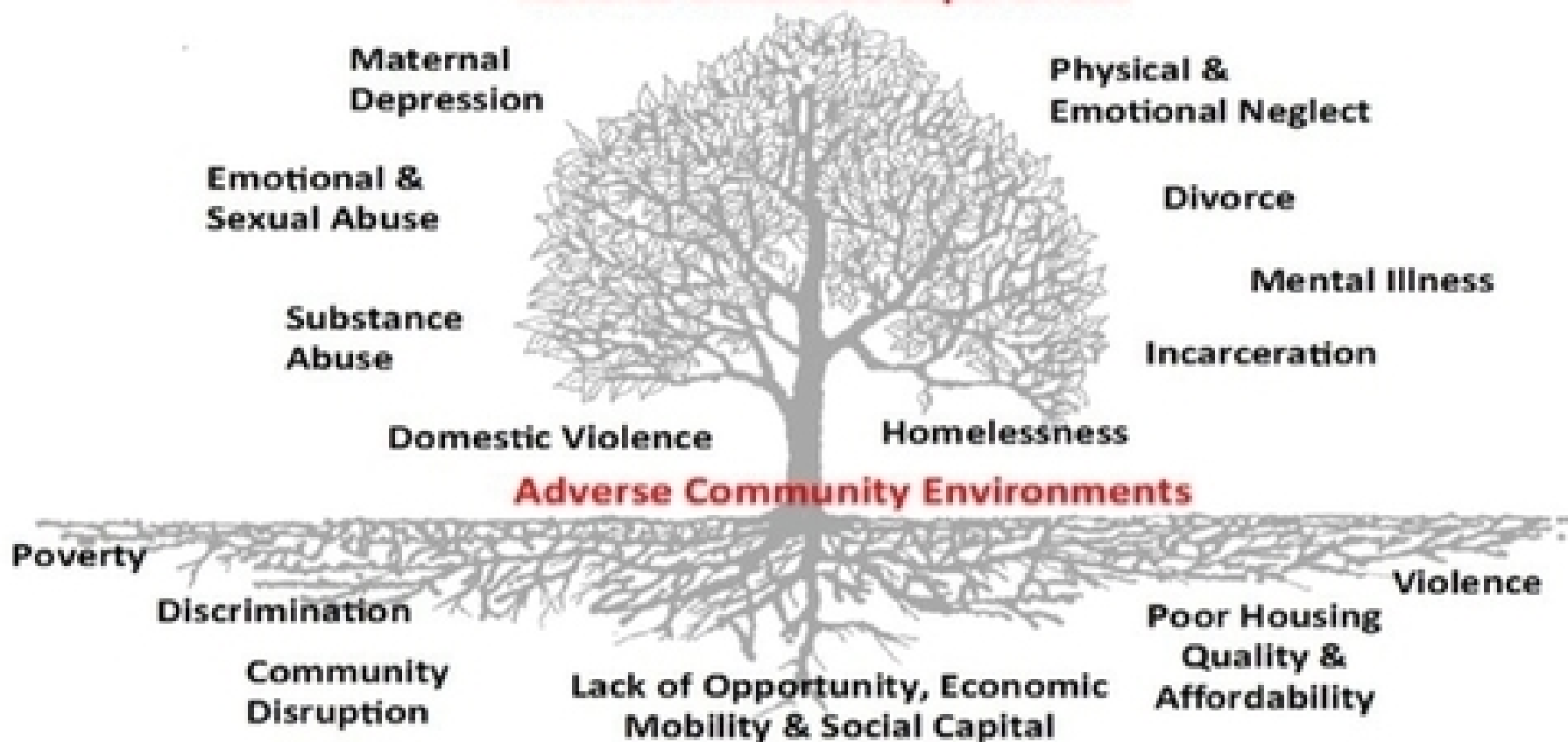
COPD



Broken bones

The Pair of ACEs

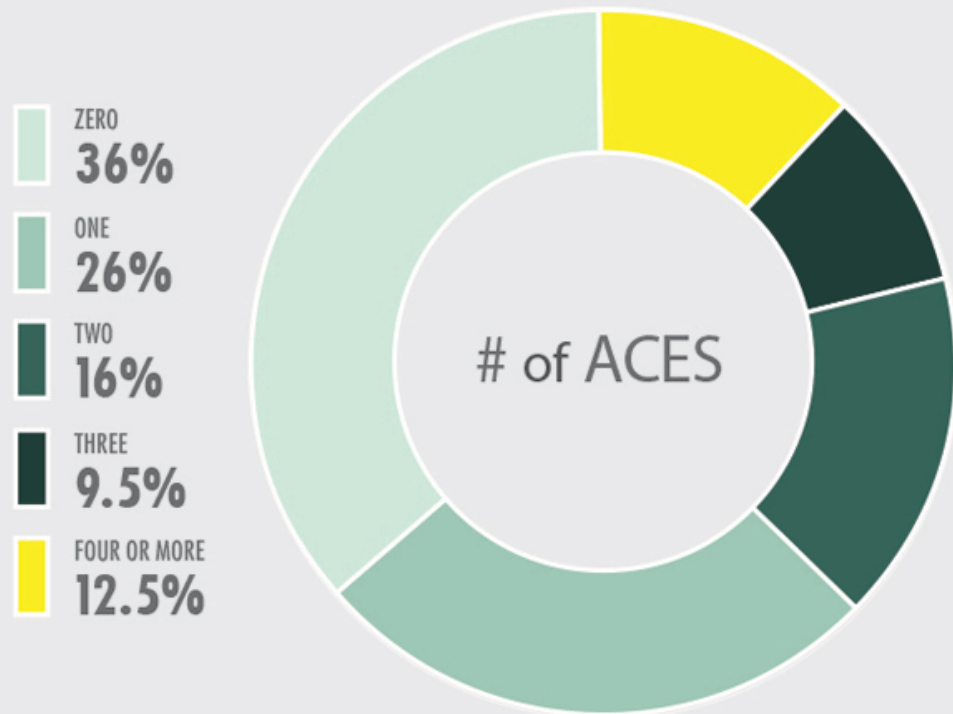
Adverse Childhood Experiences



Ellis, W., Dietz, W. (2017) A New Framework for Addressing Adverse Childhood and Community Experiences: The Building Community Resilience (BCR) Model. *Academic Pediatrics*. 17 (2017) pp. S86-S93. DOI information: 10.1016/j.acap.2016.12.011

How Common are ACES?

