



Applying the Science of Toxic Stress to Support Children's Health

April 14, 2021

ACEs Aware Mission



To change and save lives by helping providers understand the importance of screening for Adverse Childhood Experiences and training providers to respond with trauma-informed care to mitigate the health impacts of toxic stress.

Continuing Medical Education and Maintenance of Certification



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Joint Accreditation Statement

In support of improving patient care, this activity has been planned and implemented by the Postgraduate Institute for Medicine, the Office of the California Surgeon General, the California Department of Health Care Services and Aurrera Health Group. Postgraduate Institute for Medicine is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC), to provide continuing education for the healthcare team.

See [ACESAware.org](https://www.acesaware.org) for full accreditation information.

Presenters

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School of Medicine

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Agenda



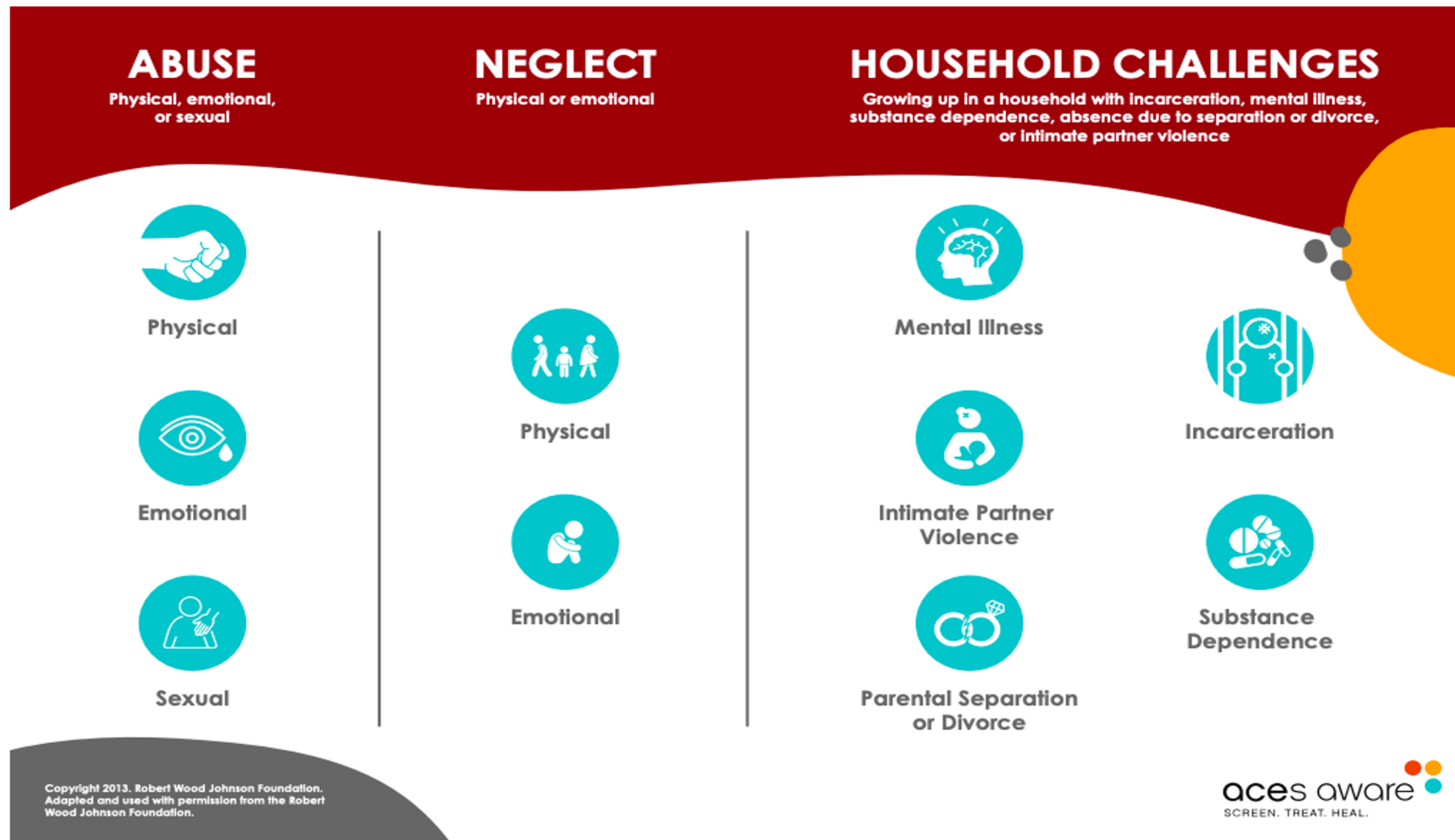
1. Review the physiology of toxic stress and the body's response, as well as the biological changes that occur in the clinical progression from ACE exposure to the toxic stress response to negative short- and long-term health outcomes
2. Researcher perspective on how to utilize data, ACE training and resources to understand the effects of ACE-Associated Health Conditions in patient care
3. Case studies with examples of how trauma-informed ACE screening and access to buffering resources can address health impacts among child patients and their caregivers
4. Answer audience questions



Biology of Stress: Overview

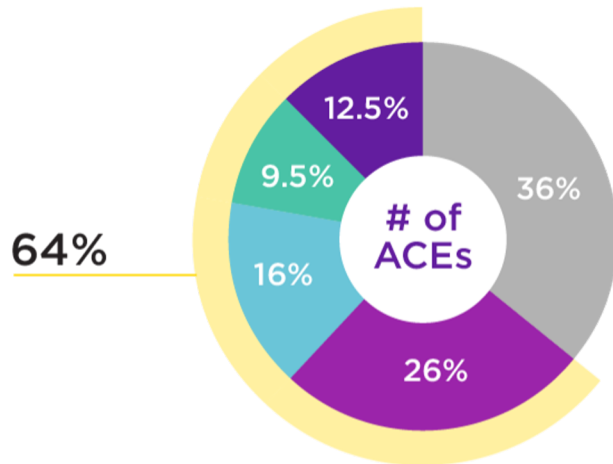
Rachel Gilgoff, MD
Pediatrician

Adverse Childhood Experiences (ACEs)



ACEs are Common

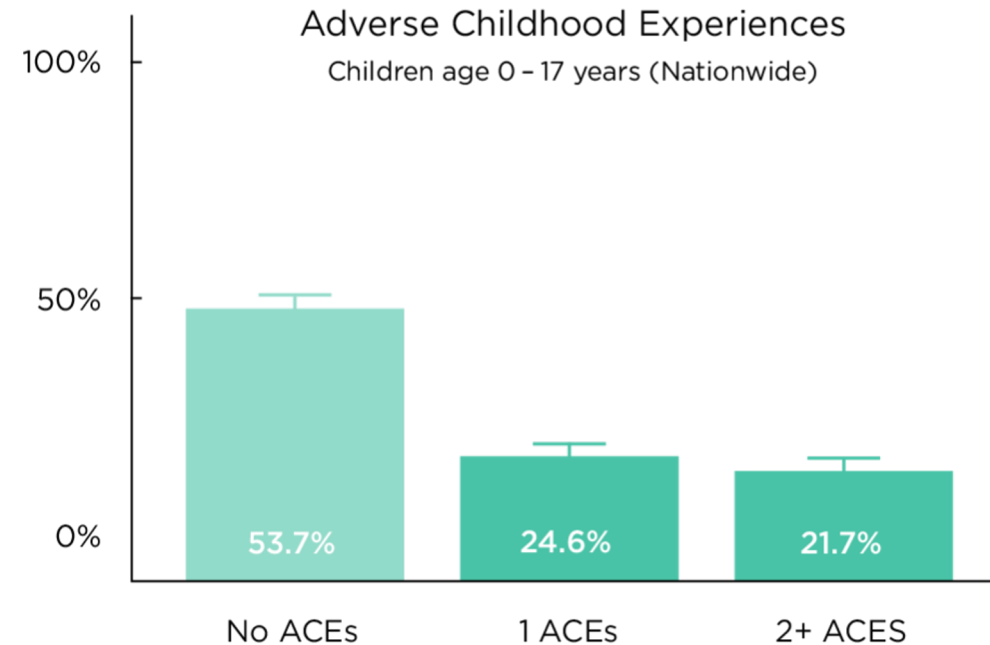
- Nearly 2 out of 3 adults have at least one ACE



- No Adverse Childhood Experiences
- 1 Adverse Childhood Experiences
- 2 Adverse Childhood Experiences
- 3 Adverse Childhood Experiences
- 4 or more Adverse Childhood Experiences

Source: CDC-Kaiser ACE Study (1998)

- Nearly half of children (34.8 million) have at least one ACE



http://www.cahmi.org/wp-content/uploads/2017/10/aces_fact_sheet.pdf

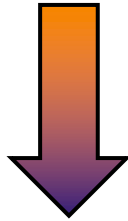
ACEs Dramatically Increase Risk for at least 9 of the 10 Leading Causes of Death in U.S.

