AGENDA

AAP-CA2 and First 5 LA ACEs Aware Peer-to-Peer Learning Session 1: ACEs Science – The Physiology of Toxic Stress

January 7, 2021 • 6:00 – 7:30 p.m.			
Item	**Description**	**Presenter**	**Time**
1	Welcome	Adam Schickedanz, MD, PhD, AAP-CA2 ACEs Committee Chair	6:00 – 6:10 (10 min)
2	ACEs Science: The Physiology of Toxic Stress	Christine Thang, MD, FAAP	6:10 – 6:35 (25 min)
3	Q&A	Christine Thang, MD, FAAP	6:35 – 6:40 (5 min)
4	Case Study	Christine Thang, MD, FAAP	6:40 – 6:45 (5 min)
5	Breakout: Discuss Case Study	Facilitators from AAP-CA2 ACEs Committee and First 5 LA	6:45 – 7:05 (20 min)
6	Report Out	Christine Thang, MD, FAAP	7:05 – 7:25 (20 min)
7	Closing and Evaluation	Tina Chinakarn, MPH, First 5 LA	7:25 – 7:30 (5 min)

Upcoming sessions will be posted on: https://aapca2.org/aces-aware/

BIOGRAPHY

Christine Thang, MD, FAAP

Dr. Christine Thang is an Assistant Clinical Professor in the Division of General Pediatrics at the David Geffen School of Medicine at UCLA. Dr. Thang is a board-certified pediatrician and member of the faculty practice at the UCLA Children's Health Center in Westwood, CA. She precepts medical students and resident physicians training in the UCLA Pediatrics Continuity Clinic. She is also one of the medical team providers for the UCLA Pediatrics Craniofacial Program.

Dr. Thang's educational interest lies in training pediatric residents to be trauma aware and responsive clinicians with the adoption of a national evidence-informed curriculum, the Pediatric Approach to Trauma, Treatment, and Resilience (PATTeR) program. The curriculum was adapted and piloted with UCLA pediatric interns starting in January 2020.

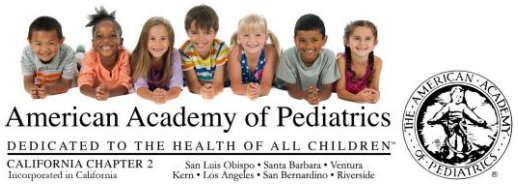
Dr. Thang currently holds AAP leadership positions in her local chapter and district, the Section on Early Career Physicians (SOECP), the Council on Foster Care, Adoption, and Kinship Care (COFCAKC), and the Community Access to Child Health (CATCH) Program. She is a graduate of the AAP Young Physicians Leadership Alliance (YPLA).

Dr. Thang grew up in Los Angeles, CA. She is a spirited Bruin alumna.

American Academy of Pediatrics – Chapter 2 (AAP-CA2)
and First 5 LA present:

ACEs Aware
Peer-to-Peer Learning Series

A Provider Engagement Activity



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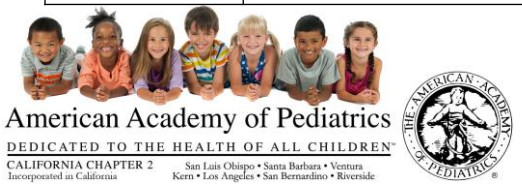
4	Clinical Case Study	Christine Thang, MD, FAAP	6:40 – 6:45 (5 min)
5	Breakouts: Discuss Case Study	Facilitators from AAP-CA2 ACEs Committee and First 5 LA	6:45 – 7:05 (20 min)
6	Idea Share from Breakouts	Christine Thang, MD, FAAP	7:05 – 7:25 (20 min)
7	Closing and Evaluation	Tina Chinakarn, MPH, First 5 LA	7:25 – 7:30 (5 min)



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Unmute yourself before you speak
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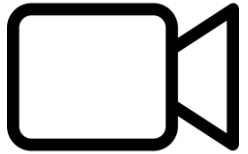

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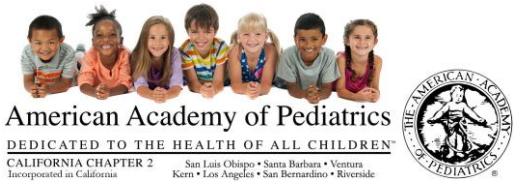

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ACEs Science:
The Physiology of Toxic Stress

Christine Thang, MD

Department of Pediatrics
University of California Los Angeles

January 7, 2021

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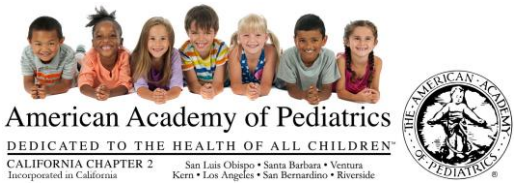
- I do not intend to discuss an unapproved/investigative use of a commercial product/device in our presentation.
- This session is part of an ACEs Aware Peer-to-Peer Learning Series funded by an ACEs Aware grant to First 5 LA.



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American Academy of Pediatrics: Pediatric Approach to Trauma, Treatment and Resilience

AAP, UMASS, & UCLA

Moira Szilagyi MD, PhD
(P.I.) Heather Forkey, MD
(P.D.)

Supported by an educational grant from the Substance Abuse and Mental Health Services Administration (SAMHSA) Grant 6U79SM080001-01M001