ACE Study



ACEs are Common

- ◆ Across all racial groups, **black and Hispanic** children were exposed to **more adversities** than white children
 - ◆ Income disparities in exposure were larger than racial disparities
 - ◆ (Slopen et al., 2016)
- ◆ Exposure to trauma is high in African-Americans living in **stressful urban environments**. Lifetime prevalence of PTSD after trauma was 51% in a study of A-A patients in PCP offices. Females>Males
 - ◆ Alim et al., 2006

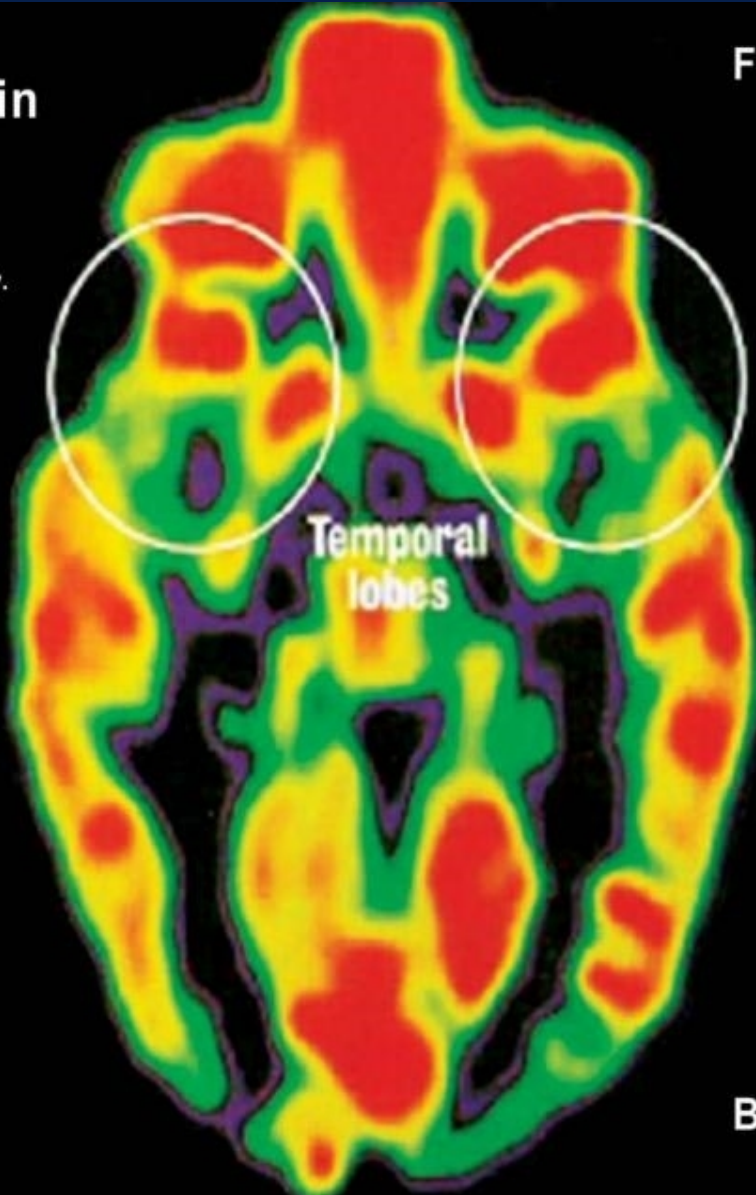
Robertson CL, Simpson TA. Introduction of the ETSU Ballard Health Strong BRAIN Institute. 2020.

Trauma

- ◆ 9.1% of African Americans have been diagnosed with PTSD (vs. 6.8% of Whites)
 - ◆ Anda and Felitti, 2009
- ◆ In a study that included 58% A-A children:
 - ◆ **67.2% had one or more ACE** (compared to 52% in the Felitti study)
 - ◆ >4 ACEs was associated with increased obesity and learning / behavior issues
 - ◆ Burke et al. 2011

Healthy Brain

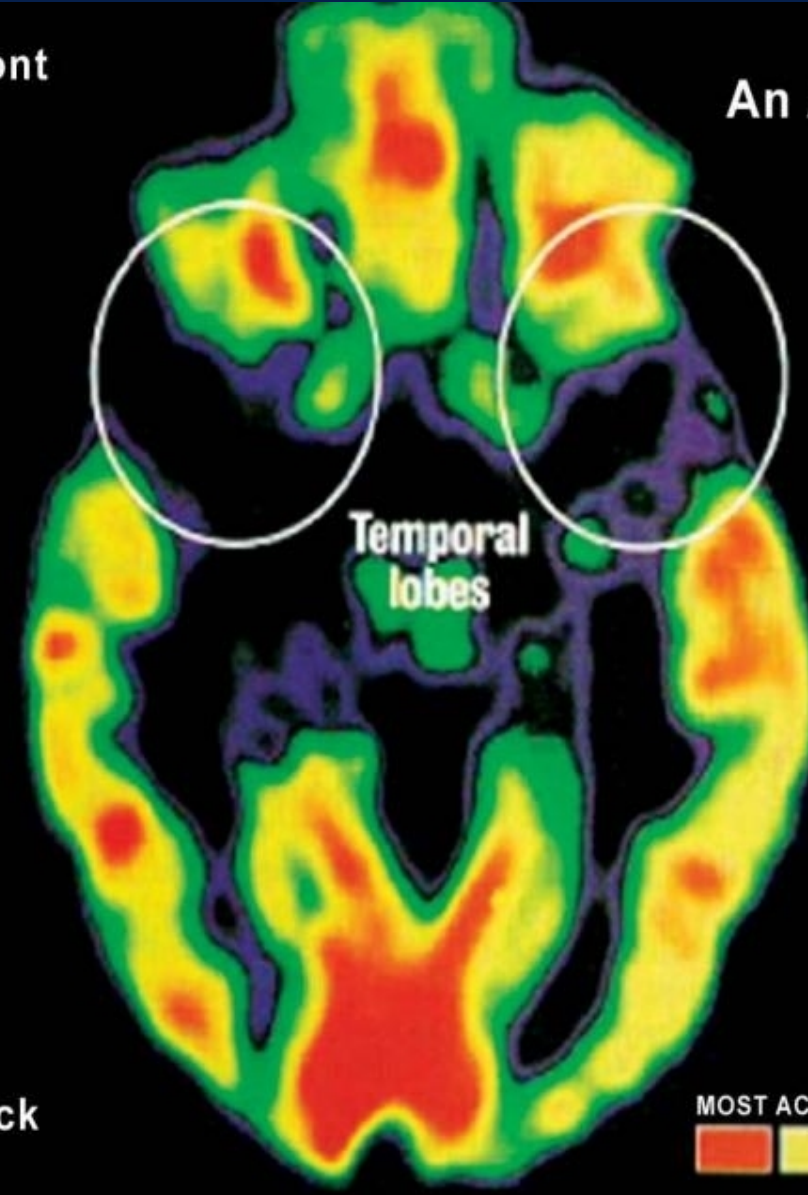
This PET scan of the brain of a normal child shows regions of high (red) and low (blue and black) activity. At birth, only primitive structures such as the brain stem (center) are fully functional; in regions like the temporal lobes (top), early childhood experiences wire the circuits.



