ACES : WHY EVERY CLINICIAN ~~SHOULD~~ SHOULDN'T HAVE TO CARE

Nadine Burke Harris, MD, MPH
CEO, Center for Youth Wellness
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CPMC Bayview Child Health Center

Headaches

- Each of the ACEs was associated with an increased prevalence and risk of frequent headaches. As the ACE score increased the prevalence and risk of frequent headaches increased in a "dose-response" fashion.
- The risk of frequent headaches increased more than 2-fold (odds ratio 2.1, 95% confidence interval 1.8-2.4) in persons with an ACE score ≥5, compared to persons with and ACE score of 0.
- The dose-response relationship of the ACE score to frequent headaches was seen for both men and women.

COPD

- Compared to people with an ACE Score of 0, those with an ACE Score of ≥ 4 had 2.6 times the risk of prevalent COPD, 2.0 times the risk of incident hospitalizations, and 1.6 times the rates of prescriptions ($p<0.01$ for all comparisons).
- These associations were only modestly reduced by adjustment for smoking.
- The mean age at hospitalization decreased as the ACE Score increased ($p<0.01$).

Anda RF, Brown DW, Dube SR, Bremner JD, Felitti VJ, Giles WH. Adverse childhood experiences and chronic obstructive pulmonary disease in adults. Am J Prev Med 2008;34(5):396-403.

Lung Cancer

- Compared to persons without ACEs, the risk of lung cancer for those with ≥ 6 ACEs was increased approximately 3-fold.
- After a priori consideration of a causal pathway (i.e., ACEs --> smoking --> lung cancer), risk ratios were attenuated toward the null, although not completely.
- For lung cancer identified through hospital or mortality records, persons with ≥ 6 ACEs were roughly 13 years younger on average at presentation than those without ACEs.

Brown DW, Anda RF, Felitti VJ, Edwards VJ, Malarcher AM, Croft JB, Giles WH. Adverse childhood experiences and the risk of lung cancer. BMC Public Health. 2010;10:20.

Liver Disease

- Each of 10 ACEs increased the risk of liver disease 1.2 to 1.6 times (P<.001).
- The number of ACEs (ACE score) had a graded relationship to liver disease (P<.001). Compared with persons with no ACEs, the adjusted odds ratio of ever having liver disease among persons with 6 or more ACEs was 2.6 (P<.001).
- The ACE score also had a strong graded relationship to risk behaviors for liver disease.
- The strength of the ACEs-liver disease association was reduced 38% to 50% by adjustment for these risk behaviors, suggesting they are mediators of this relationship.

Dong M, Anda RF, Dube SR, Felitti VJ, Giles WH. Adverse Childhood Experiences and Self- reported Liver Disease: New Insights into a Causal Pathway. Archives of Internal Medicine 2003;163:1949–1956.

Ischemic Heart Disease

- Nine of 10 categories of ACEs significantly increased the risk of IHD by 1.3- to 1.7-fold versus persons with no ACEs. The adjusted odds ratios for IHD among persons with ≥ 7 ACEs was 3.6 (95% CI, 2.4 to 5.3).
- The ACE-IHD relation was mediated more strongly by individual psychological risk factors commonly associated with ACEs than by traditional IHD risk factors.
- Significant association was observed between increased likelihood of reported IHD (adjusted ORs) and depressed affect (2.1, 1.9 to 2.4) and anger (2.5, 2.1 to 3.0) as well as traditional risk factors (smoking, physical inactivity, obesity, diabetes and hypertension), with ORs ranging from 1.2 to 2.7

Dong M, Giles WH, Felitti VJ, Dube, SR, Williams JE, Chapman DP, Anda RF. Insights into causal pathways for ischemic heart disease: Adverse Childhood Experiences Study. Circulation 2004;110:1761–1766.