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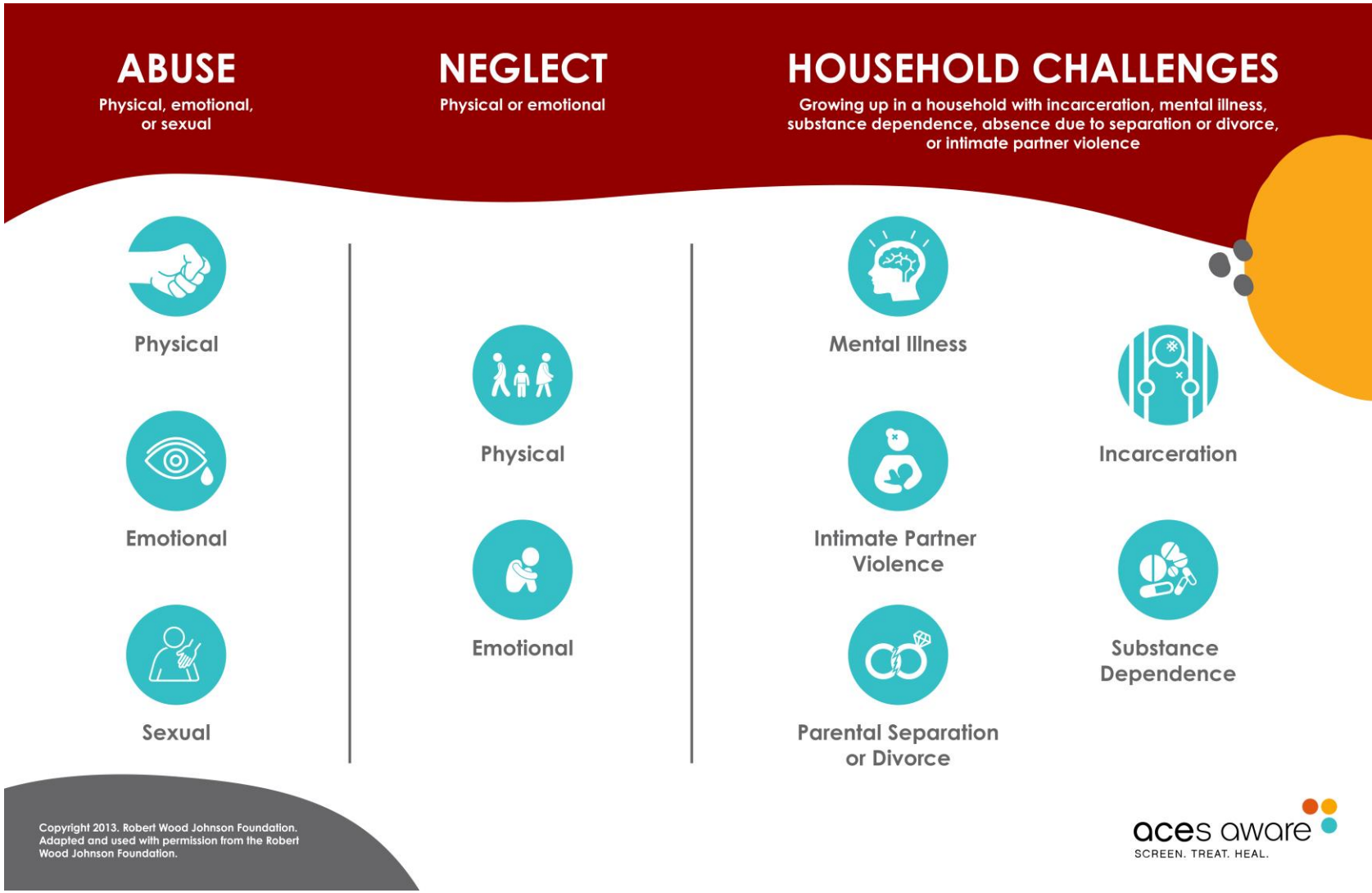
Learning Objectives

- To introduce the original Adverse Childhood Experiences (ACEs) Study
- To describe how toxic stress impacts three physiological mechanisms
- To identify variable responses to toxic stress depending on age
- To examine how toxic stress physiology relates to a pediatric clinical case

About the CDC-Kaiser ACE Study

- The original ACE Study was conducted at Kaiser Permanente in the 1990s with over 17,000 patients from Southern California.
  - Patients completed confidential surveys regarding their childhood experiences and current health status and behaviors



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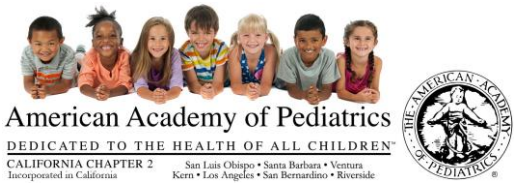
SCREEN. TREAT. HEAL.



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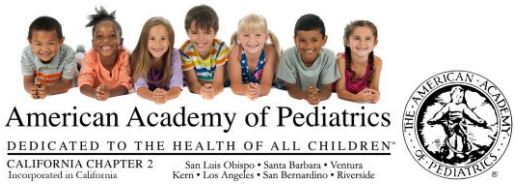
From Dr. Anda[1], Co-Principal Investigator to the ACE Study

- *ACEs are common.*
- *ACEs tend to occur in clusters, rather than single experiences.*
- *The cumulative impact of multiple exposures can be captured in an "ACE Score".*
- *The ACE Score likely captures the cumulative (neuro)developmental consequences of traumatic stress.*
- *The ACE Score has a strong, graded relationship to numerous health, social, and behavioral problems throughout a person's lifespan.*



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[1]Anda R. The Health and Social Impact of Growing Up With Adverse Childhood Experiences The Human and Economic Costs of the Status Quo.

ACEs Dramatically Increase Risk for at Least 9 of the 10 Leading Causes of Death in the U.S.

	Leading Causes of Death in the U.S., 2017	Odds Ratios for ≥ 4 ACEs (relative to no ACEs)
1	**Heart disease**	2.1
2	**Cancer**	2.3
3	**Accidents** (unintentional injuries)	2.6
4	**Chronic lower respiratory disease**	3.1
5	**Stroke**	2.0
6	**Alzheimer's** or dementia	11.2
7	**Diabetes**	1.4
8	**Influenza and pneumonia**	Risk Unknown
9	**Kidney disease**	1.7
10	**Suicide** (attempts)	37.5

- Source of causes of death: CDC, 2017; Sources of odds ratios: Hughes et al., 2017 for 1, 2, 4, 7, 10; Petrucelli et al., 2019 for 3 (injuries with fracture), 5; Center for Youth Wellness, 2014 for 6 (Alzheimer's or dementia); Center for Youth Wellness, 2014 and Merrick et al., 2019 for 9.