Front

An Abused Brain

This PET scan of the brain of a Romanian Orphan, who was institutionalized shortly after birth, shows the effect of extreme deprivation in infancy. The temporal lobes (top), which regulate emotions and receive input from the senses, are nearly quiescent. Such children suffer emotional and cognitive problems.



Back



Klein S. THE POWER OF HEAD START TO HEAL HURTING FAMILIES: Promising Evidence from Research. 2019.

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Trauma and the Brain

- ◆ Developmental Trauma Disorder (DTD) (OR=2.0-3.8) and PTSD (OR=1.8-3) were associated with previous physical assault and/or abuse, violence in the family, emotional abuse, neglect, and impaired caregivers; and DTD was associated community violence (OR=2.7)
- ◆ When controlling for PTSD symptoms, interpersonal trauma and attachment adversity was associated with highest DTD symptoms.
- ◆ “.....the impact of trauma is upon the survival or animal part of the brain. That means that our automatic danger signals are disturbed, and we become **hyper- or hypo-active: aroused** or numbed out. We become like frightened animals. **We cannot reason ourselves out of being frightened or upset.**”

Of course, talking can be very helpful in acknowledging the reality about what’s happened and how it’s affected you, but **talking about it doesn’t put it behind you because it doesn’t go deep enough into the survival brain.”**

- ◆ Spinazzola and Van der Kolk 2018
- ◆ Van der Kolk - <https://www.psychotherapy.net/interview/bessel-van-der-kolk-trauma>

Attachment and Substance Use Disorders

- ◆ Attachment adversity has been found to be associated with severe, complex, and chronic biopsychosocial impairment in childhood and across the lifespan
- ◆ Insecurely attached individuals engage in more substance use than those with secure attachments.
- ◆ Insecure attachment precedes substance use and endures throughout the lifespan
- ◆ Early attachment style predicts later changes in substance use more than substance use predicts later changes in attachment style.
 - ◆ ([Burkett & Young, 2012](#); [Insel, 2003](#)).
 - ◆ [Fairbairn](#) CE, et al. 2018
 - ◆ Berthelot et al., [2015](#)

TRAUMA AND SUBSTANCE USE DISORDERS



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SUD and Trauma

- ◆ Farley et al. (2004) – **89% of clients seeking treatment for SUD** had at least one traumatic experience.
- ◆ Gielen et al. (2012) – found **significantly higher trauma and PTSD in individuals with SUD** vs. those without. Clinicians did not often recognize or screen for trauma
- ◆ **Prevalence of PTSD in SUD clients is 3 X higher** than in gen pop (25-49%) (Driessen et al., [2008](#))
- ◆ **Poorer outcomes in SUD if PTSD is left untreated** (Mills et al. [2005](#))

CHILDHOOD TRAUMA IN A COMMUNITY SAMPLE OF WOMEN WITH SUD

60 % with sexual abuse

55% with physical abuse

46% with emotional abuse

83% were emotionally
neglected

59% were physically neglected

Lotzin A - 2019

Trauma and SUD

PTSD plus SUD:

- ◆ Poorer outcomes
- ◆ Increased physical health problems
- ◆ Poorer social functioning
- ◆ Higher rates of suicide attempts
- ◆ More legal problems
- ◆ Increased risk of violence
- ◆ Worse treatment adherence
- ◆ Less improvement during treatment

[McCauley](#) et al., 2012



Intergenerational Trauma

“...a childhood history of maltreatment increases the odds of maltreating offspring by a factor of 1.3 to 5.3 depending on the sample and the severity of the parent’s abuse history.”

- ◆ CDC Intergen.Trauma, Journal of Adolescent Health 53 (2013) S1eS3

Definitions

- ◆ Transgenerational trauma, or intergenerational trauma is a psychological term which asserts that the effects of trauma can be transferred in between generations. intergenerational trauma refers to the specific experience of trauma across familial generations, but does not necessarily imply a shared group trauma
- ◆ Historical trauma is multigenerational trauma experienced by a specific cultural, racial or ethnic group. It is related to major events that oppressed a particular group of people because of their status as oppressed, such as slavery, the Holocaust, forced migration, and the violent colonization of Native Americans.
- ◆ Instances of Transgenerational trauma where the trauma is a shared experience amongst a group of people and their role in society, are often referred to as historical trauma.