	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.

The Threat Response

**Perceived
Threat**



Fight

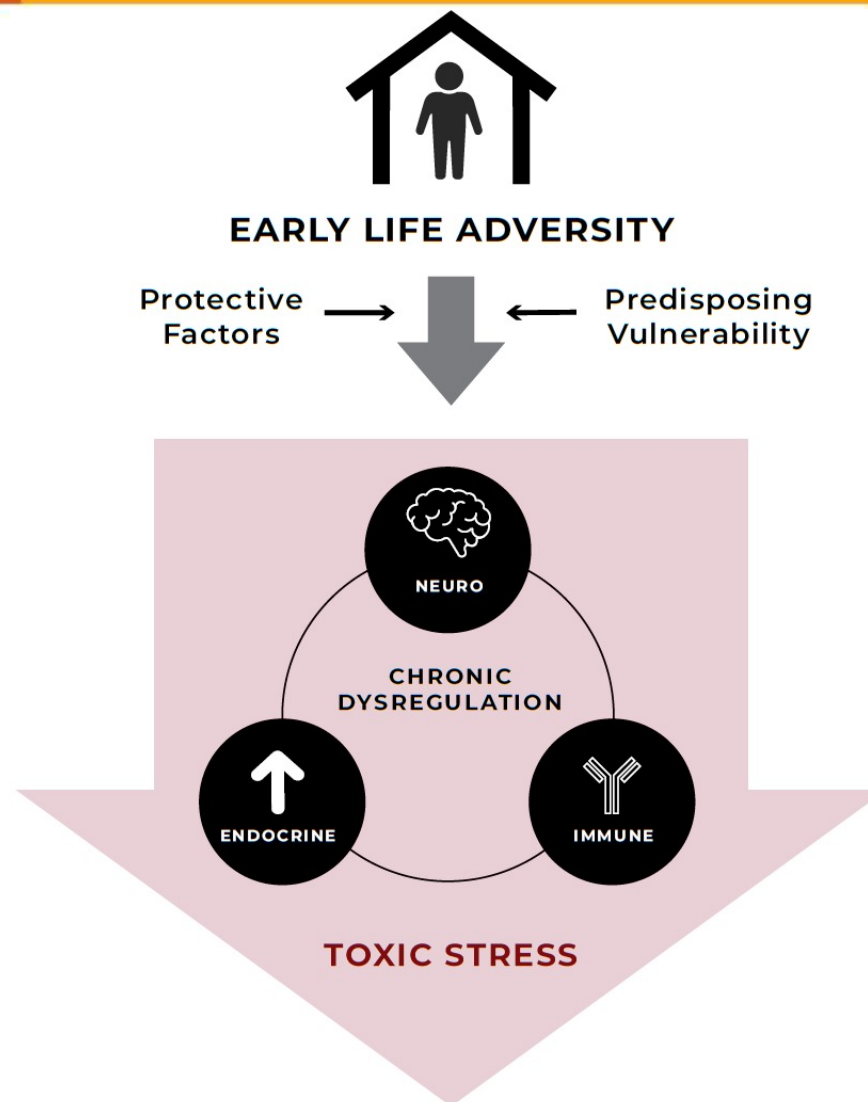
Flight

Freeze

Think quick
Get energy
Protect

Play dead
Prepare for pain and injury

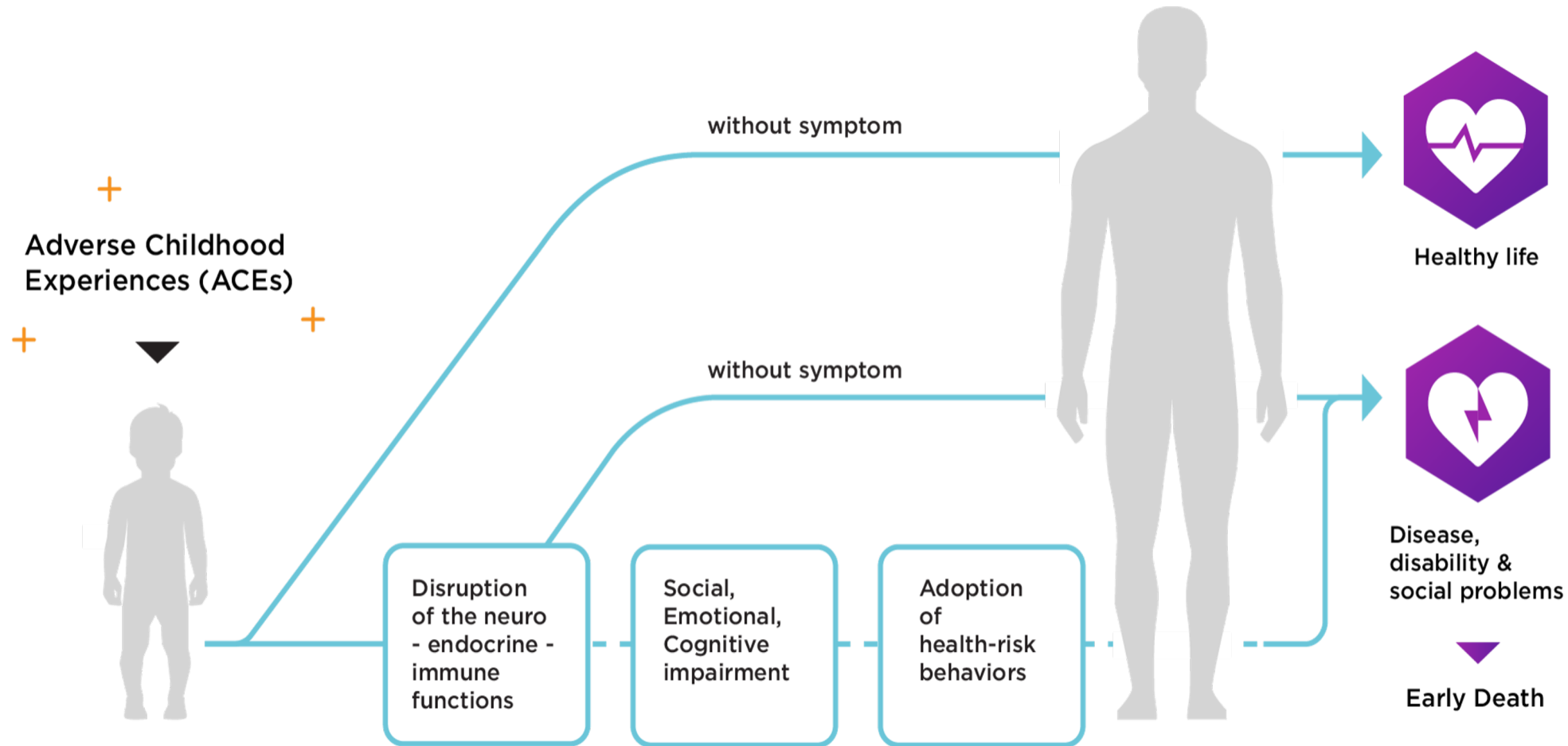




Source: Adapted from Bucci, M., Marques, S. S., Oh, D., & Harris, N. B. (2016). Toxic stress in children and adolescents. *Advances in Pediatrics*, 63(1), 403-428.

Epigenetic		
Endocrine Metabolic Reproductive	Neurological Psychiatric Behavioral	Immune Inflammatory Cardiovascular

The Impact: Variability in Symptomatology



Assess for ACE- Associated Health Conditions



ADHD
Aggression/fighting
Alcohol/Drug Use
Anxiety
Depression
Developmental
Delay
Enuresis
Encopresis
Headaches
Learning Problems
Pain
PTSD



Cardiovascular
Disease
Diabetes
Failure to Thrive
Hepatitis
Late menarche
Overweight
Obesity
Stroke



Allergies
Arthritis
Asthma
COPD
Eczema
Increased infections
Urticaria

For more details, see the ACEs and Toxic Stress Risk Assessment Algorithm at: ACEsAware.org/clinical-assessment

Clinical Response to Identification of ACEs and Increased Risk of Toxic Stress Should Include:

1. Applying principles of **trauma-informed care** including establishing trust, safety, and collaborative decision-making
2. Supplementing usual care for ACE-Associated Health Conditions by providing **patient education** on toxic stress and offering **strategies to regulate the stress response** (using seven evidence-based strategies for toxic stress regulation)
3. Validating existing **strengths and protective factors**
4. **Referrals** to patient resources or interventions, such as educational materials, social work, school agencies, care coordination or patient navigation, community health workers.
5. **Follow-up** as necessary, using the presenting ACE-Associated Health Condition(s) as indicators of treatment progress