Autoimmune Disease

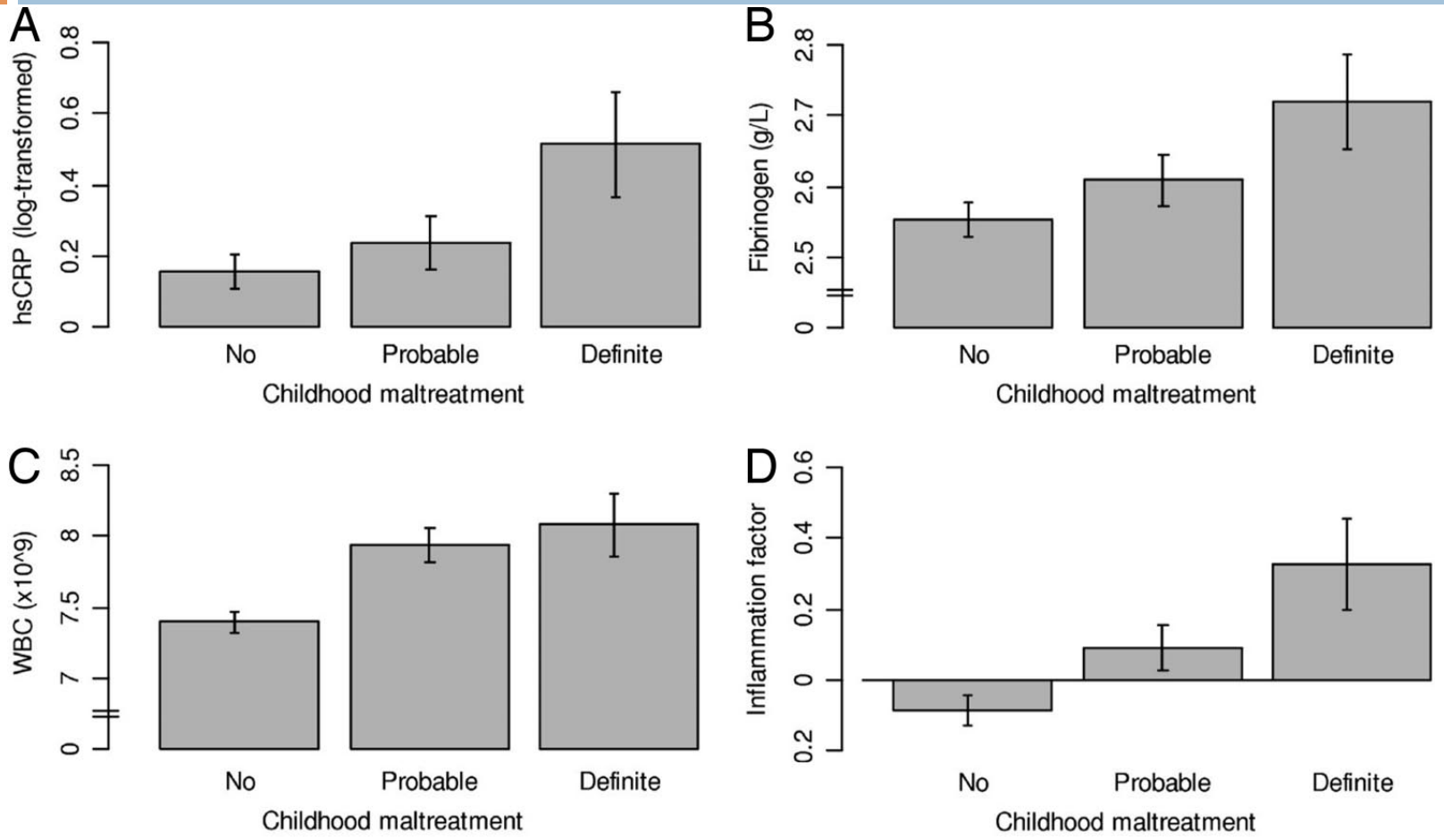
- First hospitalizations for any autoimmune disease increased with increasing number of ACEs ($p < .05$).
- Compared with persons with no ACEs, persons with ≥ 2 ACEs were at a 70% increased risk for hospitalizations with Th1, 80% increased risk for Th2, and 100% increased risk for rheumatic diseases ($p < .05$).

Dube SR, Fairweather D, Pearson WS, Felitti VJ, Anda RF, Croft JB. Cumulative childhood stress and autoimmune disease. Psychom Med 2009;71, 243–250.

Multi-systemic Impacts

- Neurologic:
  - HPA Axis Dysregulation
  - VTA and reward center dysregulation
  - Hippocampal neurotoxicity
  - Neurotransmitter and receptor dysregulation
- Immunologic
  - Increased inflammatory mediators and markers of inflammation such as interleukins, TNF alpha, IFN-γ

Effect of Child Maltreatment on Inflammatory Mediators



Multi-systemic Impacts

- Endocrine
  - Adult ACTH and plasma cortisol levels directly correlate with adverse childhood events, neglect and depression measures.
  - Maltreated children with PTSD were found to excrete greater than normal urinary cortisol and catecholamines years after disclosure of abuse.

Multi-systemic Impacts

- Epigenetic
  - Differential gene expression of pro-inflammatory transcription factors and neurotransmitter receptors
  - Epigenetic modifications leading to the reduction of glucocorticoid receptors in the brain, resulting in a increased HPA activity under both basal and stressful conditions

How do we transform practice?