Intergenerational Trauma (IGT)

- ◆ Mechanisms of IGT:
 - ◆ impact on the attachment relationship with caregivers;
 - ◆ the impact on parenting and family functioning;
 - ◆ the association with parental physical and mental illness;
 - ◆ disconnection and alienation from extended family, culture and society.
- ◆ These effects are exacerbated by exposure to **continuing high levels of stress and trauma** including multiple bereavements and other losses, the process of **vicarious traumatization** where children witness the on-going effect of the original trauma, which a parent or other family member has experienced.
- ◆ Even where children are protected from the traumatic stories of their ancestors, the **effects of past traumas still impact on children in the form of ill health, family dysfunction, community violence, psychological morbidity and early mortality.**

- ◆ DeMaio, et al. 2005

Intergenerational Trauma Research

- ◆ Union Army Soldier study
 - ◆ Malnutrition of war
- ◆ Animal studies
- ◆ The Hunger Winter
- ◆ Racial Discrimination
- ◆ Methylation in offspring of Holocaust survivors

- Costa DL - **2018**
- Chan JC - **2018**
- Bygren LO – **2013**
- Benner AD – **2009**
- Yehuda R - **2016**



Intergenerational Trauma

- ◆ Children of those with Alcohol Use Disorder
- ◆ Children of veterans with PTSD
 - ◆ [Aust. N.Z. J. Psychiatry 2001;35:345-51](#)
- ◆ Children of Vietnam veterans
 - ◆ [J. Trauma Stress 2002;15:351-7](#)

Intergenerational Trauma Questions

1. When did your ancestors settle in America?
 1. Did they come voluntarily or were they refugees, servants, or enslaved people? Were they fleeing brutality, oppression, plague, war or poverty? Did they come here in search of a better life?
2. What traumatic events directly affected your mother? Your father? How did affect the choices they made later? How did it affect they way they raised you?
3. What traumatic events directly affected your grandparents? How did affect the choices they made later?
4. When your mother was pregnant with you, was the pregnancy easy or difficult for her? Was she generally healthy or ill; happy or depressed? What else was going on for her or in the family?

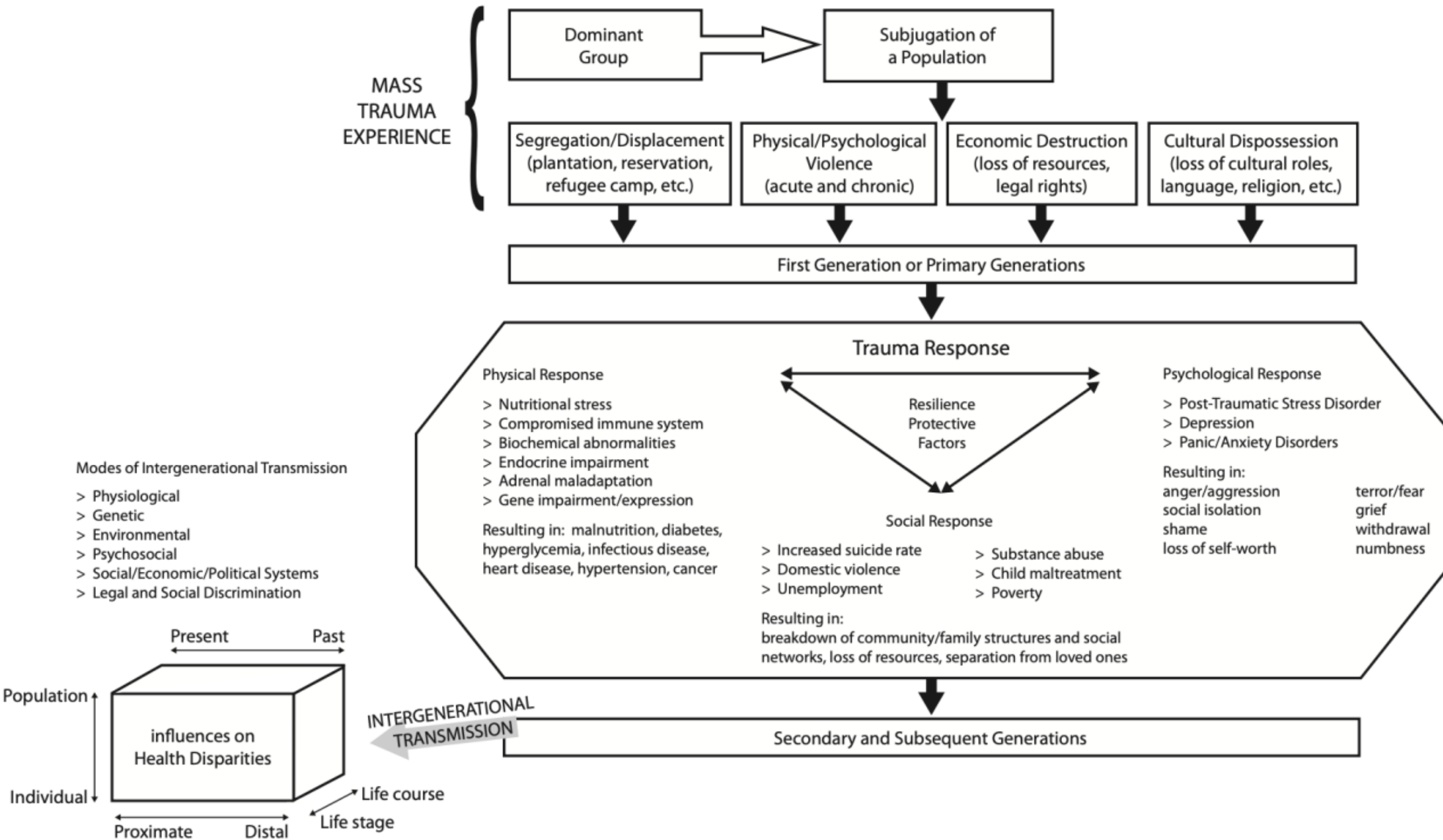
Historical Trauma

- ◆ Historical trauma requires 5 factors:
 - ◆ Trauma is deliberately and systematically inflicted on a target population by a subjugating, dominant population
 - ◆ Not a single event / continues over an extended period of time
 - ◆ The traumatic events result in collective suffering
 - ◆ Those inflicting the trauma do so with malicious intent
 - ◆ The magnitude of the trauma derails the population
 - ◆ O'Neill 2018
- ◆ Historical trauma affects a large population and is more complex than individual trauma → results in a greater loss of identity and meaning
 - ◆ Eyerman 2004



Friedbauer M. Healing old wounds: Historical trauma. The Daily of the University of Washington. 2019.