Evidenced-Based Buffering Interventions



Source: Adapted from Burke Harris, Nadine. *The Deepest Well: Healing the Long-Term Effects of Childhood Adversity*. Boston: Houghton Mifflin Harcourt, 2018; Gilgoff et al. Adverse Childhood Experiences, outcomes, and interventions. *Pediatric Clinics* 2020; **67**(2): 259-73;



Stress and ACEs: Risk Factors for Poor Health

Neeta Thakur, MD, MPH
Assistant Professor



**Nature of
stressor**

**How
stressor is
perceived**

**Ability to
cope**

**Physiologic
response**

Positive stress

Brief increases in heart rate
Mild elevations in stress hormones

Tolerable stress

Serious, *temporary* stress
responses
Buffered by supportive
relationships

Toxic stress

Prolonged stress response
activation
Absence of protective relationships

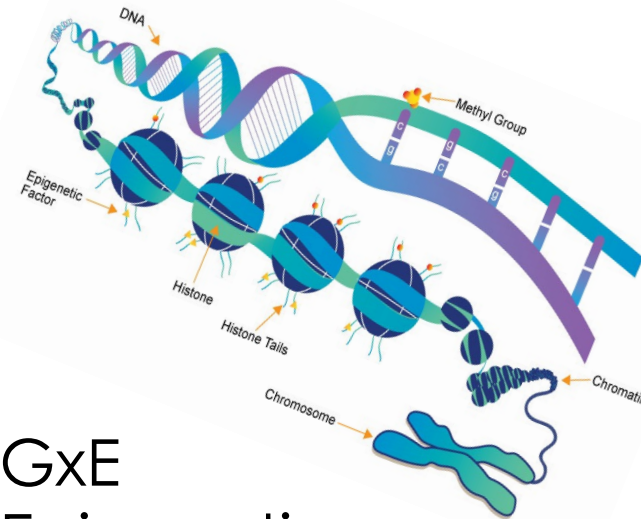
Types of Biological Response

Neuro-hormonal and Inflammatory



Allostatic Load

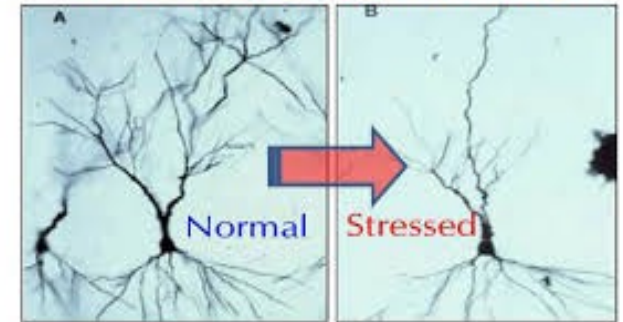
Genetic



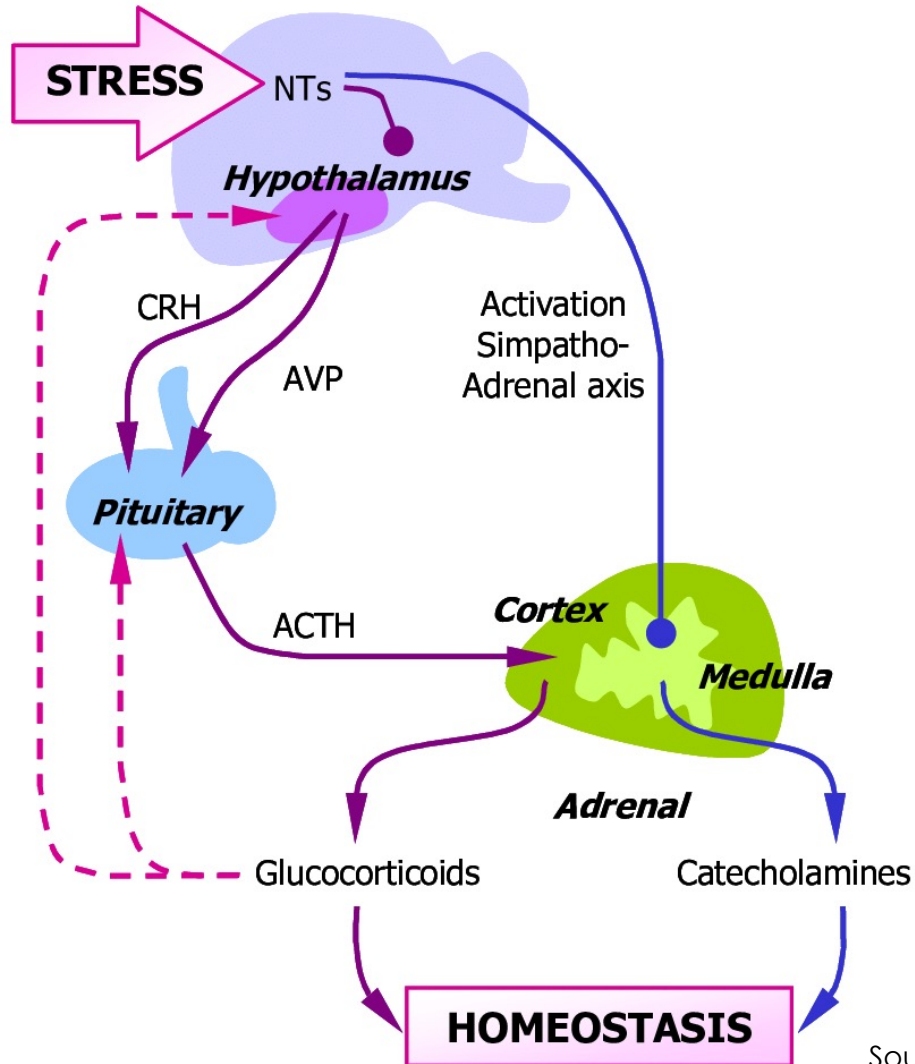
GxE
Epigenetic
Microbiome

Neuroplasticity

Childhood Adversity Shrinks Brain
Networks (prefrontal cortex →
impaired executive functioning)



Allostatic Load



Primary Outcome

“Fight or Flight Response”

