

ADVERSE CHILD EXPERIENCES: PRACTICAL APPLICATIONS

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Faculty Disclosure

- I have no relevant financial relationship with the manufacturer(s) of any commercial product(s) and/or provider of commercial services discussed in this CME activity.
- I do not intend to discuss an unapproved/ investigative use of a commercial product/ device in my presentation.

Update on Adverse Childhood Experiences

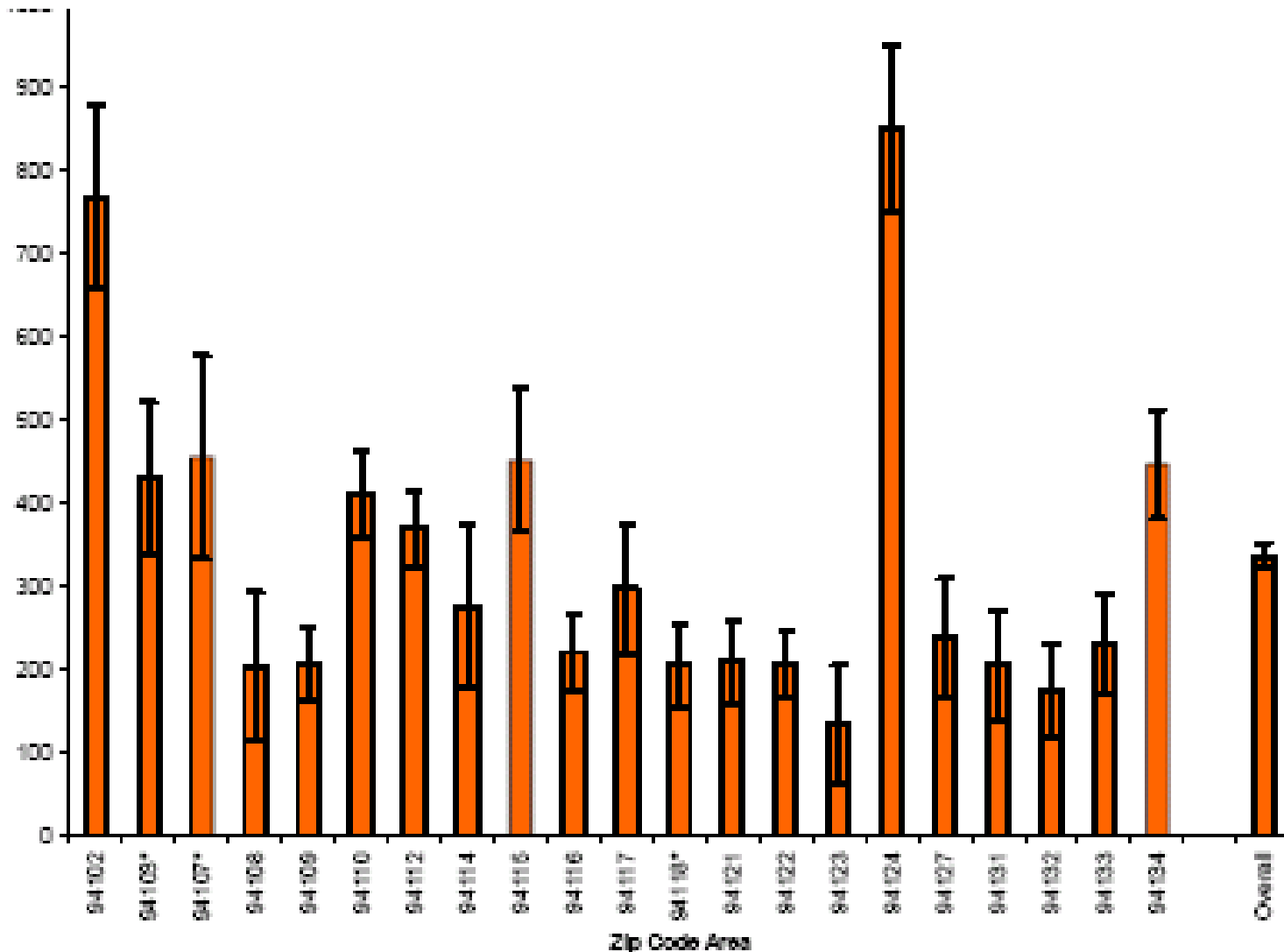


- Background
- Review of ACEs Study
- Mechanism
- Clinical Response
- Resources

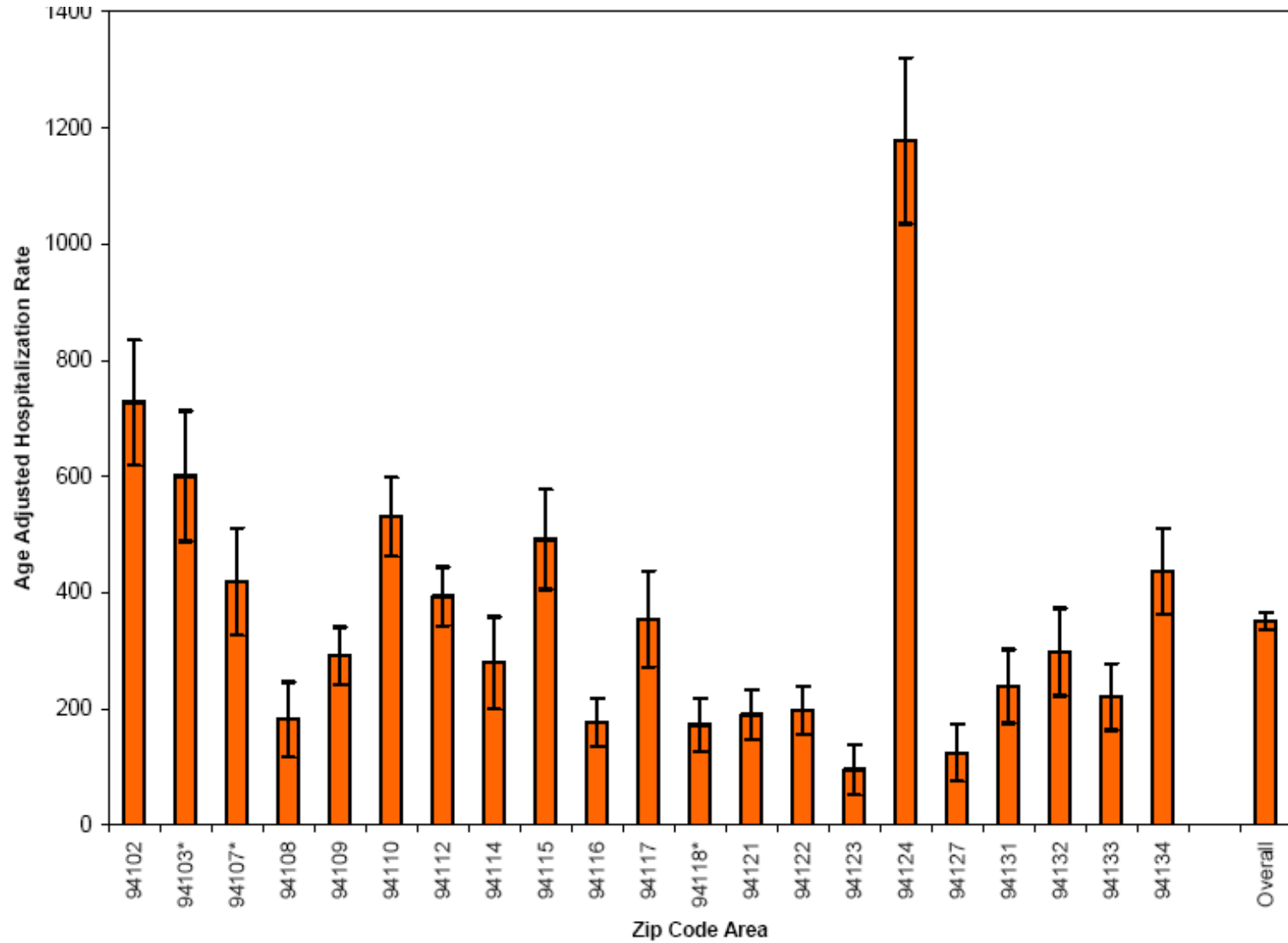
Bayview Hunters Point Demographic Profile

Population	33,170
Pediatric Population	10,042
Median Household Income	\$37,146
Population Living in Poverty	21.7%
Adults with <High School Education	36.5%
African American	47.2%
Asian/ Pacific Islander	27.6%
Latino	16.7%
Caucasian	5.4%

Ambulatory Care Sensitive Hospitalizations: Adult and Pediatric Asthma



Ambulatory Care Sensitive Hospitalizations: Diabetes



CPMC Bayview Child Health Center





Bayview Child Health Center

Serving all children of the community, regardless of insurance type or ability to pay.

Services Offered:

- Well child exams
- Immunizations
- Sick visits and urgent care
- Referrals to specialists
- Weight management
- Mental health services

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The ACEs Study



- Vincent J. Felitti, MD and Robert J. Anda, MD, MS
- Asked 26,000 adults at Kaiser, San Diego's Dept of Preventive Medicine.
- 17,421 participated in the study.
- Participants completed a questionnaire.