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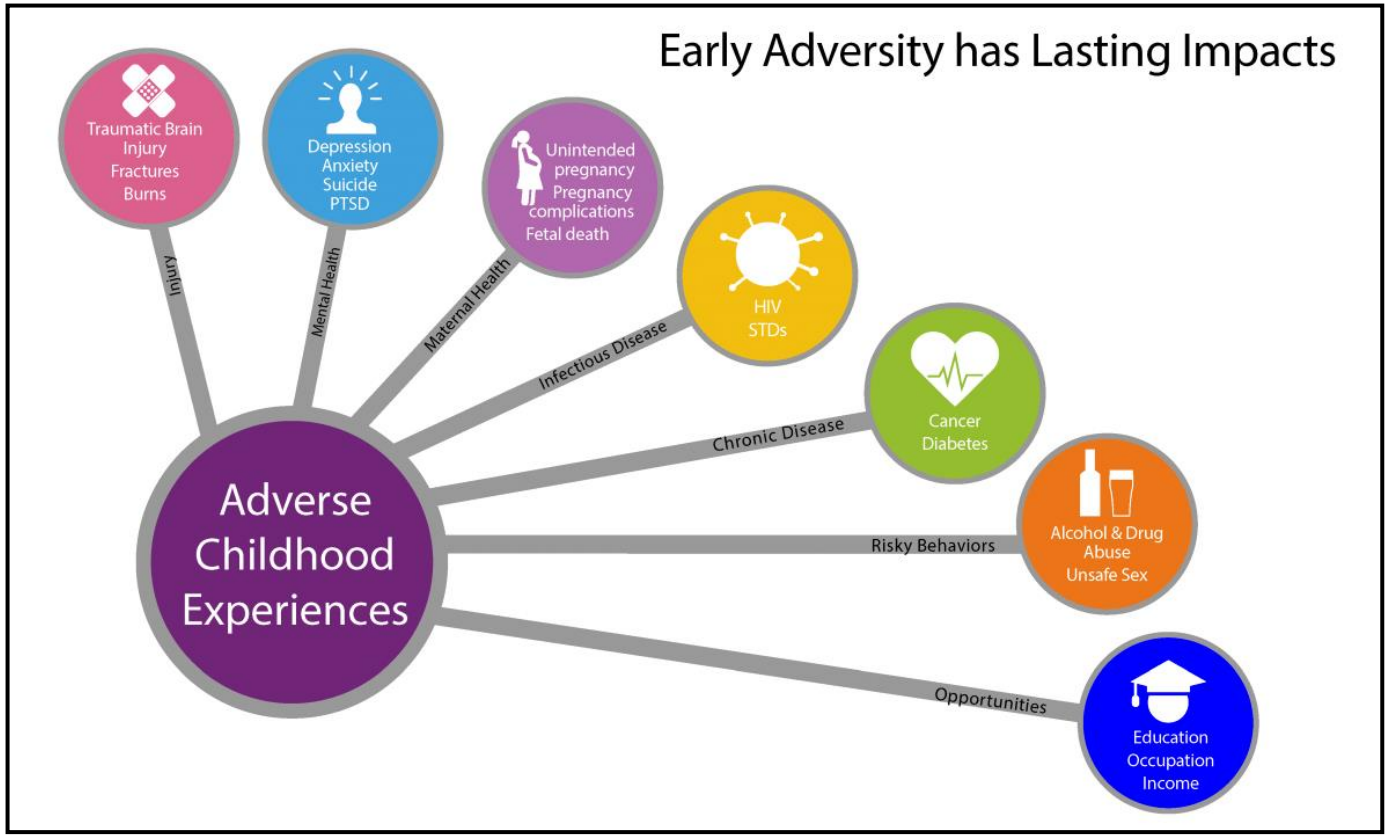
Association between ACEs and negative outcomes



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How ACEs work

Adverse Childhood Experiences

Abuse and neglect (e.g. psychological, physical, sexual)
Household dysfunction (e.g. domestic violence, substance abuse, mental illness)

Impact on Child Development

Neurobiologic effects (e.g., brain abnormalities, stress hormone dysregulation)
Psychosocial effects (e.g., poor attachment, poor socialization, poor self-efficacy)
Health risk behaviors (e.g., smoking, obesity, substance abuse, promiscuity)

Long-term Consequences

Disease and disability

- Major depression, suicide, PTSD
- Drug and alcohol abuse
- Heart disease
- Cancer
- Chronic lung disease
- Sexually transmitted diseases
- Intergenerational transmission of abuse

Social Problems

- Homelessness
- Prostitution
- Criminal behavior
- Unemployment
- Parenting problems
- High utilization of health and social services
- Shortened lifespan

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Positive Stress

- Normal and essential part of healthy development
- Brief increases in heart rate and blood pressure
- Mild elevations in hormonal levels
- Example: Final exam Playoff game.

Tolerable Stress

- Body's alert systems activated to a greater degree
- Activation is time-limited and buffered by caring adult relationships.
- Brain and organs recover
- Example: Death of a grandparent, car accident.

Toxic Stress

- Occurs with strong, frequent or prolonged adversity
- Disrupts brain architecture and other organ systems
- Increased risk of stress-related disease and cognitive impairment
- Example: abuse, neglect, caregiver substance dependence or mental illness

Intense, prolonged, repeated, unaddressed;
Child or family vulnerabilities, limited supports, devel. delays

Social-Emotional buffering, Learned skills, Parent/Child Resilience,
Early Detection, Effective Intervention

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Definition of Toxic Stress

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

Serious, temporary stress responses, buffered by supportive relationships.

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

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The Question:
What does trauma look like in children?

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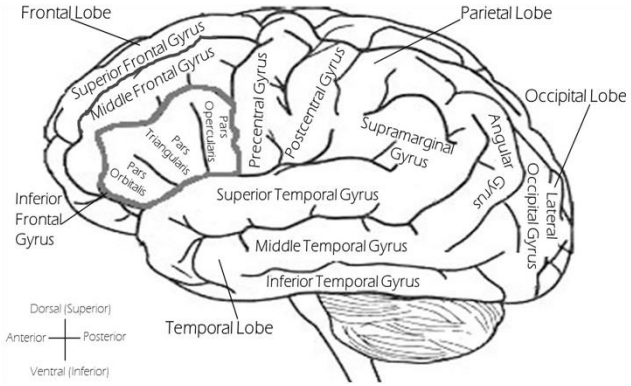
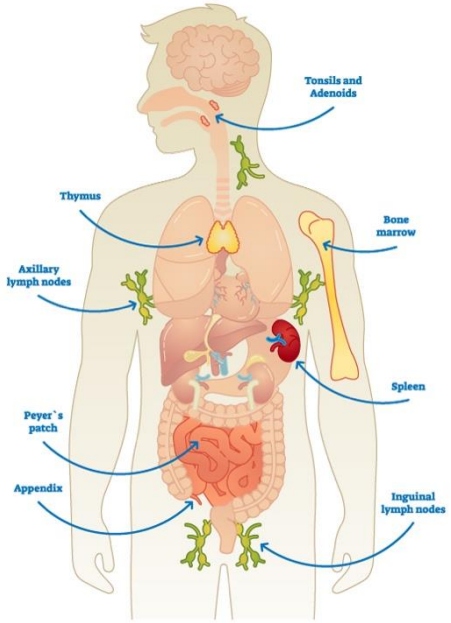
Toxic stress triggers potentially permanent changes thru 3 mechanisms:

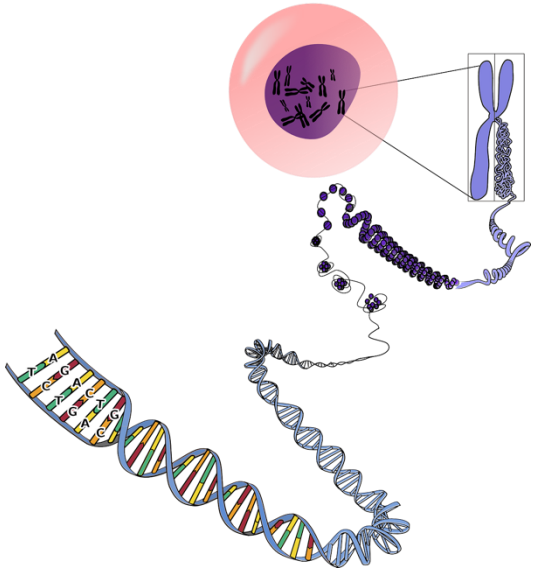
Neurobiology



Immunology



Epigenetics



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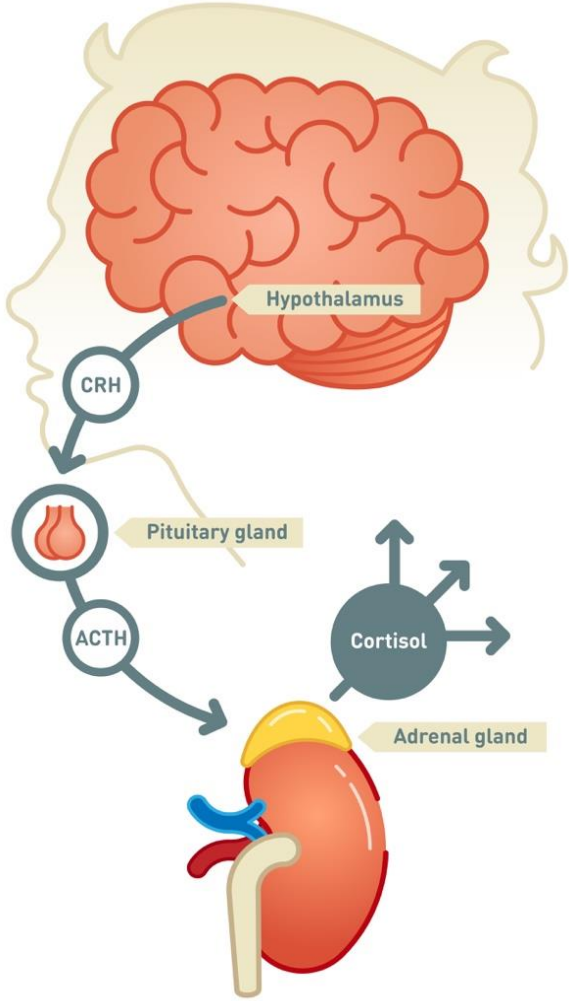
Neurobiology of Trauma

Hypothalamic-Pituitary-Adrenal Axis (HPA)

- Activated by stress
- Releases cortisol
- Stimulates multiple areas of body and immune system



Source: Johnson SB, Riley AW, Granger DA, Riis J. The science of early life toxic stress for pediatric practice and advocacy. Pediatrics. Feb 2013;131(2):319-327.

Trauma

Stress and the tiger

- Bodies designed to respond to stress
- Adrenaline and cortisol help us run from the tiger or hide
- Duration of threat is short

Source: Johnson SB, Riley AW, Granger DA, Riis J. The science of early life toxic stress for pediatric practice and advocacy. *Pediatrics.* Feb 2013;131(2):319-327.

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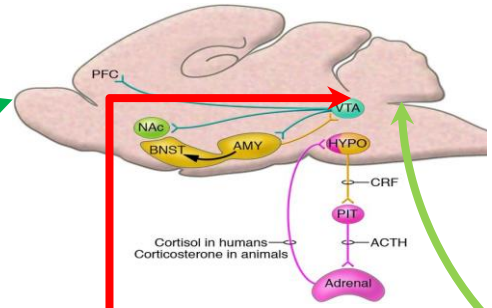
Significant trauma or adversity



Cortisol

Other body systems

Immune system

Gene expression (epigenetics)

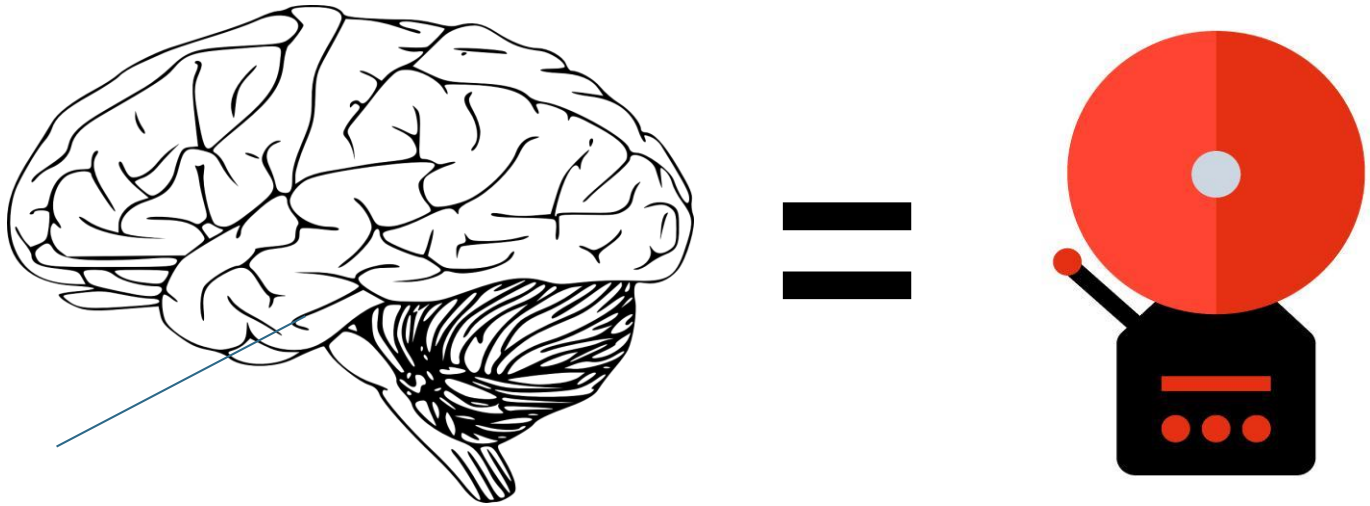
Inflammatory response

Infection fighting (antibodies)

Source: Johnson SB, Riley AW, Granger DA, Riis J. The science of early life toxic stress for pediatric practice and advocacy. Pediatrics. Feb 2013;131(2):319-327.