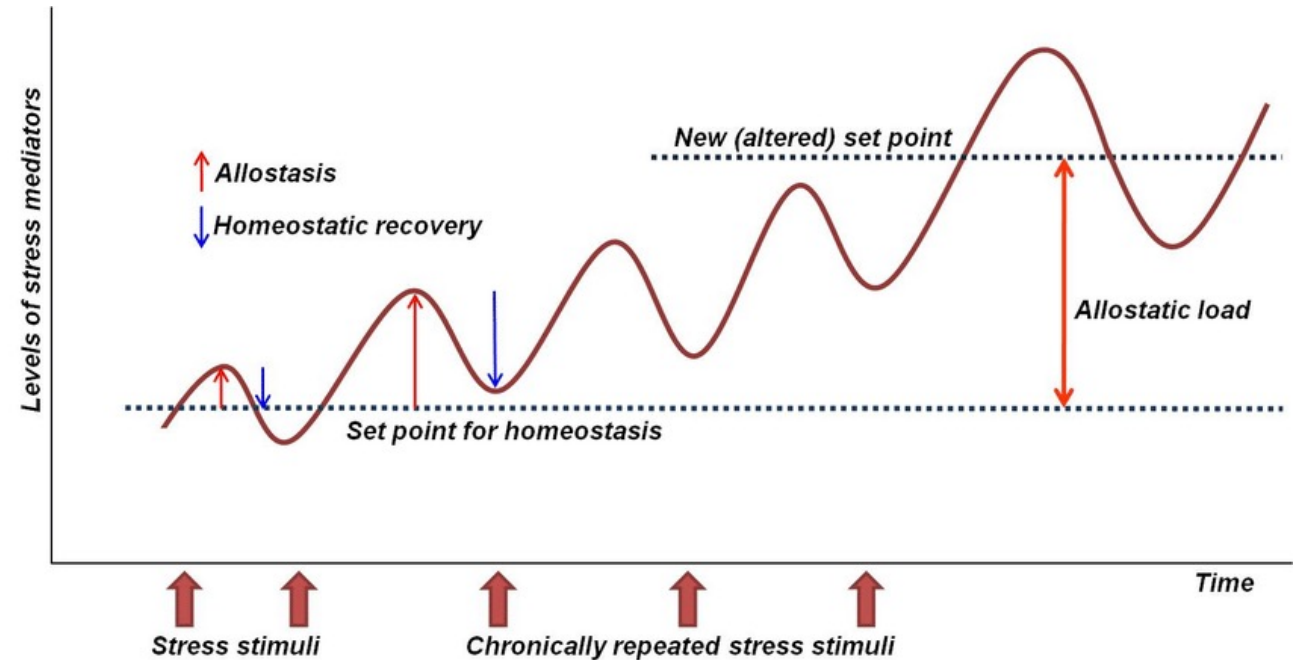
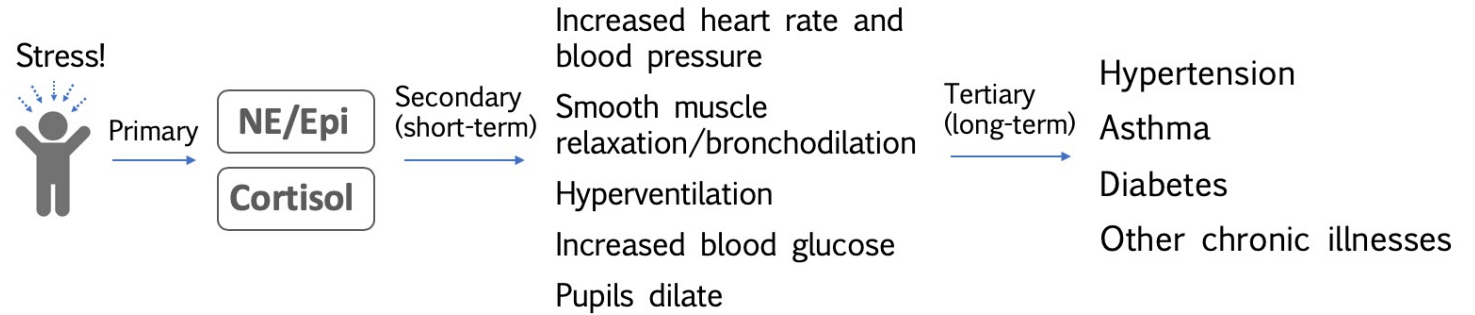
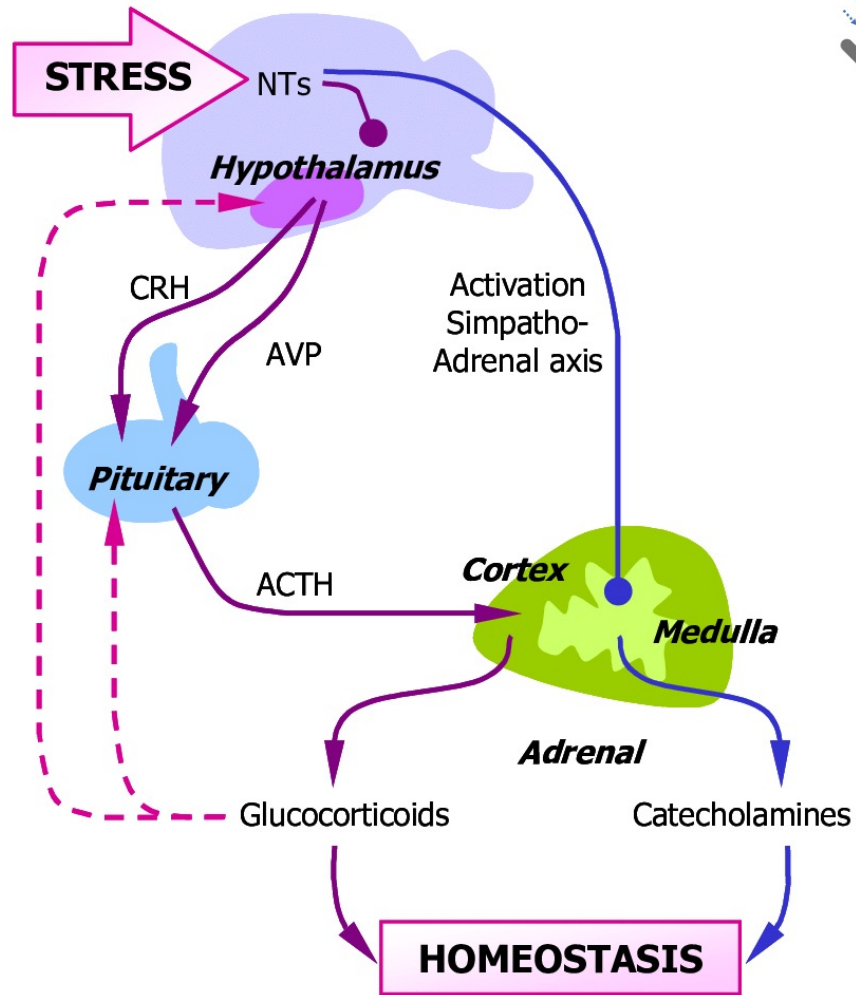
- Catecholamines
- HPA (cortisol)

Secondary Outcome

- Tissue/Organ specific
- e.g. blood pressure, lipid metabolism, and inflammation

Source: McEwen, B.S., Seeman, T., Protective and damaging effects of mediators of stress: elaborating and testing the concepts of allostasis and allostatic load. Ann. N. Y. Acad. Sci. 896, 30. (1999)