ACEs Criteria

1. Recurrent physical abuse
2. Recurrent emotional abuse
3. Contact sexual abuse
4. An alcohol or drug abuser in the household
5. An incarcerated household member

ACEs Criteria

6. Someone who was chronically depressed, institutionalized, or suicidal
7. Mother treated violently
8. One or no parents, or parents divorced.
9. Emotional or physical neglect

Population Demographics

GENDER

- Male 46%
- Female 54%

ETHNICITY

- White 74.8%
- Hisp 11.2%
- API 7.2%
- AA 4.6%
- Other 1.9%

Population Demographics

AGES

- 19-29 5.3%
- 30-39 9.8%
- 40-49 18.6%
- 50-59 19.9%
- ≥ 60 46.4%

EDUCATION

- Not HS Grad 7.2%
- HS Grad 17.6%
- Some college 35.9%
- \geq College grad 39.3%

Results

Abuse:

- Emotional 10%
- Physical 26%
- Sexual 21%

Neglect:

- Emotional 15%
- Physical 10%

Results

Household Dysfunction

- Mother treated violently 13%
- Mental illness 20%
- Substance abuse 28%
- Parental separation/divorce 24%
- Household member imprisoned 6%

ACEs ≥ 4 12.6%

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 an 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 \rightarrow smoking \rightarrow 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

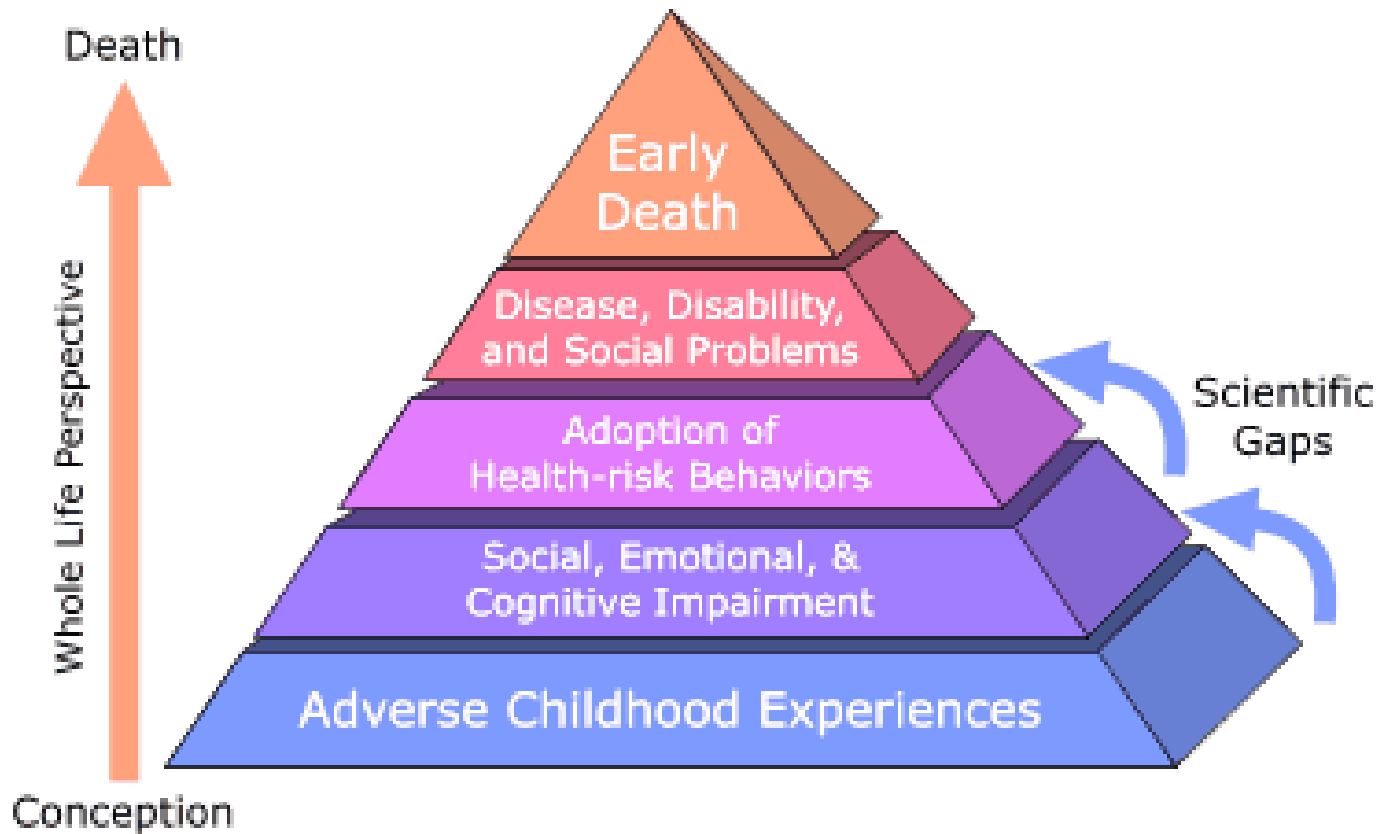
Dong M, Giles WH, Felitti VJ, Dube, SR, Williams JE, Chapman DP, Anda RF. Insights into causal pathways for ischemic heart disease: Adverse Childhood Experiences Study. *Circulation* 2004;110:1761–1766.

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.