Figure 1. Conceptual Model of Historical Trauma



Examples of Historical Trauma

- ◆ Holocaust
- ◆ Slavery
 - ◆ African Americans experienced generations of slavery, segregation, and institutionalized racism that has contributed to physical, psychological, and spiritual trauma (DeGruy, 2005).
- ◆ Japanese Internment
 - ◆ The children and grandchildren of survivors commonly experience attachment issues and isolation by their parents (Danieli, 1980).
- ◆ Immigration Trauma
- ◆ Genocide Survivors
- ◆ Violent colonization of Native Americans/Alaska Natives
 - ◆ Repeated massacres and the forced removal of children to federal and mission boarding and day schools (Brave Heart, 2003)

Historical Trauma

- ◆ Populations historically subjected to long-term, mass trauma exhibit a higher **prevalence of disease even several generations after the original trauma occurred.**
 - ◆ Disease is from both **physical and psychological stressors**
 - ◆ There are **political and economic determinants of health and disease** – unjust power relationships and class inequity
 - ◆ There is a multilevel dynamic and **interdependence of present and past life course factors that cause disease.**

Offspring of Holocaust Survivors

- ◆ Two comprehensive reviews reported that in non- clinical populations, offspring of Holocaust survivors did not demonstrate higher rates of psychopathology.
 - ◆ When parental PTSD was taken into account, Holocaust offspring demonstrated higher rates of PTSD in association with maternal PTSD, and higher rates of mood and anxiety disorders in association with PTSD in either parent
 - ◆ Period of development in which survivors were exposed to trauma also has relevance (child, adolescence, etc.) and interval between exposure and conception
- ◆ When exposed to trauma, children of survivors are twice as likely as others to develop PTSD
 - ◆ Yehuda, Halligan, & Grossman, 2001

OHS STUDIES

- ◆ Holocaust survivors with PTSD – 50% recovery
- ◆ However, when faced with life- threatening medical conditions, Holocaust survivors responded with more distress and negative emotion than matched contrast patients
- ◆ When exposed to trauma, children of survivors are twice as likely as others to develop PTSD
 - ◆ Yehuda, Halligan, & Grossman, 2001
- ◆ When diagnosed with breast cancer, the second-generation women (OHS) responded with much more distress and psychiatric symptomatology than controls
- ◆ Some evidence that Holocaust survivors formed **more anxious and less secure attachment with their children, and especially women survivors with their daughters**
- ◆ Mothers (OHS) who are more Holocaust exposed have daughters who are more eating disordered.
 - ◆ Zohar, 2007

INTERGENERATIONAL TRAUMA

- Trauma experienced
- Behavioral changes
- Epigenetic changes, such as methylation of DNA and alteration of RNA

Holocaust Survivor



Grandmother



Offspring

- Affected by psychic numbing



Mother

- Emotional abuse & neglect
- Obesity and alcoholism
- Epigenetic memory



- Addiction, obesity, depression, anxiety
- Epigenetic memory



Historical Trauma Requires Subjugation

- ◆ Overwhelming physical and psychological violence
- ◆ Segregation and/or displacement
- ◆ Economic deprivation
- ◆ Cultural dispossession

Sotero M - 2006

Historical Trauma – Native American

- ◆ *“The cumulative emotional and psychological wounding over the lifespan and across generations, emanating from massive group trauma experience.”*
 - ◆ Maria Yellow Horse Brave Heart - **2011**

Boarding School Era



1. “Kill the Indian, Save the Man”- **1900**
 - ◆ Motto of the Carlisle School
 - ◆ Sexual, manual, physical and mental abuse – highest in church-run schools
2. Meriam Report – **1928**
 - ◆ Widespread infectious diseases
 - ◆ Malnutrition
 - ◆ Overcrowding
 - ◆ Poor sanitation
 - ◆ Overwork
 - ◆ Death rates = 6.5 times higher than for other ethnic groups
3. Indian Child Welfare Act – **1978**



Torres SB. Beyond Colonizing Epistemicides: Toward a Decolonizing Framework for Indigenous Education. 2019.

Historical Trauma in Native Populations

- ◆ A breakdown of traditional Native family values
- ◆ Alcohol and other substance abuse
- ◆ Depression, anxiety, and suicidality,
- ◆ Child abuse and neglect and domestic violence,
- ◆ Posttraumatic stress disorder,
- ◆ General loss of meaning and sense of hope,
- ◆ Internalized oppression, self-hatred

UNDERSTANDING HISTORICAL TRAUMA WHEN RESPONDING TO AN EVENT IN INDIAN COUNTRY. <http://store.samhsa.gov>; 2014. p. 4.

Native American / Alaska Native

- ◆ 566 different tribal nations, numerous different cultures and languages, and numerous different experiences of historical loss
- ◆ Lowest income, least education, highest poverty level, and lowest life expectancy of any population
- ◆ Native adults are at greater risk of experiencing psychological distress, and more likely to have poorer overall physical and mental health
- ◆ Highest suicide rate
 - ◆ Suicide rate has increased 139% in women and 71% for men (vs. 33% for US) since 1999
 - ◆ Curtin SC - 2019.