How do we transform practice?

- Public Health Approach
  - Public awareness campaign
  - Public policy intervention
  - Systems change

- Credible clinical intervention
  - Universal screening with a tool that is brief and actionable.
  - Straightforward clinical algorithm
  - Tracking of biomarkers

BCHC Protocol

- Every child screened for ACEs at the WCC
  - ACEs = 0 → Yah! Nothing to do.
  - ACEs = 1-3 w/o symptoms → anticipatory guidance
  - ACEs = 1-3 w/ symptoms → Refer to MDR.
  - ACEs ≥ 4 → Refer to MDR.

Symptoms

- Sleep disturbance
- Weight gain or loss
- Enuresis, encopresis
- Hair loss
- Developmental regression
- School failure or absenteeism
- Failure to thrive
- Poor control of chronic disease
- Aggression
- Disordered attachment
- Poor impulse control
- Restricted affect or numbing
- High risk behavior in adolescents

CYW ACEs Curriculum for Providers

- Step 1: Intro to ACEs
- Step 2: Homework – Develop a database of community resources and high quality referrals
- Step 3: Clinical screening
- Step 4: Follow up and trouble shooting

Trauma-Informed System of Care

- Step 1: Recognition of the impacts of trauma
  - On your patients
  - On your staff
  - On YOU
- Step 2: Put your own oxygen mask on
- Step 3: Create a system and a plan
- Step 4: Take the long-term view

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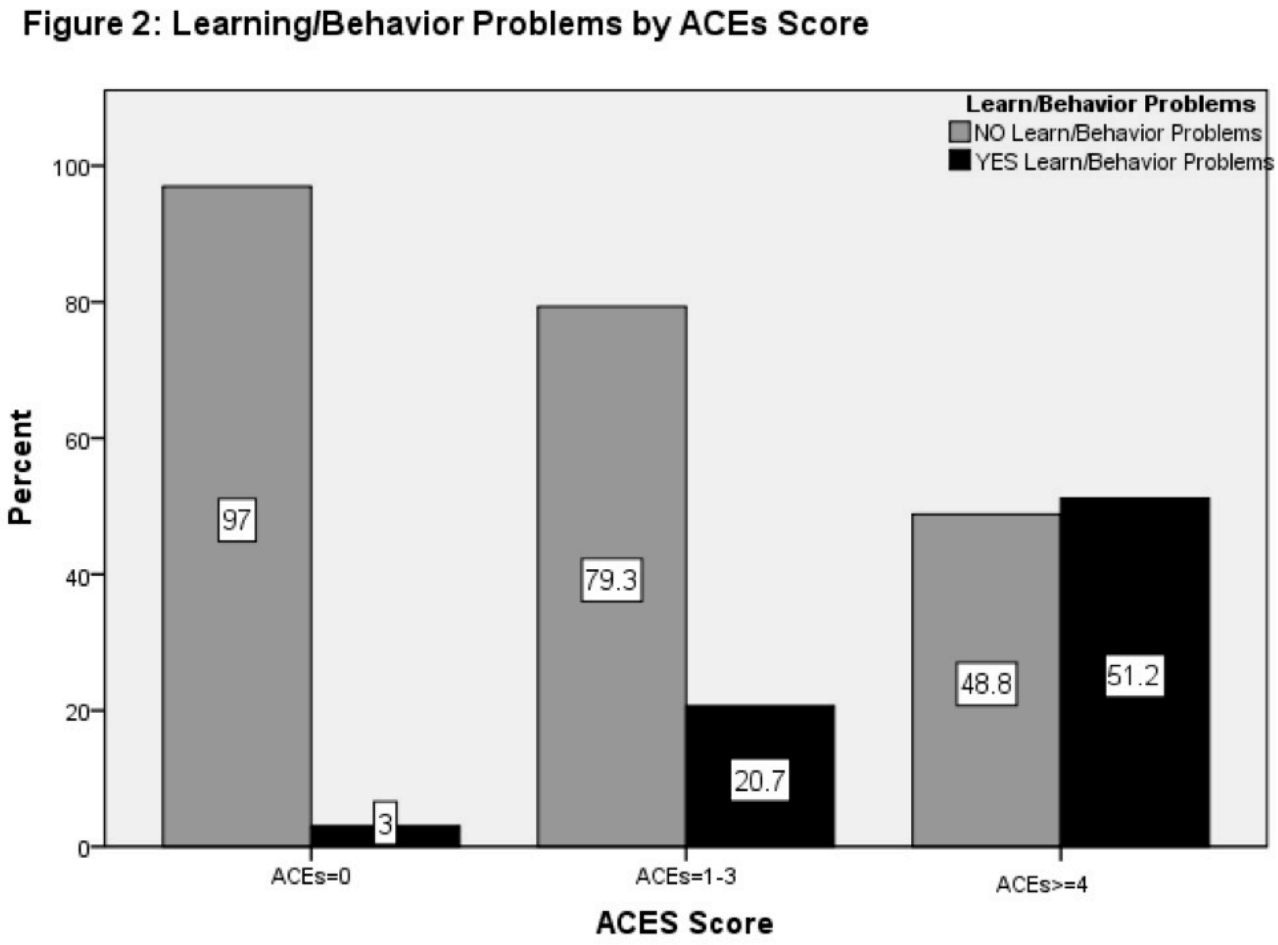
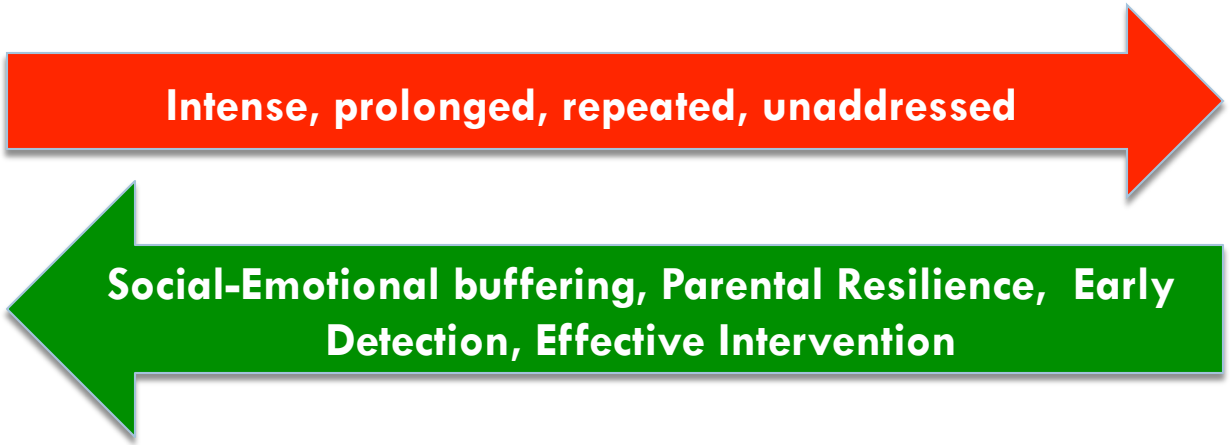
ACEs ≥ 1	67.2%
ACEs ≥ 4	12%
ACEs ≥ 4 and BMI ≥ 85%	OR: 2.0 p< .02
ACEs ≥ 4 and learning/beh probs	OR: 32.6 p< .001