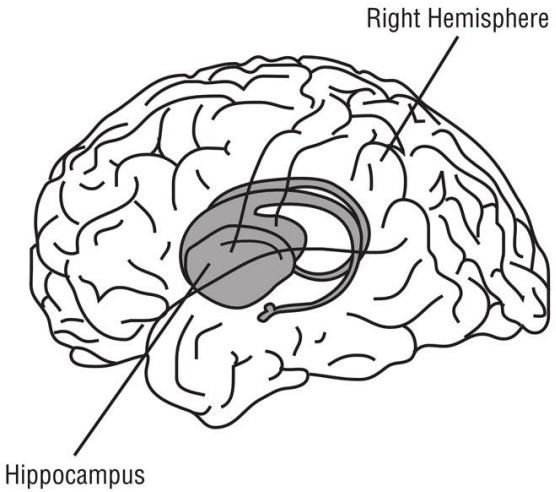
Amygdala

- Input from sensory, memory, and attention center
- Emotional memory system
  - The brain's alarm system



Hippocampus

- Interface between cortex and lower brain areas
- Major role in memory and learning
  - The brain's file cabinet or search engine



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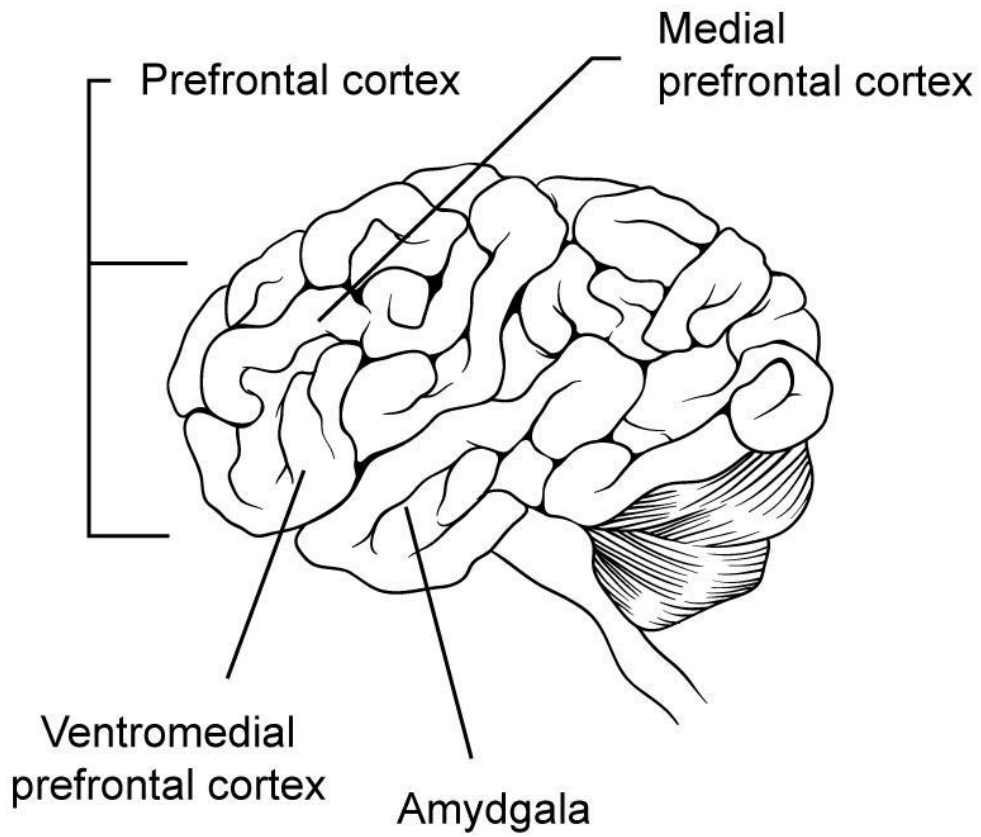
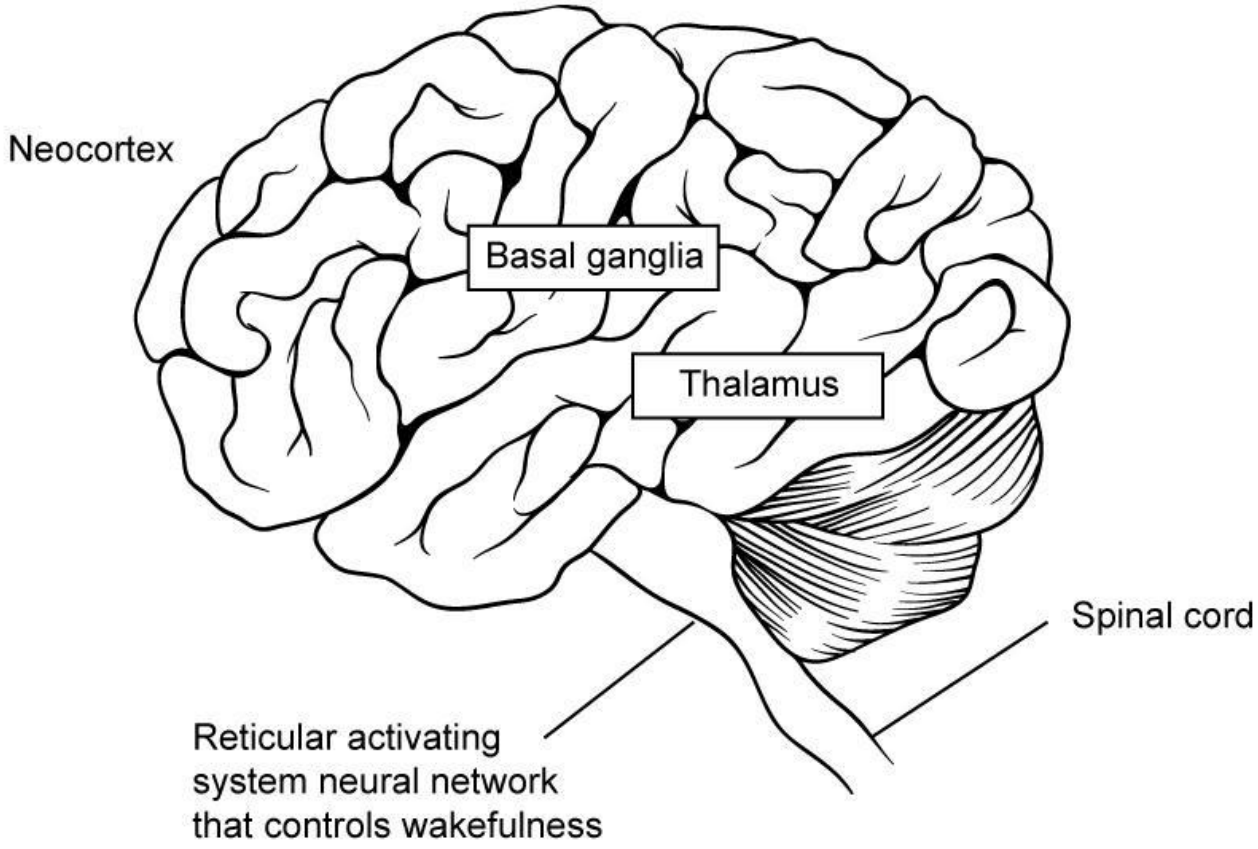
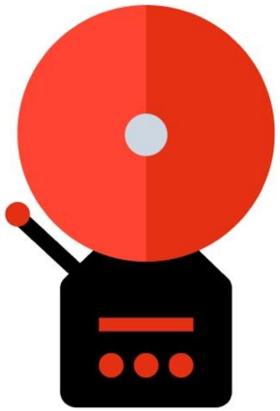
Prefrontal cortex