Mechanism



Neurobiology

- Amygdala: mediates fear responses
- Prefrontal Cortex: mood, emotional and cognitive function including judgment.
- Hypothalamic-Pituitary-Adrenal (HPA) Axis: stress response
- Hippocampus: learning and memory (high density of glucocorticoid receptors)
- Noradrenergic nucleus in the locus coeruleus: regulation of affect, irritability, locomotion, arousal, attention and startle



Stress Response

- Activation of the HPA Axis - release of ACTH, epinephrine and cortisol
- Increase in centrally controlled peripheral sympathetic tone
- Nucleus Coeruleus activation of noradrenergic tone throughout the midbrain and forebrain including the cortex



Neuropathology

- Dysregulation of the HPA Axis
- Loss of noradrenergic feedback inhibition leads to increased NA responses to subsequent stressors (hyper-arousal, irritability)
- Alterations in serotonergic and GABAergic receptors (mood and attachment)
- Hippocampal neurotoxicity (memory)
- Altered release of dopamine in the nucleus accumbens (reward center)

Post Traumatic Symptoms

- Exaggerated startle response
- Irritability or outbursts of anger
- Poor concentration
- Memory impairment
- Hyper-vigilance
- Intrusive recollection
- Restricted range of affect
- Numbing

From Neurochemistry to Behavior

- Heroin and alcohol decrease firing of the locus coeruleus.
- Nicotine and cocaine stimulate dopamine release in the nucleus accumbens.
- Sex releases oxytocin which mediates pair bonding and social attachment. It also decreases cortisol levels.
- Glucocorticoids stimulate appetite and deposition of abdominal fat.

Clinical Sequelae

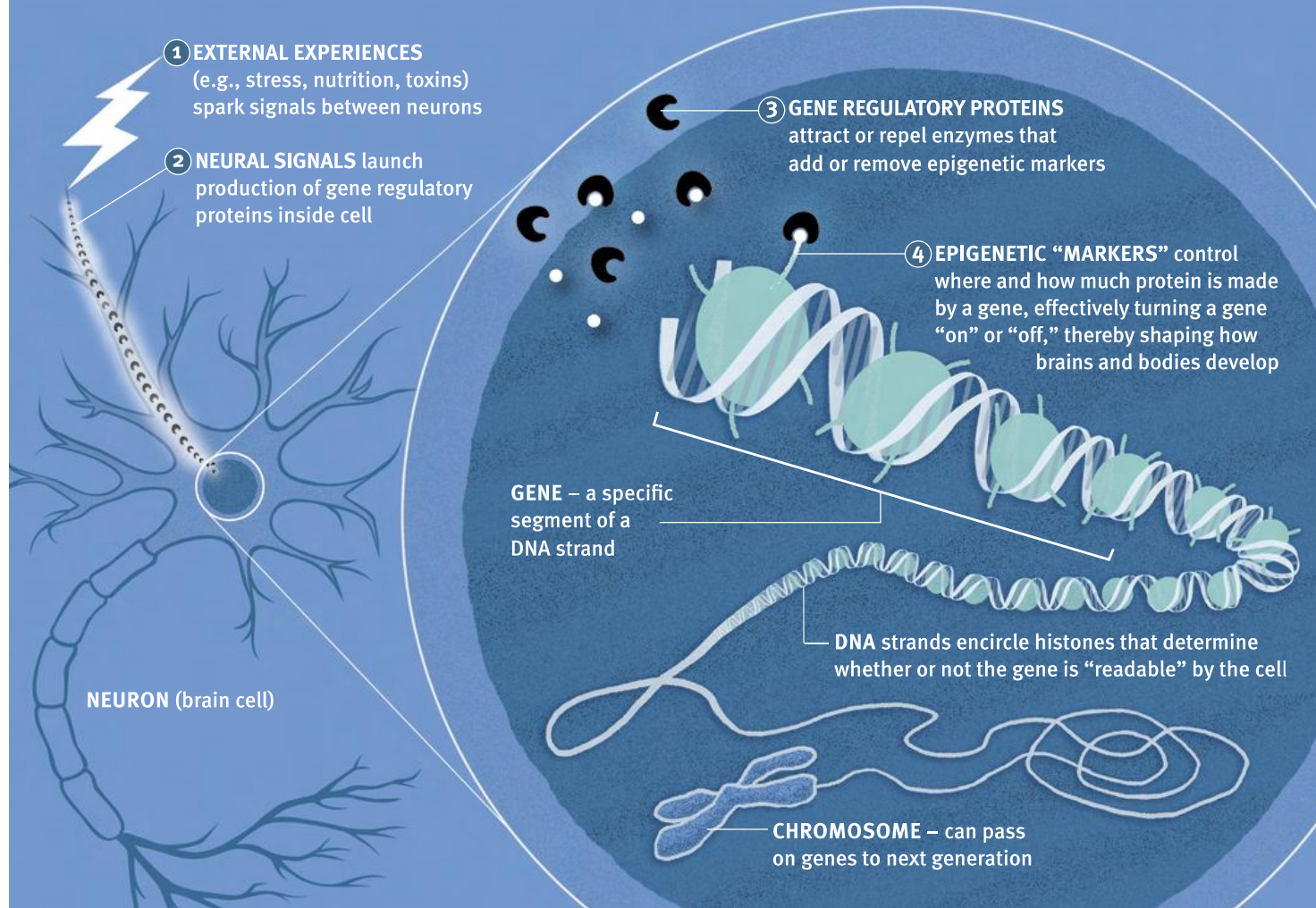
- COPD
- Cancer
- Diabetes
- Hepatitis
- Ischemic Heart Disease
- Overweight and Obesity
- Sleep Disturbance
- Sexually Transmitted Infections