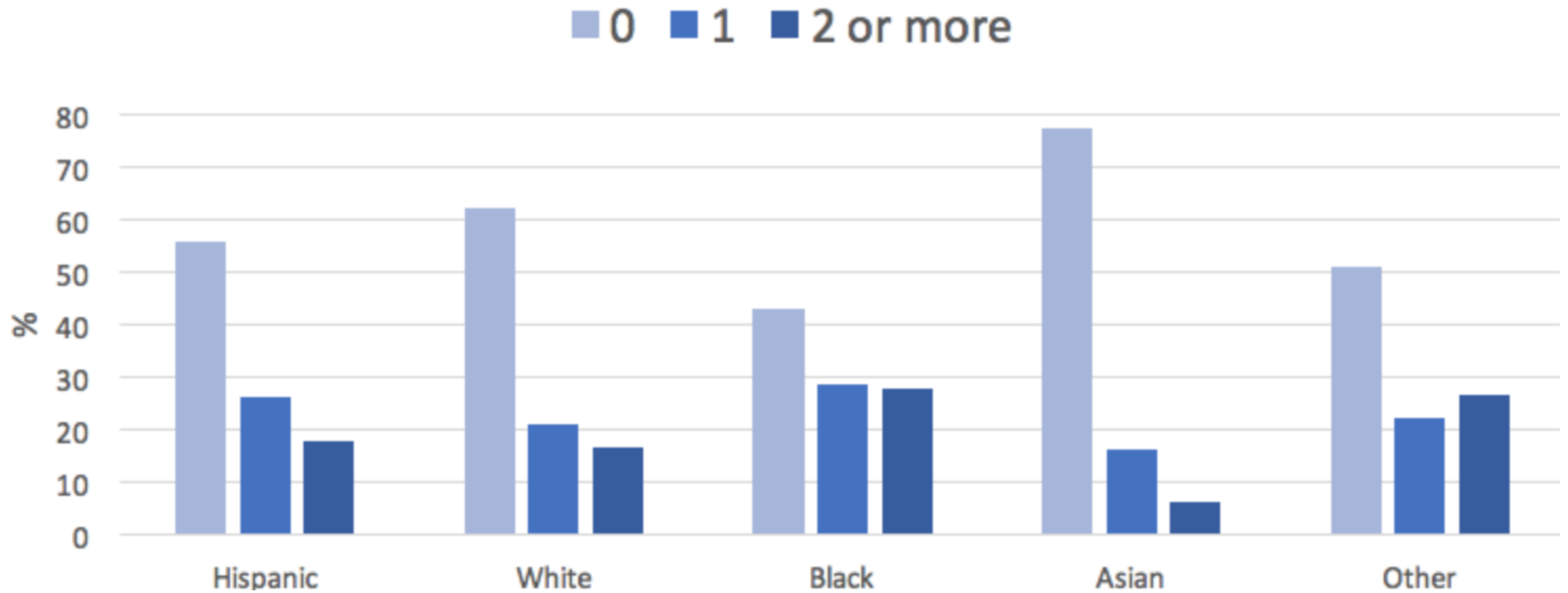
Historical Trauma: Legacy of Slavery

- ◆ Historical trauma and ongoing discrimination and racial abuse
- ◆ Medical experimentation → Longstanding distrust of the medical and mental Health professions
- ◆ Displacement beginning with separation of family in slavery; followed by mass incarceration and further family separation and fracture of families leading to economic deprivation
- ◆ PTSS

Post-Traumatic Slave Syndrome



Table 1. Number of ACEs by Child Race/Ethnicity



Richards O. Racism is an Adverse Childhood Experience (ACE).
2020.

Psychoanalysis' Refusal to Remember

- ◆ “Refusal to remember, denial, disassociation and disavowal are all echoed in the absence of slavery from the trauma literature, and until recently, from psychoanalytic literature. Trauma literature gives attention to the Holocaust, floods, earthquakes, sexual abuse, rape, etc. but not to slavery and racism.”
 - ◆ The Intergenerational Trauma of Slavery and its Aftermath Graff, Gilda The Journal of Psychohistory; Winter 2014; 41, 3; ProQuest Central Essentials pg. 181

SIGNIFICANCE

Median Household Income and Race, 2013

Racial Differences in Income are Substantial:

1 dollar



White

1.15 dollar



Asian

70 cents



Hispanic

59 cents



Black

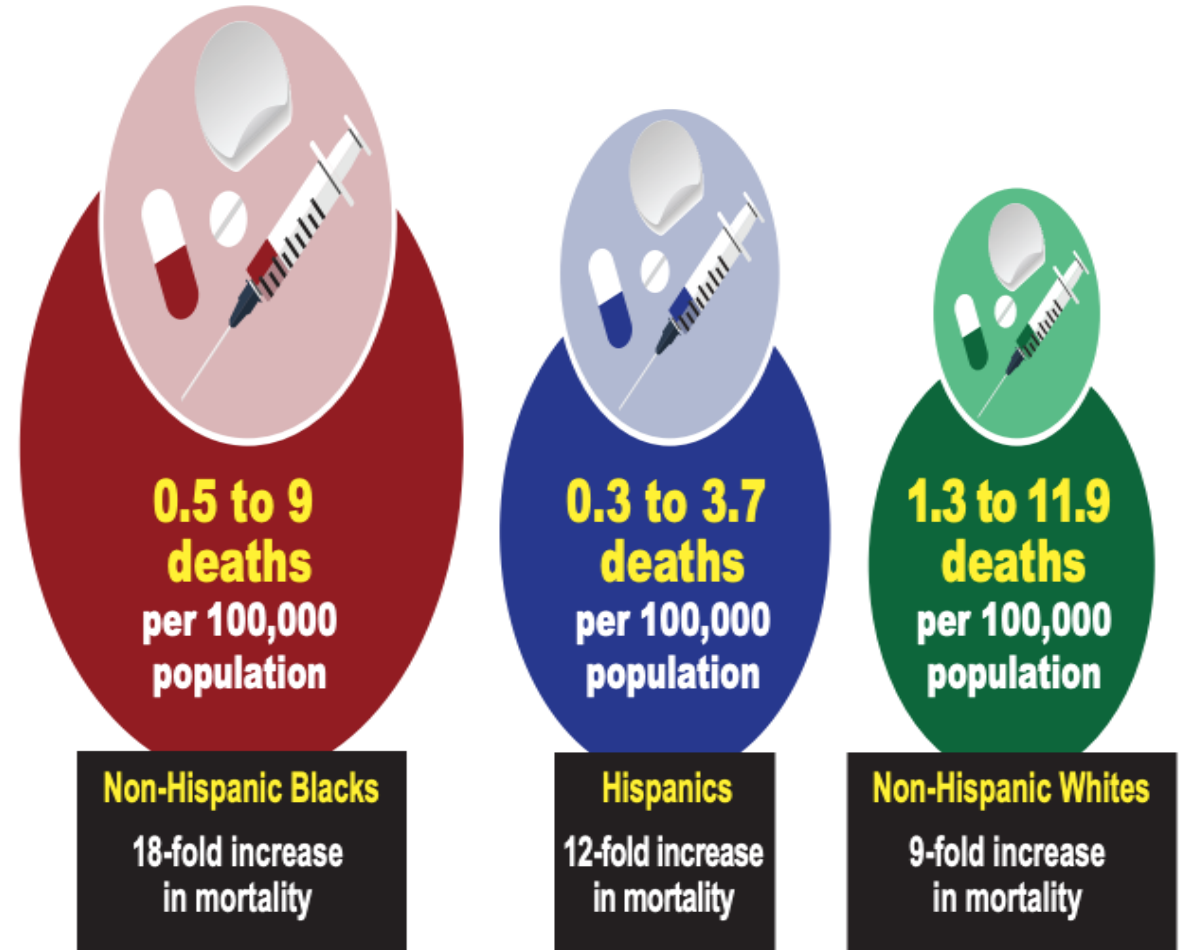
U.S. Census Bureau (DeNavas – Walt and Proctor 2014)