N.J. Burke et al/ Child Abuse and Neglect 35(2011) 408-413

Example of Adverse Affects on Educational Outcomes



Positive Stress	Tolerable Stress	Toxic Stress
▪ Normal and essential part of healthy development ▪ Brief increases in heart rate and blood pressure ▪ Mild elevations in hormonal levels ▪ *Example*: Tough test at school. Playoff game.	▪ 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 loved one, divorce, natural disaster	▪ 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



Intervention Targets

- Neurologic:
  - HPA Axis Dysregulation
  - VTA and reward center dysregulation
  - Hippocampal neurotoxicity
  - Neurotransmitter and receptor dysregulation
- Immunologic
  - Increased inflammatory mediators and markers of inflammation such as interleukins, TNF alpha, IFN-γ

Intervention Targets

- Endocrine
  - ACTH
  - Cortisol
  - Adrenaline
- Epigenetic
  - DNA Methylation
  - Telomere regulation

Primary and Secondary Prevention

- Brain architecture is **experience dependent**
- Social-emotional buffering makes a big difference
  - Positive parenting
  - Trusted mentor
  - Healthy attachment
  - Social-emotional skills

Lick Your Pups!

Primary and Secondary Prevention

- Exercise
  - Regulation of HR and BP
  - Regulation of HPA Axis
  - Decrease depression and anxiety
  - Regulation of cerebral neurotransmitters including dopamine and serotonin
  - Endorphin release
  - Opportunity for healthy adult relationships
  - Wide community acceptance (cultural norm)

Primary and Secondary Prevention

- Mindfulness Based Awareness
  - Regulation of HR and BP
  - Regulation of inflammatory mediators including CRP
  - Regulation of HPA Axis including serum cortisol
  - Decrease depression and anxiety
  - Decrease in post-traumatic symptoms
- Biofeedback
  - Regulation of autonomic nervous system
- Psychiatry and Psychotherapy

Question?