- Executive function
  - Impulse control
  - Working memory
  - Cognitive flexibility



Not Sleeping





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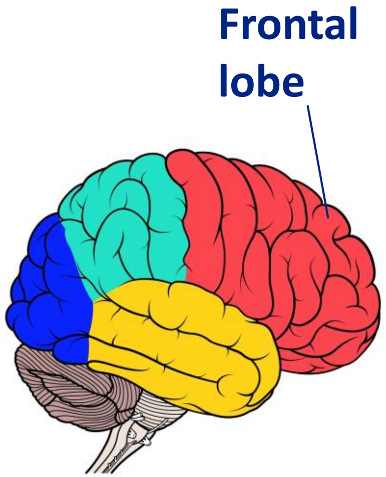
Frontal
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So, what does trauma look like in children?

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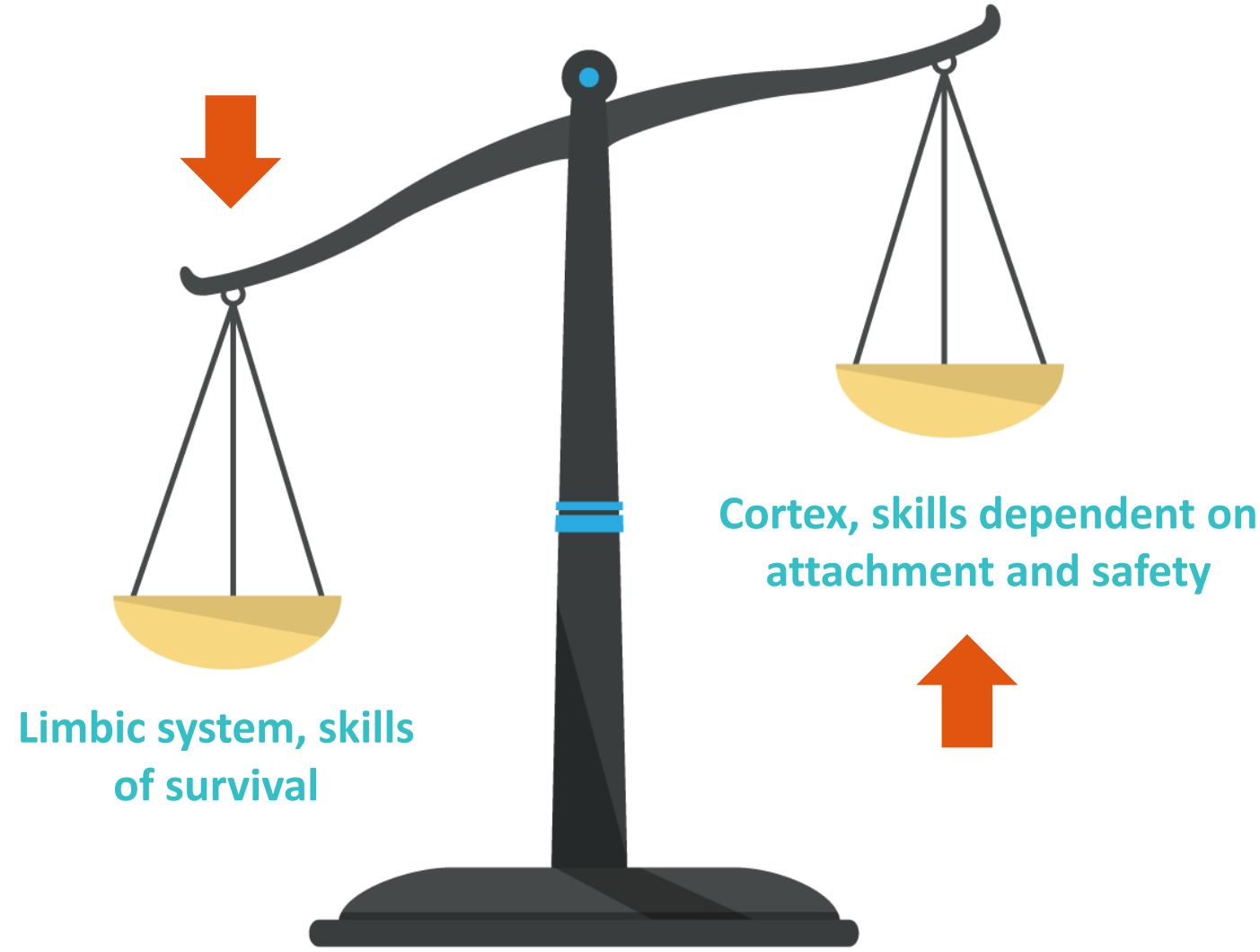
Response to Trauma: Development and Learning[15,16]

AGE	IMPACT ON WORKING MEMORY	IMPACT ON INHIBITORY CONTROL	IMPACT ON COGNITIVE FLEXIBILITY
Infant / toddler / pre-schooler	Difficulty acquiring developmental milestones	Frequent severe tantrums Aggressive with other children Attachment may be impacted	Easily frustrated
School-aged child	Difficulty with school skill acquisition Losing details can lead to confabulation, viewed by others as lying	Frequently in trouble at school and with peers for fighting and disrupting	Organizational difficulties Can look like learning problems or ADHD
Adolescent	Difficulty keeping up with material as academics advance Trouble keeping school work and home life organized Confabulation increasingly interpreted by others as integrity issue	Impulsive actions which can threaten health and well-being Actions can lead to involvement with law enforcement and increasingly serious consequences	Difficulty assuming tasks of young adulthood which require rapid interpretation of information: ie, driving, functioning in workforce

American Academy of Pediatrics, Dave Thomas Foundation for Adoption. Helping foster and adoptive families cope with trauma. https://www.aap.org/en-us/Documents/hfca_foster_trauma_guide.pdf . Published 2016. Accessed May 30, 2019.