Development

- Converging evidence from neurobiology and epidemiology suggests that early life stress such as abuse and related adverse experiences cause enduring brain dysfunction that, in turn, affects health and quality of life throughout the lifespan.

Anda RF, Felitti VJ, Walker J, Whitfield, CL, Bremner JD, Perry BD, Dube SR, Giles WH. The enduring effects of abuse and related adverse experiences in childhood: a convergence of evidence from neurobiology and epidemiology. *European Archives of Psychiatry and Clinical Neurosciences* 2006; 56(3):174–86.

How Early Experiences Alter Gene Expression and Shape Development



**National Scientific Council on the Developing Child
Working Paper 10: Early Experiences Can Alter the Gene Expression and Affect Long-Term Development**

Effect of Early Stress

- Long-term increases in glucocorticoid responses to stress (Plotsky and Meaney 1993; Ladd 1996)
- Decreased genetic expression of cortisol receptors in the hippocampus
- Increased genetic expression of corticotrophin-releasing factor in the hypothalamus

Anda RF, Felitti VJ, Walker J, Whitfield, CL, Bremner JD, Perry BD, Dube SR, Giles WH. The enduring effects of abuse and related adverse experiences in childhood: a convergence of evidence from neurobiology and epidemiology. *European Archives of Psychiatry and Clinical Neurosciences* 2006; 56(3):174–86.

Long term alterations in stress hormone levels

- 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.

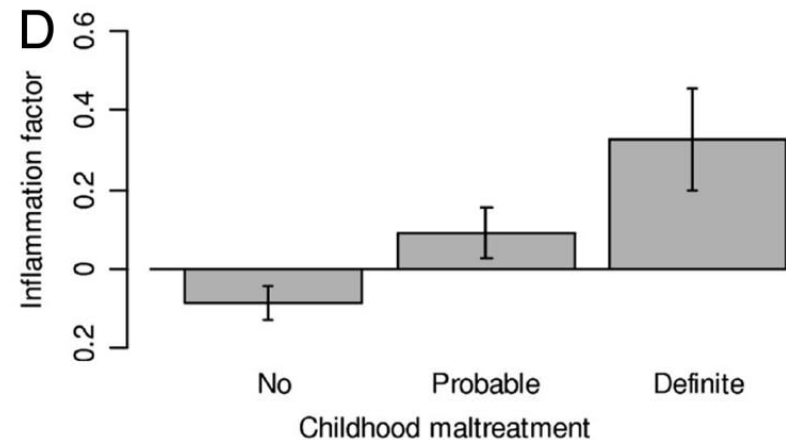
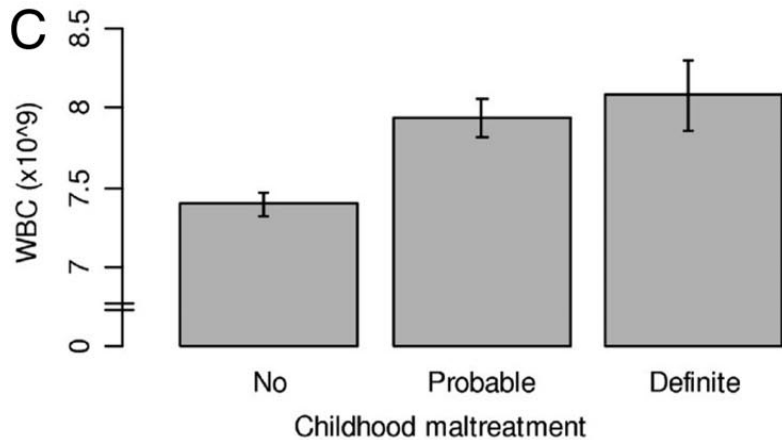
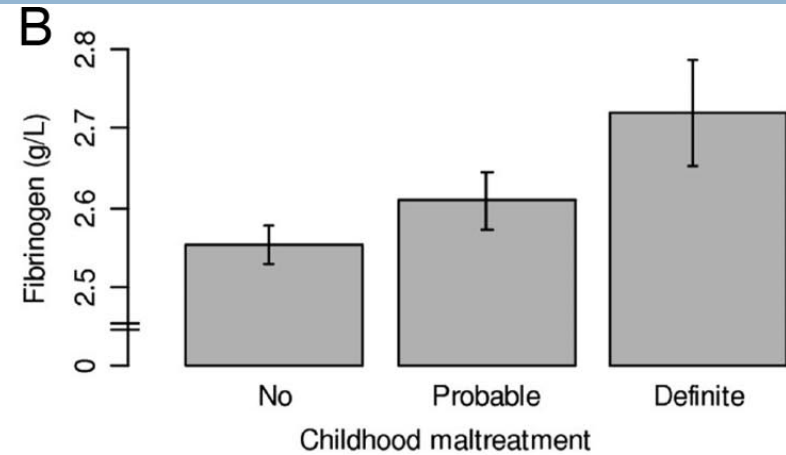
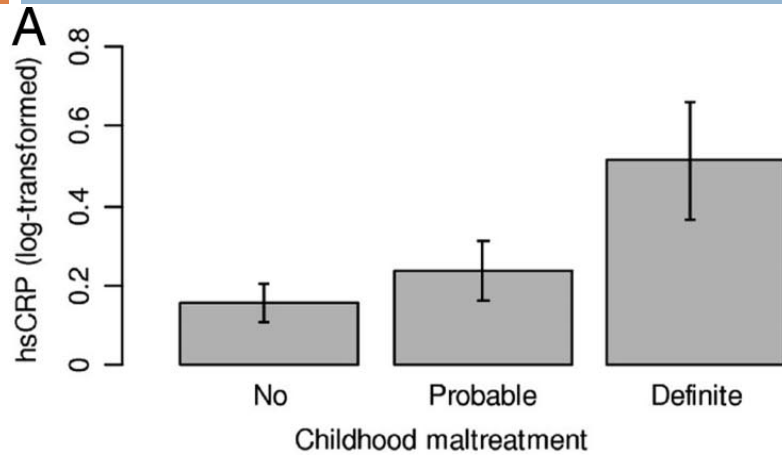
Immunology