Allostatic Load



Chronic stress over time leads to new set point

Allostatic Load and Childhood Adversity

Cardiovascular

Metabolic

Immune Response

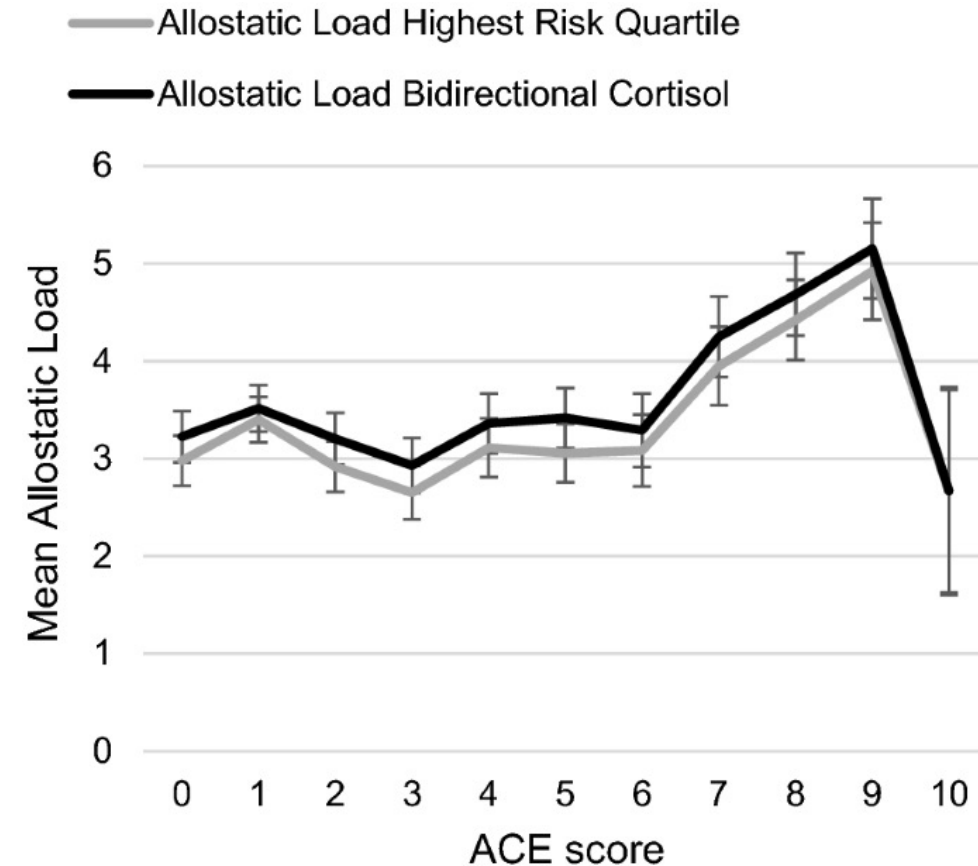
HPA Axis

Respiratory

Parasympathetic Nervous System

+ Kidney/Liver Function

Allostatic Load Index



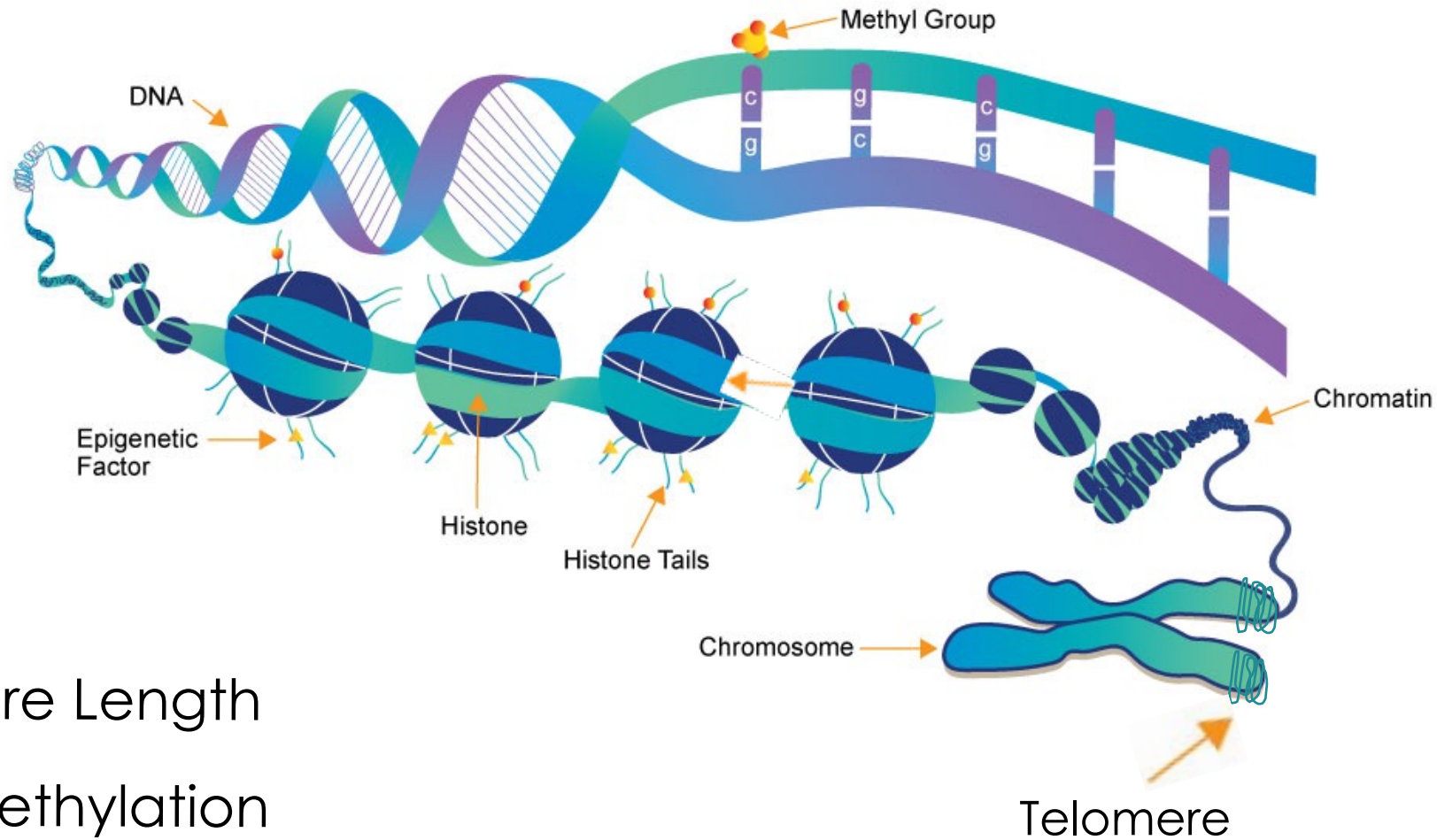
Genetics: Epigenetic Changes



<https://www.whatisepigenetics.com/fundamentals/>

- Telomere Length
- DNA Methylation

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A Deeper Dive: Pediatric ACEs and Resiliency Study (PEARLS)

Partnership



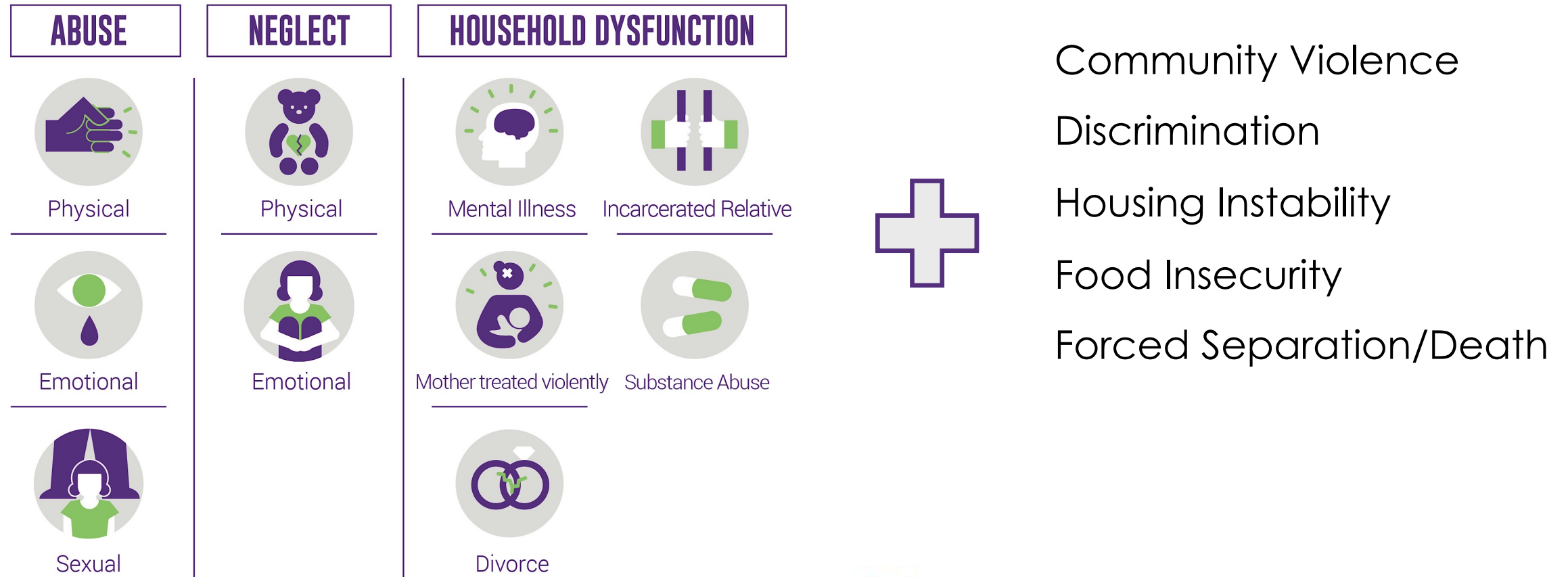
Bay Area Research Consortium on Toxic Stress and Health

PEdiAtric Resiliency and ACEs Study (PEARLS)

Goals:

- Develop a screener for ACEs for Pediatric Primary Care
- Examine associations between ACEs and health in childhood
- Develop and pilot primary care-based interventions

PEARLS



Source: Thakur, Child abuse and neglect. (2020)