Cortex, skills dependent on attachment and safety

Limbic system, skills of survival

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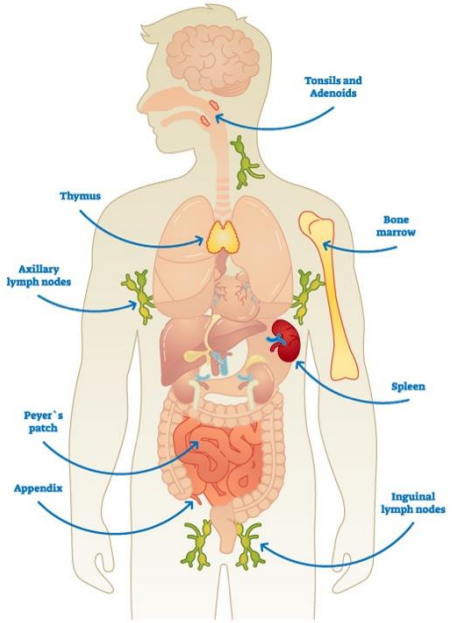
Toxic stress triggers potentially permanent changes thru 3 mechanisms:

Neurobiology

Immunology



Epigenetics

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The impact on the immune system

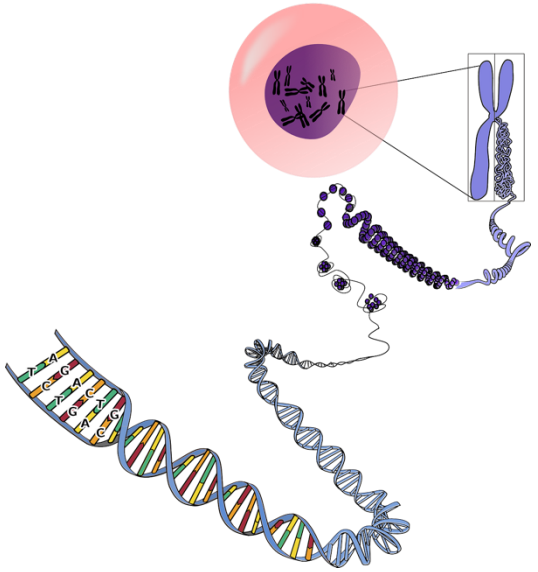
- Immune consequences
  - Suppression of immune system
  - Inflammatory pathways not responsive to cortisol - upregulated
  - Impact on areas of brain can lead to depression (subset of depression - inflammatory mediated)
- Developing system is chronically pressed into action
  - Excessive cortisol suppresses humoral immunity, increasing risk of infection
  - Inflammatory response persists after it is no longer needed
  - Somatic perception impaired

Toxic stress triggers potentially permanent changes thru 3 mechanisms:

Brain connectivity

Immune function

Epigenetics



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The impact on epigenetics

A pup that is raised by an anxious, low-nurturing mother becomes an anxious adult.

A pup that is raised by a relaxed, high-nurturing mother becomes a relaxed adult.

Source: Lick Your Rats. https://learn.genetics.utah.edu/content/epigenetics/rats/?__hstc=170503551.b69ddabbfe2a2984ddbe128ddda21184.1474761600053.1474761600055.1474761600056.2&__hssc=170503551.1.1474761600056&__hsfp=1773666937. Accessed May 30, 2019.

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Bottom Line:
Significant adversity results in less than optimal outcomes later in life

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Trauma Responses:
Adaptive and protective when in threatening situation

- Same bodily functions and behaviors may be maladaptive when children are removed from the stressor
- When not examined within the context of past traumas can be misinterpreted as pathologic
- Not "what's wrong with you?", but instead **"what happened to you?"**

THREADS: The Resiliency Factors of Childhood

Resiliency skills as the **THREADS** of childhood:

- **T**hinking and learning brain
- **H**ope
- **R**egulation or self control
- **E**fficacy
- **A**ttachment
- **D**evelopmental skill mastery
- **S**ocial connectedness

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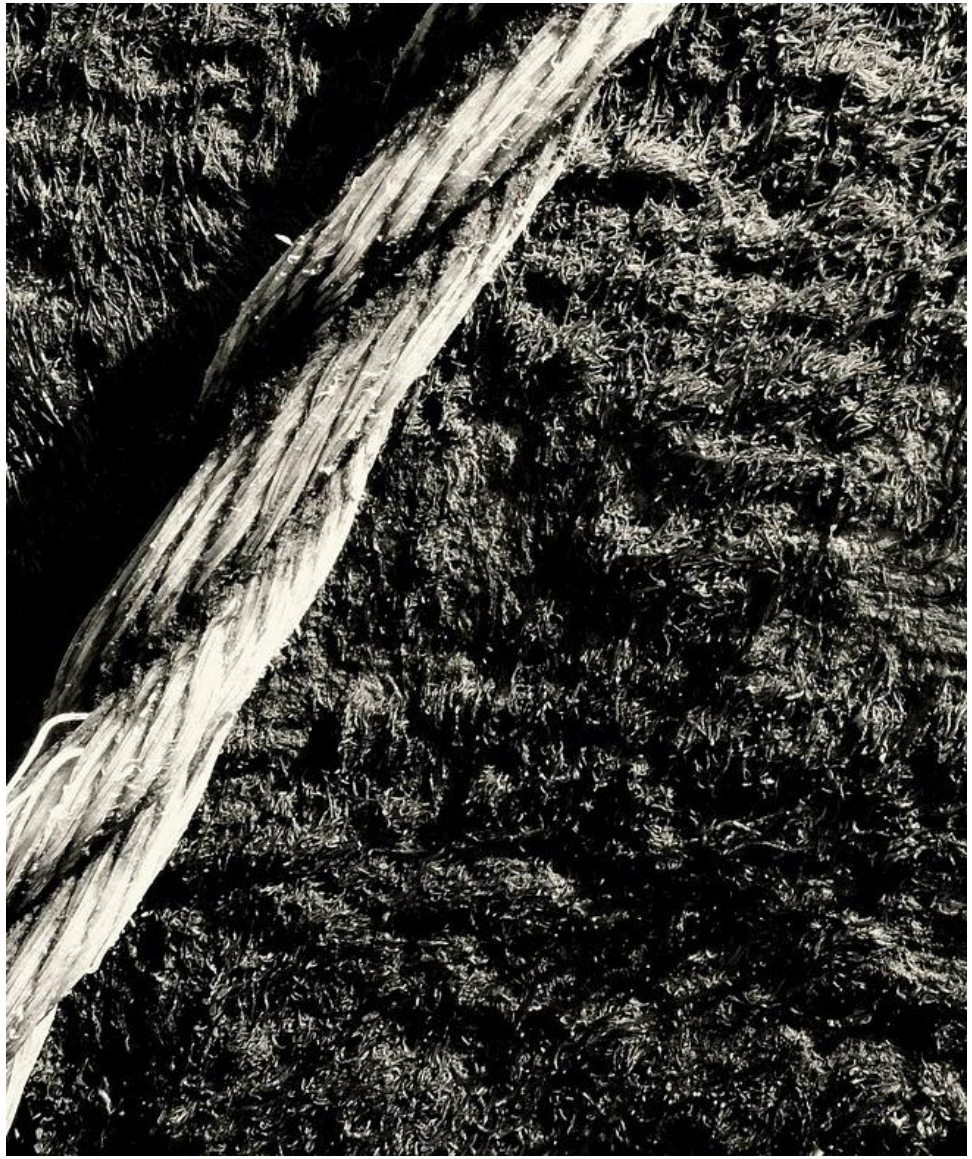