- Acute psychosocial stress can induce activation of the transcription nuclear factor κ B and secretion of pro-inflammatory cytokines (presumed to be through adrenergic stimulation).

Immunology

- Children who were maltreated were 1.8 times as likely to have elevated hsCRP in adulthood compared with non-maltreated children
- After controlling for the effect of health-damaging behaviors, the association between childhood maltreatment and elevated adult hsCRP was still significant (RR= 1.76)

Effect of Child Maltreatment on Inflammatory Mediators



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

Multi-systemic Impacts

- Endocrine
 - ▣ Long-term changes in ACTH and cortisol levels and catecholamines.
- 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

CPMC Bayview Child Health Center



Name	DOB

Denied	ACE Category	Hx	Date & Initial
	1. Physical Abuse		
	2. Emotional Abuse		
	3. Contact Sexual Abuse		
	4. Alcohol and/or Drug Abuser in the Household		
	5. Incarcerated Household Member		
	6. Someone Chronically Depressed, Mentally Ill, Institutionalized, or Suicidal		
	7. Mother Treated Violently		
	8. One or No Parents, Parental Separation, or Divorce		
	9. Emotional or Physical Neglect		

Denied	+1 Categories	Hx	Date & Initial
	Homelessness (Hx or Current)		
	Traumatic Incident		
	Foster Care System (Hx or Current)		
	Witness to Violence/Abuse		
Denied	Other/Not Scored	Hx	Date & Initial
	Public Housing		
	Intrauterine Drug Exposure		
	Child Protective Services Involvement		