Blacks make up 13% of the US population but:

- ◆ 30% of Black households have no husband present vs. 9% of white households
- ◆ 27% of Blacks live below the poverty line vs. 10.8% of whites
- ◆ Death rates for A-A is higher than for whites for heart disease, stroke, cancer, asthma, Flu, pneumonia, diabetes, COVID
- ◆ A-A are less likely than the gen. pop. To be offered evidence-based medication therapy or psychotherapy
- ◆ More frequently diagnosed with schizophrenia
- ◆ Black people with schizophrenia, bipolar disorders or psychosis are more likely to be **incarcerated** than other races.

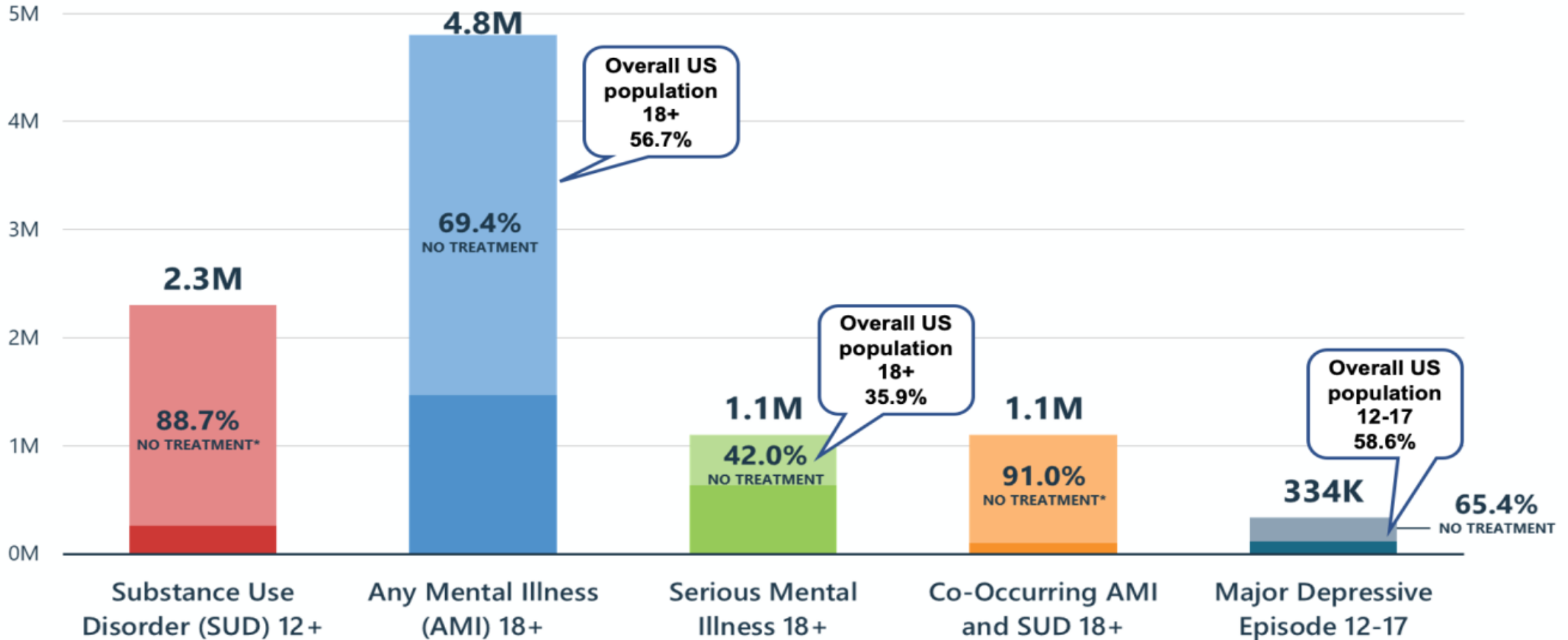
OPIOID DEATHS BY RACE

Drug overdose deaths involving **synthetic opioids other than methadone** per 100,000 population, by ethnicity, 2013-2017



Despite Consequences and Disease Burden, Treatment Gaps among African Americans Remain Vast

PAST YEAR, 2018 NSDUH, African American 12+



* No Treatment for SUD is defined as not receiving treatment at any location, such as a hospital (inpatient), rehabilitation facility (inpatient or outpatient), mental health center, emergency room, private doctor's office, self-help group, or prison/jail.

SAMHSA
Substance Abuse and Mental Health

WHAT IS THE PURPOSE OF TREATMENT?