When the THREADS of Resilience are FRAYED

You are **FRAYED** (and at the end of your rope):

- **F**its, **F**rets and **F**ear
- **R**estricted development
- **A**ttachment concerns
- **Y**elling and yawning
- **E**ducational delays
- **D**efeated/dissociation

Interested in more training? The AAP has a course…

Supported by an educational grant from Substance Abuse and Mental Health Services Administration (SAMHSA) Grant 6U79SM080001-01M001

Questions?

Email:cthang@mednet.ucla.edu

Want more info on AAP-CA & ACEs? Visit aapca2.org/aces/

Let's take a case together

(case shared by Dr. Adwoa Osei)

- 12yo boy ("Henry") comes in with mother for well child visit. Mother has no concerns today. "We are here for his annual physical and shots."

- **PMH/PSH:** Asthma diagnosed at 3yo, fairly controlled. Albuterol inhaler used PRN. Sometimes misses school because of wheezing episodes. No allergies to drugs or medications.

- **SHx:** Henry resides with his mother & mat grandmother. Occasional contact with his father who is now remarried and has another child. When questioned alone and directly about his father, Henry is open to the discussion and bluntly reports, "I feel unloved by my father. There is no point in being alive." He is also very sad about losing his "best uncle" 2 years ago to witnessed assault. He was like a father to him. He is afraid "his mother will die too." He is happy to have his grandmother and mom who care "deeply about him." He has no health concerns for today's visit and shrugs his shoulders when asked about school. Mom reports he struggles with his 6th grade schoolwork. Per mom, "if only he got off those video games and paid attention, he would do better in school." When questioned directly, Henry reports, "I don't get math, and the words don't make sense when I read. School is boring." Henry confides in you that this is his third school, and kids always pick on him. He barely speaks to anyone in school because the kids are "mean and dumb." Video games make him happy, "oh and church," he adds. He would like to study coding and programming in the future. He stays up until 2AM playing games most nights and struggles to wake up for school in the mornings. When asked to turn it off, he becomes "very angry and threatens to burn down the house." Mom reports she is "tired of this behavior but doesn't know what to do." Mom also reports she lives with an anxiety disorder and has trouble sleeping if Henry is awake due to safety concerns.

- You review his depression screening which shows a high risk for moderate to severe depression. Screening for alcohol and substance abuse is negative.

- **FHx:** Mom has generalized anxiety disorder, depression, pseudo seizures, diabetes, and hypertension. She had a cerebrovascular accident a few years ago that has affected her memory. Dad is otherwise healthy.

- **ROS:** Increase in weight and difficulty concentrating but otherwise negative.

- **Physical exam:** BP 110/70, RR 18, BMI >99% percentile, Height 75% percentile

- He is calm and well appearing, avoids eye contact and plays on his phone through the visit.

- His psychiatric assessment reveals that he has passive thoughts of harming himself but has no specific plans. The last time he thought about that was 2 months ago.

Breakout Objectives

1. To examine how toxic stress physiology relates to pediatric clinical presentation

2. To use the FRAYED and THREAD acronyms to better understand the trauma presentation and resilience approach.

3. To identify practice changes that can lead to more trauma-informed care

Breakout Questions

1. Using the FRAYED acronym, what symptoms do you note among Henry and his mother?

2. Using the THREADS acronym, what buffering and protective factors do you note for Henry and his mother?

Breakout Questions (cont'd)

3. How would you approach this visit today?

3a. How would you manage care for this child using resources available to you in your current practice?

3b. Based on what you heard today, what additional services or changes to your current practice would you like to make to optimally address the needs of your patient and family?

3c. What additional information or resources are needed to implement these changes?

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Report Out

(1) 1-2 surprising points that came from our breakout session, *and/or*

(2) Any action items that were brought up.

Closing and Evaluation

- Thank you for your attendance and participation!
- Please complete the post-session survey at https://tinyurl.com/PeerToPeerSession1 (Required to receive CME credit).
  This link will also be emailed to you.

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AAP-CA2 and First 5 LA Peer-to-Peer Learning Session Series

Session	Date	Topic	Speaker
Session 1	January 7, 2021 {TODAY}	ACEs Science – The Physiology of Toxic Stress	Christine Thang, MD, FAAP
Session 2	**February 11, 2021**	**Childhood Adversity, Health Systems Change, and the Future of Trauma-Informed Pediatric Practice**	**Adam Schickedanz, MD, PhD, FAAP**
Session 3	March 18, 2021	After screening: Building ACEs Response Interventions and Overcoming Barriers to Referrals	Carlo DeAntonio, MD, FAAP
Session 4	April 22, 2021	Beyond the screen: What does it mean to be trauma-informed?	Nirupama Madduri, MD, FAAP and Adwoa Osei, MD, FAAP

Upcoming sessions posted here: https://aapca2.org/aces-aware/

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