PEARLS Interventions

Care Coordination

- Screened for unmet needs
- Connected to community resources
- Warm handoffs

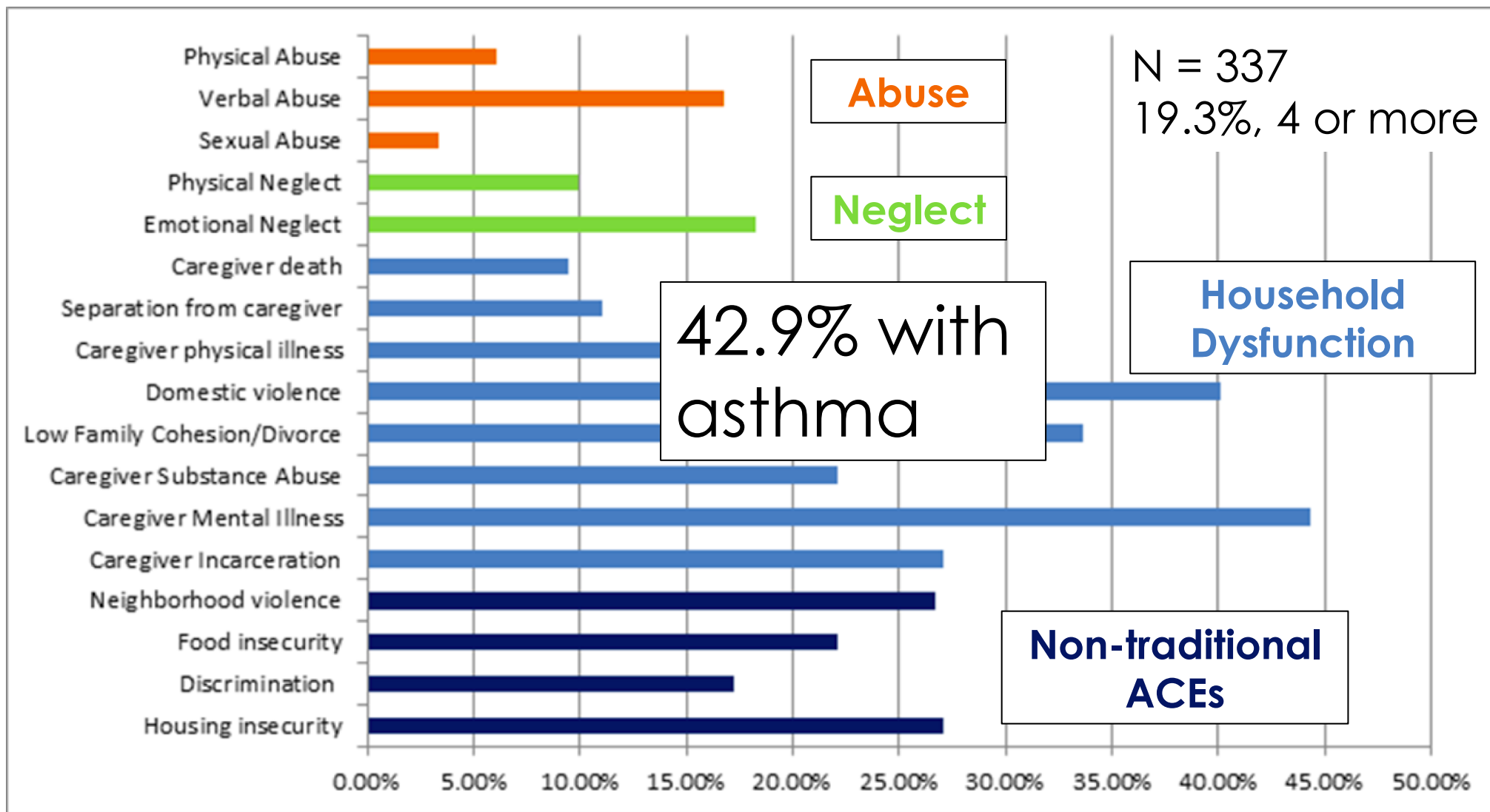
Anticipatory Guidance

- Short (2 min) scripted statement
- Providers deliver after ACEs screening
- 100% of staff trained

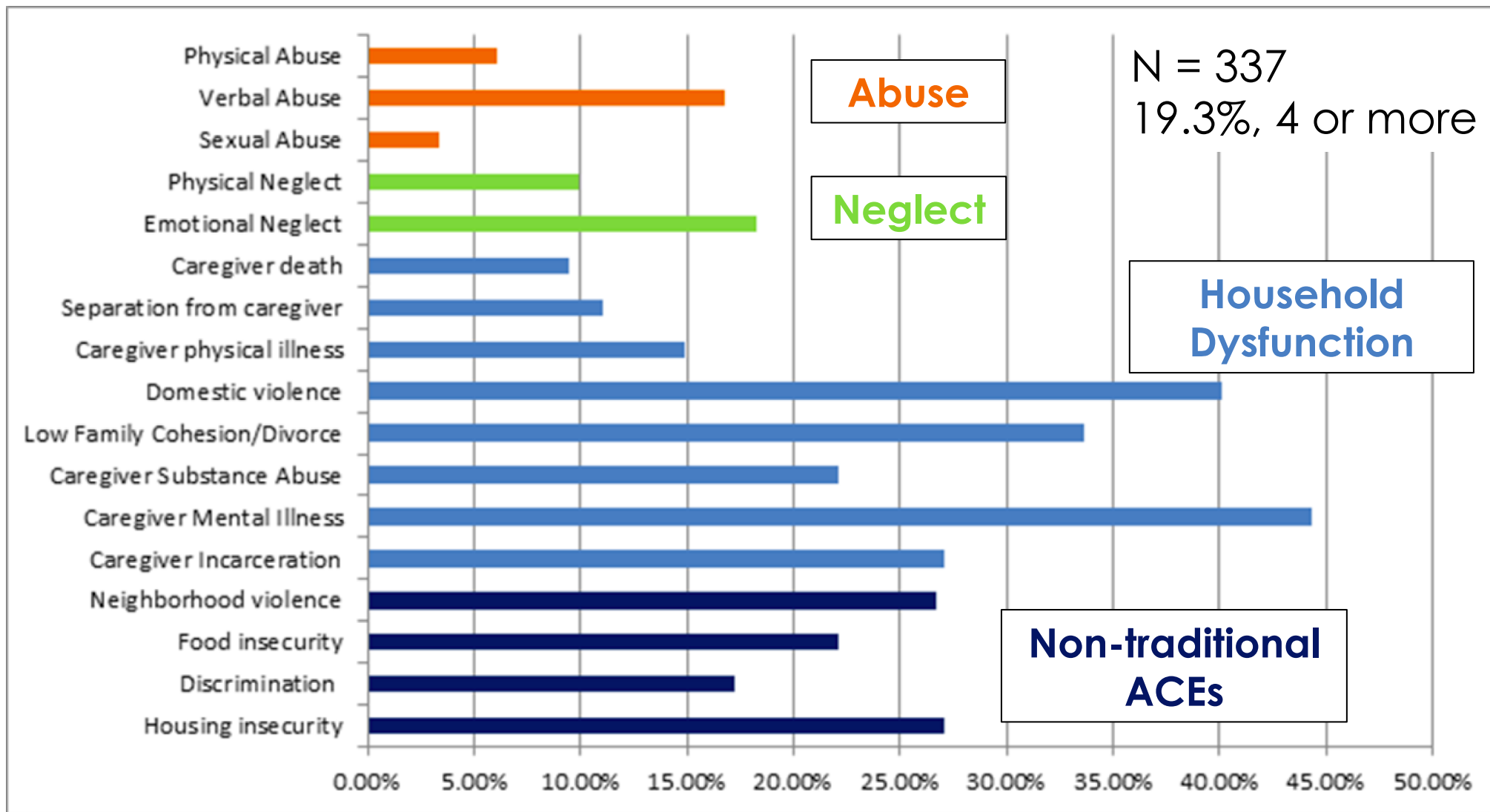
Resiliency Clinic

- 6 monthly group clinic visits
- Led by mental health and medical providers
- Building caregiver-child relationship and self-regulation

ALL Operated Within Primary Care



Source: Thakur, Child abuse and neglect. (2020)



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PEARLS: Adversities and Asthma

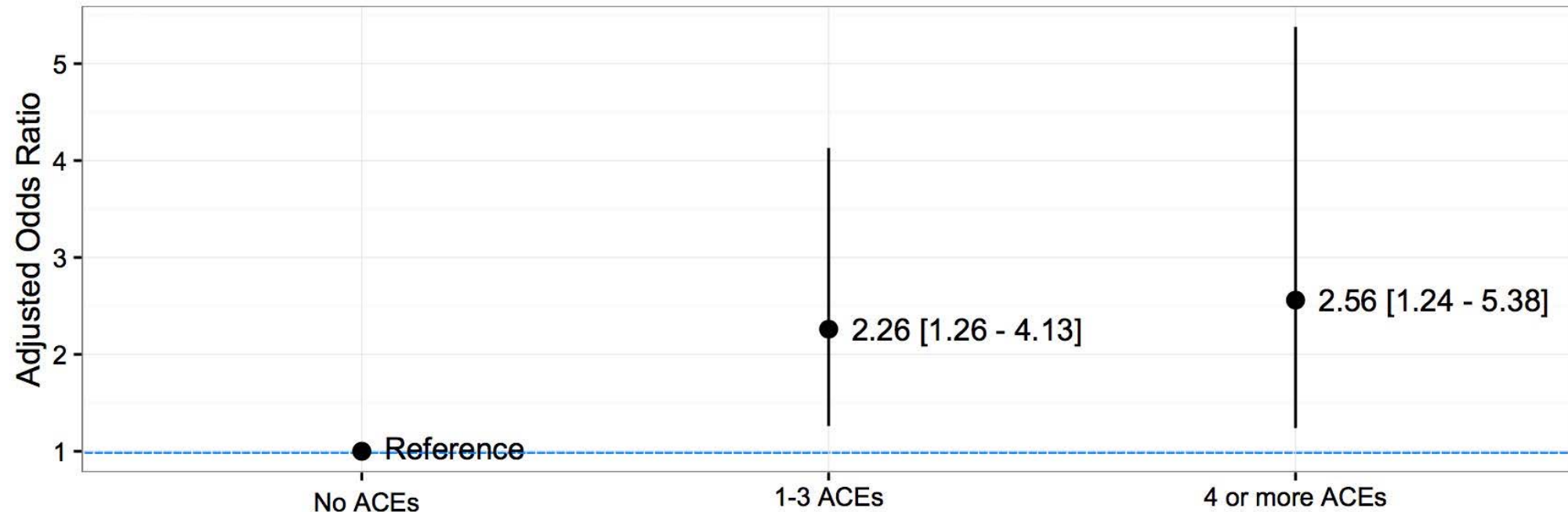
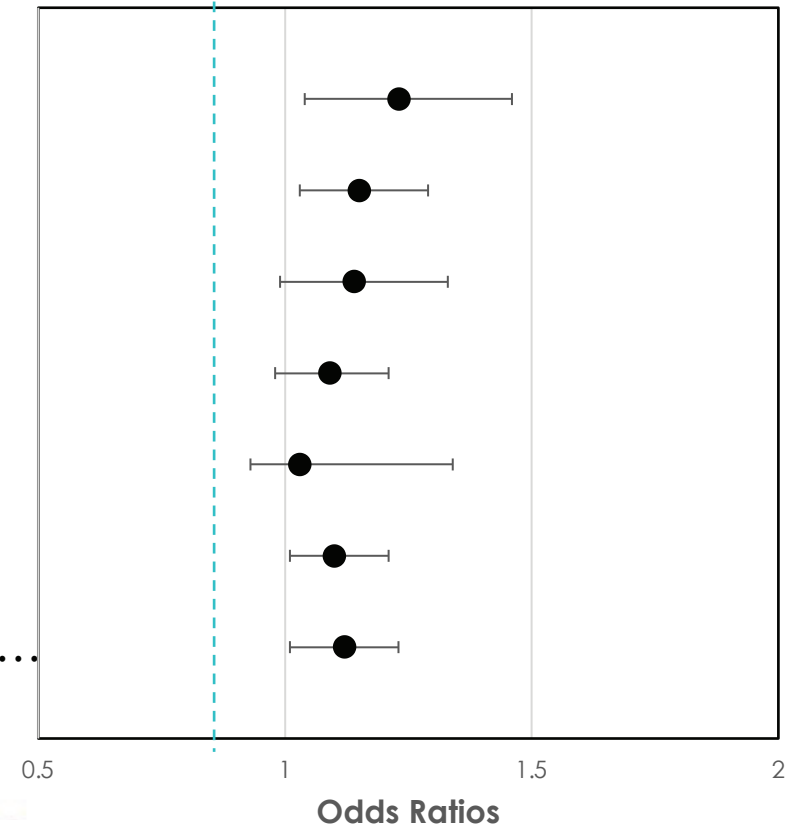