Therapy must change the brain

- ◆ Childhood maltreatment → **disorganized** or poorly regulated networks (monoamine neurotransmitters) in the **lower brain**
- ◆ Current treatment targets the limbic or cortical (cognitive and relational interactions)
- ◆ Changing the brain requires **repetitions** to modify the neural pathways in the brain

Therapy must take into account and understand effects of systemic racism

<i>Pillar</i>	<i>Threat: Past Present and Future</i>	<i>Normative Psychological Response</i>	<i>Normative Adaptive Response</i>	<i>Negative Outcomes (if Adaptive Responses Fail)</i>
Security	Ongoing violence, poverty, lack of food, absence of medical care	Fear, anxiety, hyper-vigilance, insecurity	Security seeking, protectiveness, vigilance	Anxiety, post-traumatic stress
Attachment and Bonds	Forced separation, losses, disappearances	Grief, separation anxiety	Parental protectiveness, attention to restoring families and networks	Complicated grief, pathological separation anxiety, depression
Justice and Human Rights	Discrimination, racism, humiliation, degradation, rejection, incarceration, dehumanization	Suspicion, lack of trust in authorities, anger	Sensitisation to justice, universalism, human rights promotion and demanding of justice	Pathological anger and violence, loss of trust
Roles and Identity	Dispossession and deprivation, genocide, denial/inadequate rights to: work, residency, and self-support	Aimlessness, reduced awareness, loss of sense of belonging, reduced efficacy	Role confusion, recreation of new or hybrid roles and identities	Loss of direction, giving up, persisting aimlessness or persistent inactivity
Meaning and Coherence	Destruction of places of worship, banning of religious/spiritual activities, suppression of spiritual, political and cultural aspirations and practices	Loss of coherence, a feeling of disorientation and alienation from society Cultural disintegration	Rediscovery or regeneration of cultural, and religion/spirit, pursuit of social and political causes	Isolation, discontinuity, fragmentation, loss of coherence

5 Pillars of society And individual and Response to Trauma and Mass violence

Silove D. Adaptation, Ecosocial Safety Signals, and the Trajectory of PTSD. 2007.

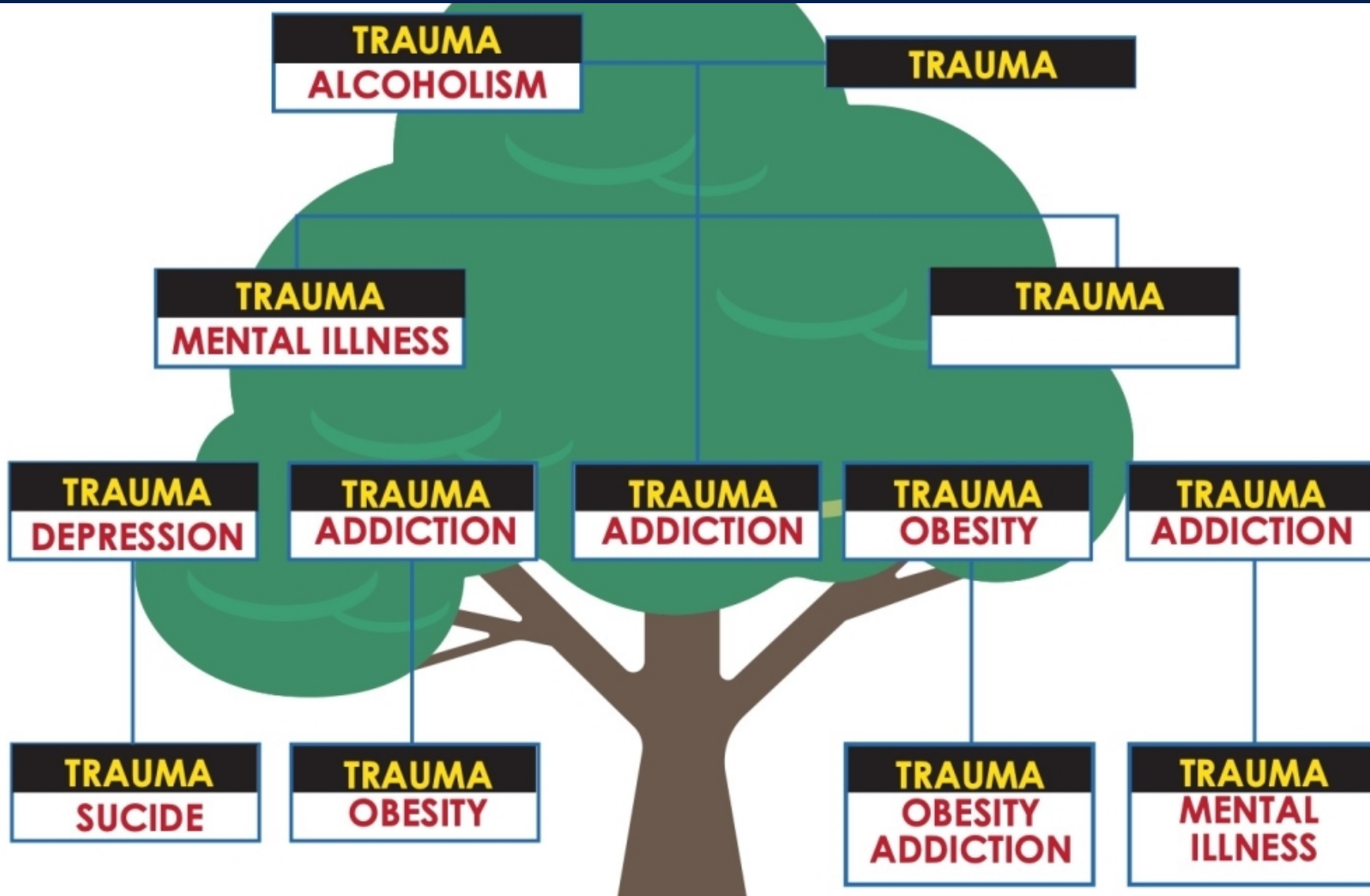
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FINAL TAKEAWAYS

- ◆ PATHWAY TO ADDICTION and ED
 - ◆ ACEs
 - ◆ Overwhelmed emotionally / hot wire / a dam
 - ◆ Response -
 - ◆ Self medicate with substances or food
 - ◆ Explode → anger, DV
 - ◆ Shut down
 - ◆ Act out
 - ◆ Core beliefs → I'm not worthy, I'm weak, I'm _____
 - ◆ Intergenerational Trauma - Pass on to next generations (EX. ACOA)
 - ◆ Relationship issues, social problems, **not reaching potential**
 - ◆ **THE PATTERN CONTINUES EVEN THOUGH THE ORIGIN IS FORGOTTEN OR DEEPLY BURIED**

Billy's Story







BILLY'S STORY



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