- What do tertiary and quaternary care for toxic stress and ACES look like?

Tertiary Care

Quaternary Care

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- Clinical Model:
  - Bio-psycho-social assessment for toxic stress
  - Home visits
  - High quality referrals
  - Psychotherapy
  - Psychiatry
  - Biofeedback
  - Exercise
  - Mindfulness and coping
  - Tracking biologic markers

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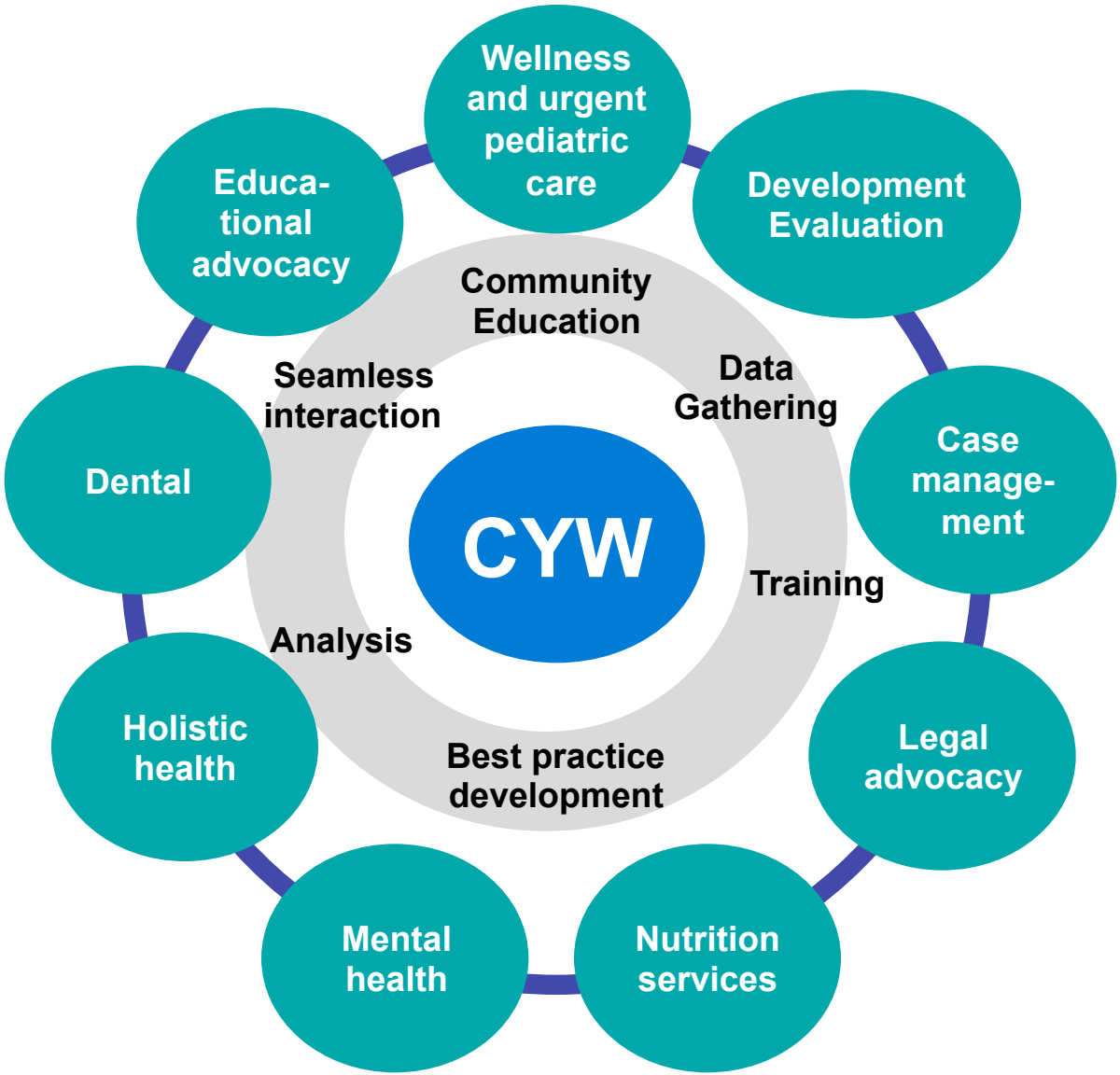

SOURCE: Core Team

Thank You!

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