Figure. Adjusted odds of physician's diagnosed asthma based on caregiver reported Adverse Childhood Experiences. Model adjusted for age, sex, race, in utero tobacco exposure, and caregiver education level.

PEARLS: Adversities and Asthma

**Childhood adversity
is associated with
asthma symptoms**

Wheezing ever
Wheezing past 12 months
Severe wheezing
Wheezing with exercise
Nighttime Coughing
Frequent wheezing attacks
Wheezing that interrupts...



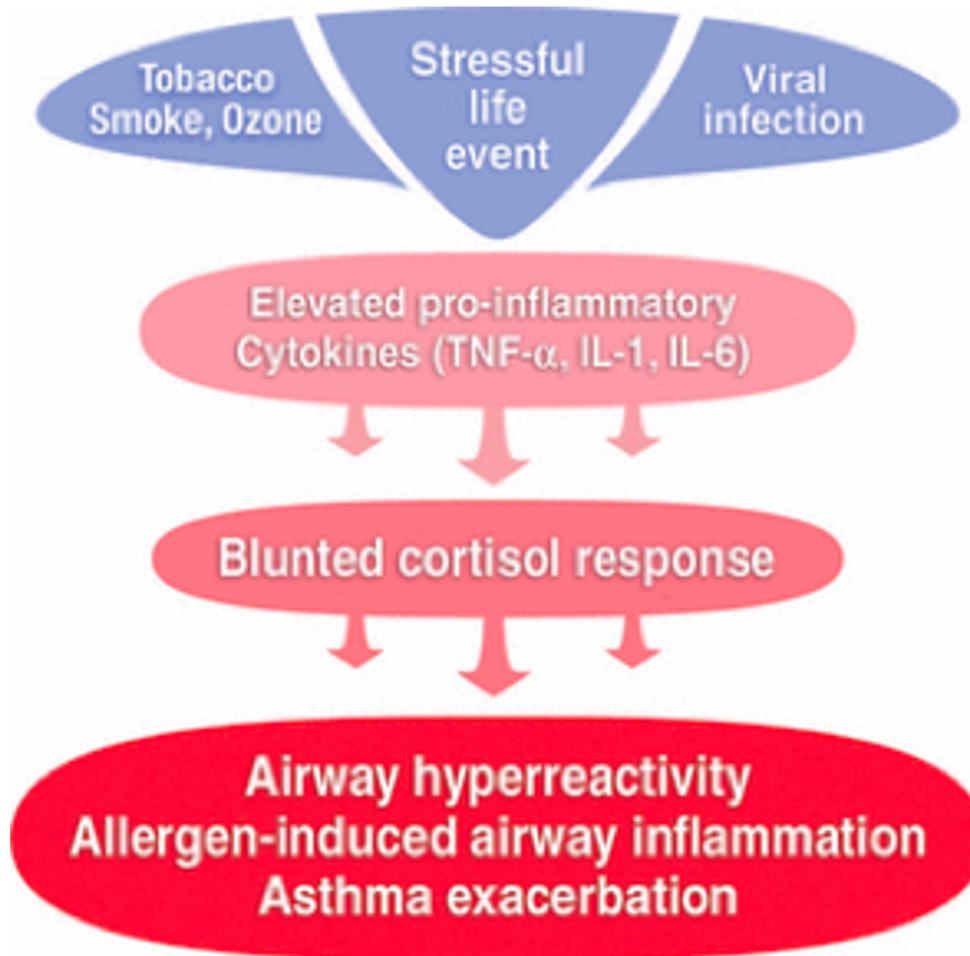
Source: Martinez, ATS Conference Abstract, 2020



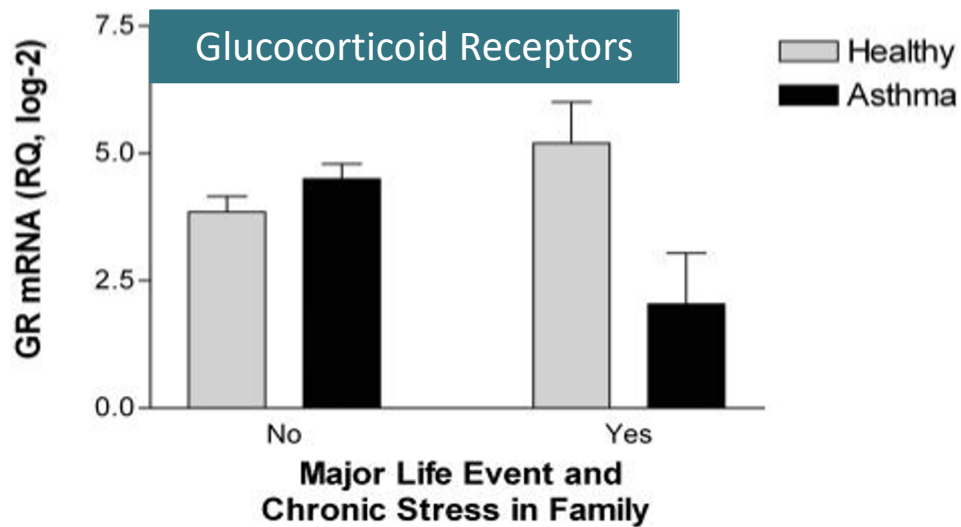
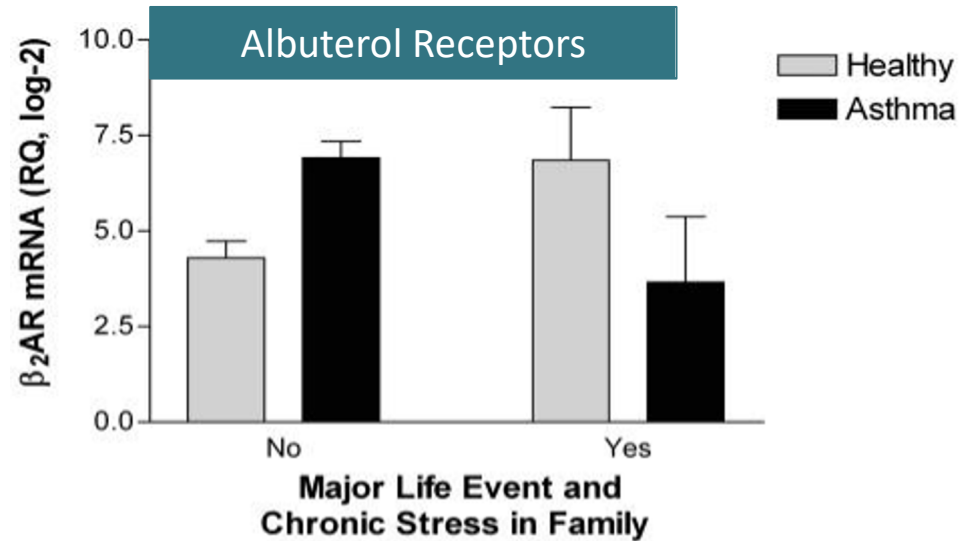
Potential Approaches: Asthma & Adversity

Case Study: 12-year-old boy

- Hospitalized numerous times for asthma exacerbations
- Reports taking medications as directed
- Parents recently separated, before separation “lots of fighting”
- Moving a lot



Asthma and toxic stress are associated with a dysregulated HPA axis and immunologic changes relevant to allergic sensitization and asthma



Childhood adversity may impact response to important rescue and controller medications for asthma

Source: Miller, Gregory E., and Edith Chen. "Life stress and diminished expression of genes encoding glucocorticoid receptor and β_2 -adrenergic receptor in children with asthma." *Proceedings of the National Academy of Sciences* 103.14 (2006): 5496-5501.