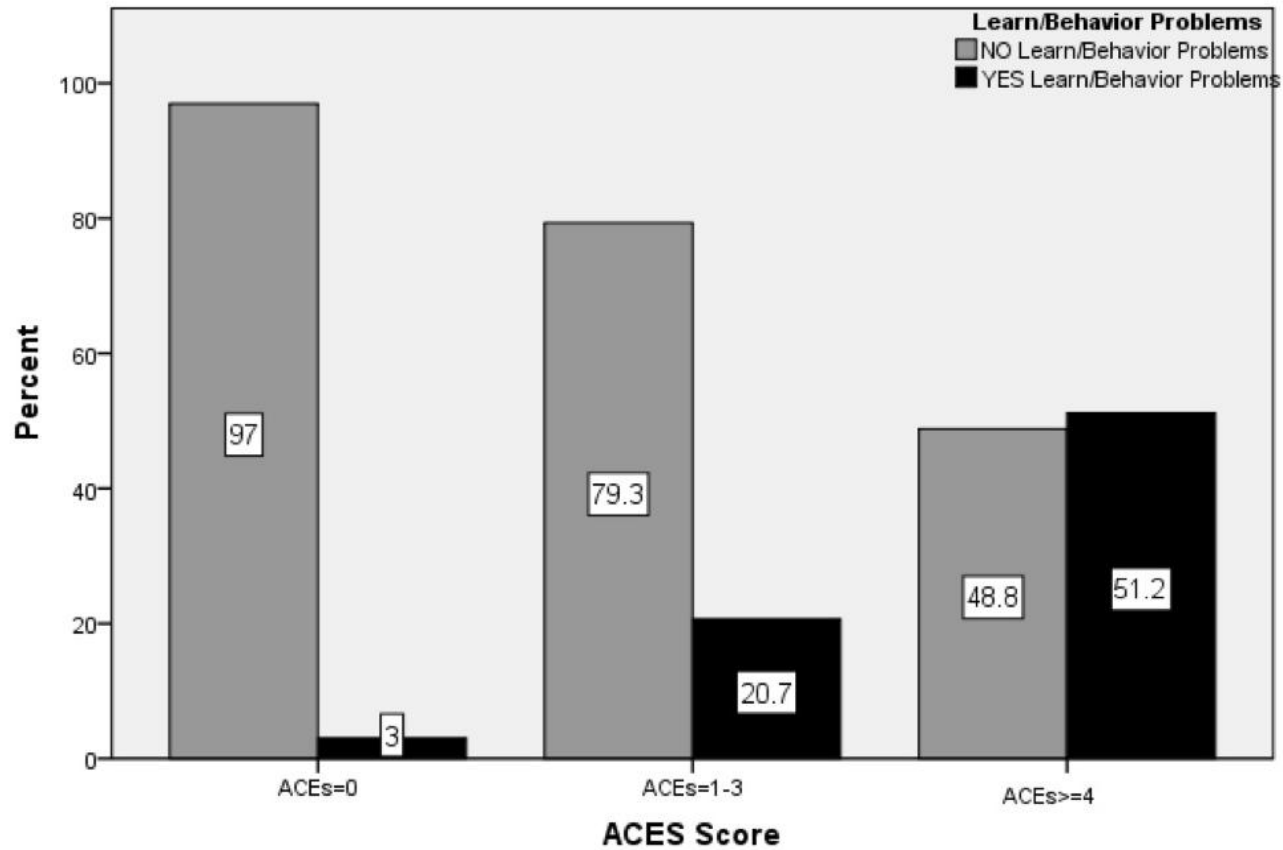
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ACEs ≥ 1	67.2%
ACEs ≥ 4	12%
ACEs ≥ 4 and BMI $\geq 85\%$	OR: 2.0 p < .02
ACEs ≥ 4 and learning/beh probs	OR: 32.6 p < .001

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

Effect of ACEs on Educational Outcomes

Figure 2: Learning/Behavior Problems by ACEs Score





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SCOPE OF THE CHALLENGE

- Impacts are pervasive and long-lasting
 - ▣ Development
 - ▣ Physical and Mental Health
 - ▣ Social and Educational impacts
 - ▣ Economic impacts
- Prevalence is high
- Strong evidence relating the risk
- Early intervention improves outcomes

PRICE
OBAMA AND THE MIDDLE EAST
by David Remnick

MAR. 21, 2011
THE NEW YORKER

Does poverty make you sick?

New research suggests that the stresses of a deprived childhood have a lasting impact on the human body. Do we need a fresh approach to public health? Paul Tough reports

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Plus:

Anthony Lane on aliens in L.A.
James Wood on life and daydreams
Ian Frazier on New York's seals



Center for Youth Wellness

- Clinical Interventions
 - ▣ Clinical protocols
 - ▣ Collaboration and integration of services
 - ▣ Creation of an integrated treatment infrastructure
- Best Practice Development
 - ▣ Evaluation of promising protocols
 - ▣ Long-term follow up
- Policy Intervention
 - ▣ Professional groups (AAP)
 - ▣ Local, State and Federal action to protect children

Clinical Approach

- Multidisciplinary Approach
 - Trauma informed medical care
 - Psychiatric and psychological services
 - Case Management
 - Educational Advocacy
 - Evidence-Based Supplemental therapies
 - mindfulness based awareness
 - Biofeedback

Bayview Protocol

- Every child screened for ACEs
 - ACEs = 0 → Yah! Nothing to do.
 - ACEs = 1-3 with symptoms → Refer to MDR.
 - ACEs \geq 4 → Refer to MDR.
- Multidisciplinary Rounds:
 - Medical
 - Mental Health
 - Case Management
 - Reception

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
- Poor impulse control
- Frequent crying
- Restricted affect or numbing
- High risk behavior in adolescents

Treatments

- Psychoactive Medications
 - ▣ Many children with a history of trauma are being treated with atypical anti-psychotics (Risperdal)
 - ▣ Increased risk of obesity with some meds
 - ▣ Medications without other supports not recommended

Treatments

- Trauma Focused Therapies
 - ▣ Child Parent Psychotherapy
 - ▣ Cue Centered Therapy
 - ▣ Trauma Focused Cognitive Behavioral Therapy