Current, Recurrent, Frequent or Severe Asthma Symptoms?

1. Ask if anything scary, stressful or upsetting has happened recently.
2. Ask about or screen for history of ACEs or other adversity.
3. If child, ask about or screen for parental ACEs or other parental adversity.

Current, Recurrent, Frequent or Severe Asthma Symptoms?

Assess current safety

Address PARENTAL stress, depression and anxiety

All Patients

Anticipatory Guidance on Asthma and Toxic Stress

Strategies for Stress Reduction

Increased surveillance and reduction of other possible inflammatory agents.

Further Assessment Recommendations

Additional evaluation for ANS function:
1. Screen for depression
2. Screen for PNS symptoms
3. Consider Heart Rate Variability

Additional evaluation for Immune function:
1. CBC with diff
2. Total IgE
3. Aeroallergen panel
4. FeNO

Assess for co-morbid conditions:
1. Neurodevelopmental
2. Depression/Anxiety
3. Obesity
4. Diabetes

Assess for current social needs and potential environmental triggers.

Asthma Predictive Index (API) or modified API

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Asthma Predictive Index (API) or modified API

Additional Management Recommendations

Follow clinic procedures for additional support, resources, and mandated reporting needs

If any are positive: Consider adding anti-cholinergic medication such as tiotropium or ipratropium

Integrative Medicine approaches to decrease stress and inflammation: sleep, exercise, anti-inflammatory diet and supplements, nature, mind-body, relational health, mental health

Increased eosinophils: Consider Mepolizumab or Dupilumab

Increased IgE: Consider Omalizumab

Address co-morbid conditions:
Consider mental health referral
Anti-anxiety support
Physical Activity
Weight loss (Antidepressants)

Address current unmet social needs and environmental triggers

Lower threshold for referral to pulmonologist, allergist, or immunologist for further support

People live their lives in a holistic manner. Issues such as health care, education and economic empowerment cannot be addressed in a vacuum.

Helene D. Gayle
CEO McKinsey Social Initiative





Pediatric Cases: Examples of Screening in Action

R.J. Gillespie, MD, MHPE
Pediatrician

Premature Morbidity & Mortality with ACEs

- Alcoholism and alcohol abuse
- Chronic obstructive pulmonary disease (COPD)
- Depression
- Fetal death
- Health-related quality of life
- Illicit drug use
- Ischemic heart disease (IHD)
- Liver disease
- Risk for intimate partner violence
- Multiple sexual partners
- Sexually transmitted diseases (STDs)
- Smoking
- Suicide attempts
- Unintended pregnancies
- Early initiation of smoking
- Early initiation of sexual activity
- Adolescent pregnancy
- Autoimmune diseases
- ER Visits
- Medical Office Visits
- Fractures
- Psychotropic medications prescribed
- Early death from MI

So What if We Don't Screen?

- Are we able to think beyond our typical medical training to see trauma in all of its forms, or at least to add it to our differential diagnoses? Or do we get stuck in a medical framework?
- Do we 'get to the point' fast enough in a clinical visit...or is screening in fact helping us with efficiencies?
- Are we missing out on opportunities to prevent outcomes, knowing that 'what is predictable becomes preventable'?



Case Studies

Case Study #1: 15-year-old

- 15-year-old who is doing “everything wrong” comes in for a well visit
 - Truancy: being kicked out of the “last ditch” high school
 - Violent fights with mom
 - Unprotected sex with her “boyfriend”, who is 26
 - Meth, marijuana, cocaine
- After figuring out this history, I ask her if she has any goals
- Her response: “You think I’m having unprotected sex because I don’t have any goals? You’re an a\$\$#@*&!”

After the shock wore off...

- In my head, a review of possible resources:
 - Substance use disorder programs?
 - Mental health providers?
 - STI testing? Pregnancy testing?
 - DHS report (statutory rape)?
- Yes, but...

What I actually did...

- First, get mom out of the room...and then ask a little more about her history of ACEs.
- She reported her ACE score as 5.
 - Father is out of the picture after going to jail for drug abuse.
 - Verbal abuse, emotional neglect were part of her experience.
- My instinct now?
- Discussion about coping strategies and boosting her sense of competence.



**“It's hard to get enough of something
that *almost* works.”**

▀ Vincent Felitti, MD

And the Next Visit?

- She had transferred to a Gateway program at our community college.
- She had stopped all drugs except marijuana.
- She ditched her much-older boyfriend.
- When I asked her what had changed...

“The kids at that last school were losers...they didn’t have any goals.”

Case Study #2: 4-month-old

- 4-month-old infant in for a well visit. Primary concern is colic. Infant spends 3-4 hours crying every evening.
- Two parent household, 7-year-old sister at home.
 - Mom works full-time, dad is in training to be a firefighter.
 - Generally, mom leaves work, immediately drives through traffic to get home to relieve the nanny.
- He feeds fine, growth is great, not spitting up. Remainder of physical exam and review of systems doesn't add anything to the story.

Typical Medical Response/ Differential?

- Consider “silent” reflux? Start antacids?
- Recommend over-the-counter gas remedies?
- Reassurance about normal variants in behavior?

Fight, Flight or Freeze?

- ACE score for mom: 5
- Parents went through an acrimonious divorce. Verbal abuse, domestic violence, substance abuse were common in her household.
- Her reaction to a “yelling” infant? The infant’s reaction to her reaction?



Tapping Into Resilience

- Mom used to do yoga before the new baby.
- How can mom return to this mindfulness activity?
 - If no time for yoga class, can she carve out 15 minutes out of her day to breathe, relax, recharge?
 - Mom started a new habit of stopping for a cup of tea on her way home, to give 15 minutes to herself.



And the Next Visit?

- Two months later...mom was much more relaxed! Colic wasn't entirely gone, but stress was less, crying was less, and perceptions were improved.
- Over time, mom disclosed other family stressors – and was able to talk more openly about parenting challenges.

Punchlines

- Parents often need “permission” for self-care.
- Parents may not be entirely aware of how their own experiences affect how they handle parenting, stressful situations, or work-life balance.

“...Place the oxygen mask on yourself first before helping small children or others who may need your assistance.”



Why These Cases Worked...And What Might Have Been Different

- Radical acceptance
- The power of listening
- Changing the culture of practice
- Helping parents understand what they are modeling for their kids
- With universal screening, would we have known the details of families like these earlier?
- Are we able to eventually move toward prevention – not only prevention of ACEs, but prevention of the outcomes associated with people who experience ACEs?

Punchlines

- Screening for ACEs in **ANY** context in our practice has made us aware of ACEs in **ALL** contexts.
- This fundamental culture shift towards Trauma-Informed Care changes how we view patients and their problems.
- Instead of just asking “what’s wrong with this patient?”, think “what happened to this patient?”
- Our needs as health care providers are extending beyond what our clinic can provide on its own...



On Being a Snowflake...





Audience Questions & Answers

ACEs Aware Provider Training



- 1. Get trained** at www.ACEsAware.org/training
 - Free, 2-hour online course that offers CME and MOC credits
- 2. Self-attest to completing the training** at www.Medi-Cal.ca.gov/TSTA/TSTAattest.aspx
 - List of Medi-Cal provider types eligible to receive payment at www.ACEsAware.org/eligible-providers/
- 3. Be part of the ACEs Aware Provider Directory** at www.acesaware.org/provider-directory





Resources By Topic

The ACE resources below are organized by topic to help you find the resource more quickly. Select a topic to view the corresponding resources.

Visit [Advanced Search](#) to filter the resources and search by keyword.

COVID-19 & Stress

Educational Events

Provider Toolkit

ACEs Aware Grants

ACE Resources

right

Resources by Type

Clinical Resources for Adult Providers

Clinical Resources for Pediatric Providers

Organizational Toolkits

Patient/Family Education Handouts

Policy, Research and Advocacy Briefs

Resources by Topic

Resilience-Building Interventions

Science of Toxic Stress

Screening & Clinical Response

Self-Care Tools

Trauma-Informed Systems

Upcoming Webinars

Register for Webinars and Find Webinar Recordings at:

www.ACEsAware.org/educational-events



Questions?

Contact Us



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