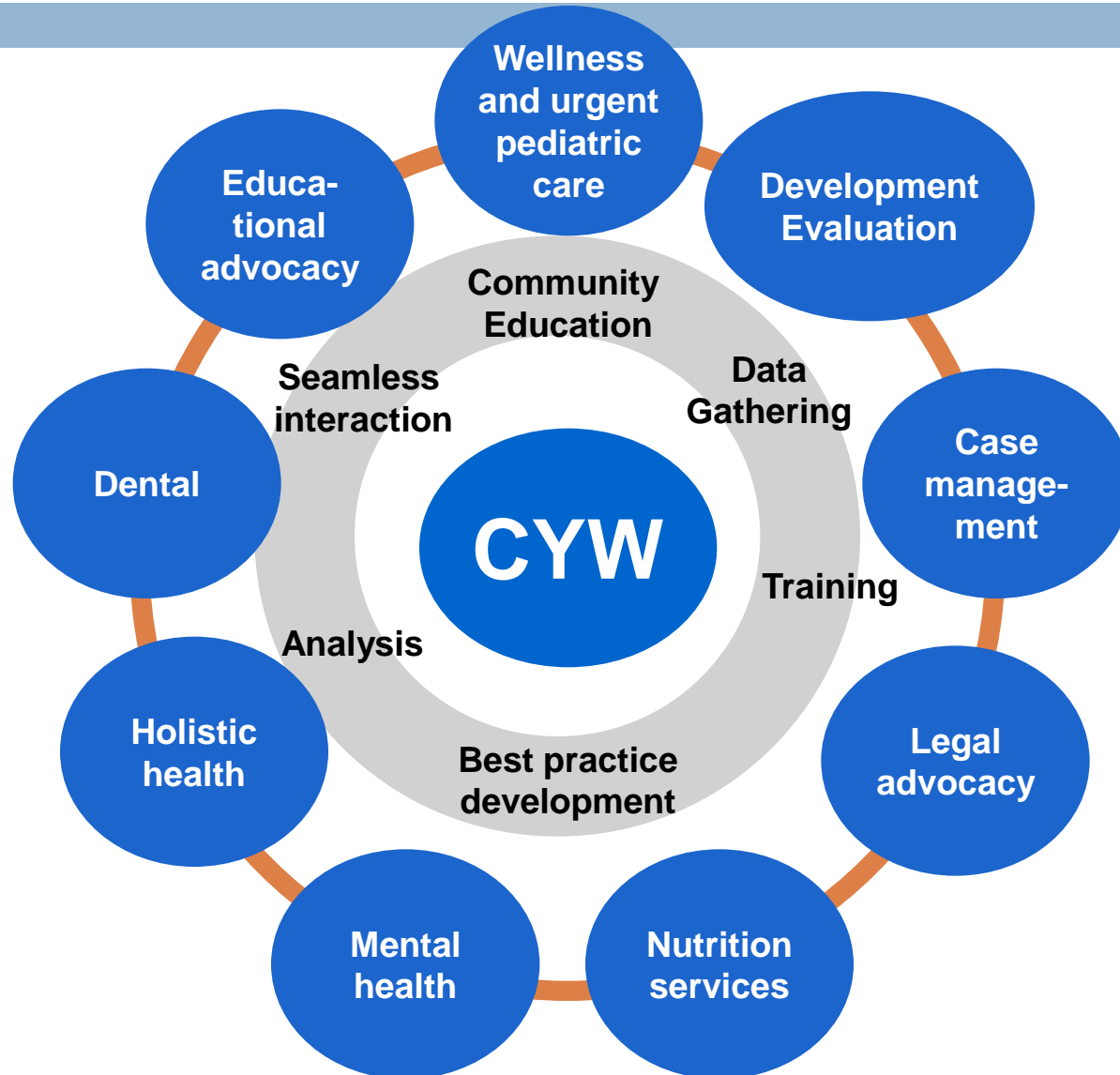
Treatments

- Exercise
 - Regulation of HR and BP
 - Regulation of HPA Axis
 - Decrease depression and anxiety
 - Regulation of cerebral neurotransmitters including dopamine and serotonin
 - Endorphin release

Treatments

- Mindfulness Based Awareness
 - Regulation of HR and BP
 - Regulation of inflammatory mediators
 - Regulation of HPA Axis including serum cortisol
 - Decrease depression and anxiety
 - Decrease in post-traumatic symptoms

Center for Youth Wellness



What you can do in clinic

- Universal screening
- Look for signs of HPA Axis dysregulation
- Refer to Social Work, Mental Health and Developmental Peds where necessary
- Where medications necessary- combine with behavioral therapy
- Follow up, follow up, follow up

Resources

- Centers for Disease Control and Prevention
 - <http://www.cdc.gov/ace/index.htm>

- San Francisco Child Abuse Prevention Center
 - <http://sfcapc.org>
 - (415) 441-KIDS

- UCSF Child Trauma Research Program
 - <http://childtrauma.ucsf.edu/>

- Lucile Packard Early Life Stress Program
 - <http://childpsychiatry.stanford.edu/clinical/stress.html>

- National Child Traumatic Stress Network
 - <http://www.nctsn.org/>

Thank You!



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