

Stress = Dis-Ease

An Examination of Adverse Childhood Experiences' Impact on Health Later in Life

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The Link Between Childhood Stress and Disease

- Relationship of Child Abuse and Household Dysfunction to Many of the Leading Causes of Death in Adults
 - ▣ The Adverse Childhood Experiences (ACE) Study
 - ▣ N=17,337
 - ▣ Survey and medical chart review
 - ▣ [Video](#)

Source: Vincent J. Felitti, MD, Robert F. Anda, MD, MS, Dale Nordenberg, MD, David F. Williamson, MS, PhD, Alison M. Spitz, MS, MPH, Valerie Edwards, BA, Mary P. Koss, PhD, James S. Marks, MD, MPH, (1998). *American Journal of Preventive Medicine* 14 (4), 245 – 258.

Adverse Childhood Events Included in the ACE Survey

- Child Abuse and Neglect
 - ▣ Physical
 - ▣ Emotional
 - ▣ Sexual

- Dysfunctional Household
 - ▣ Substance abuse
 - ▣ Mental illness
 - ▣ Intimate partner violence
 - ▣ Criminal behavior



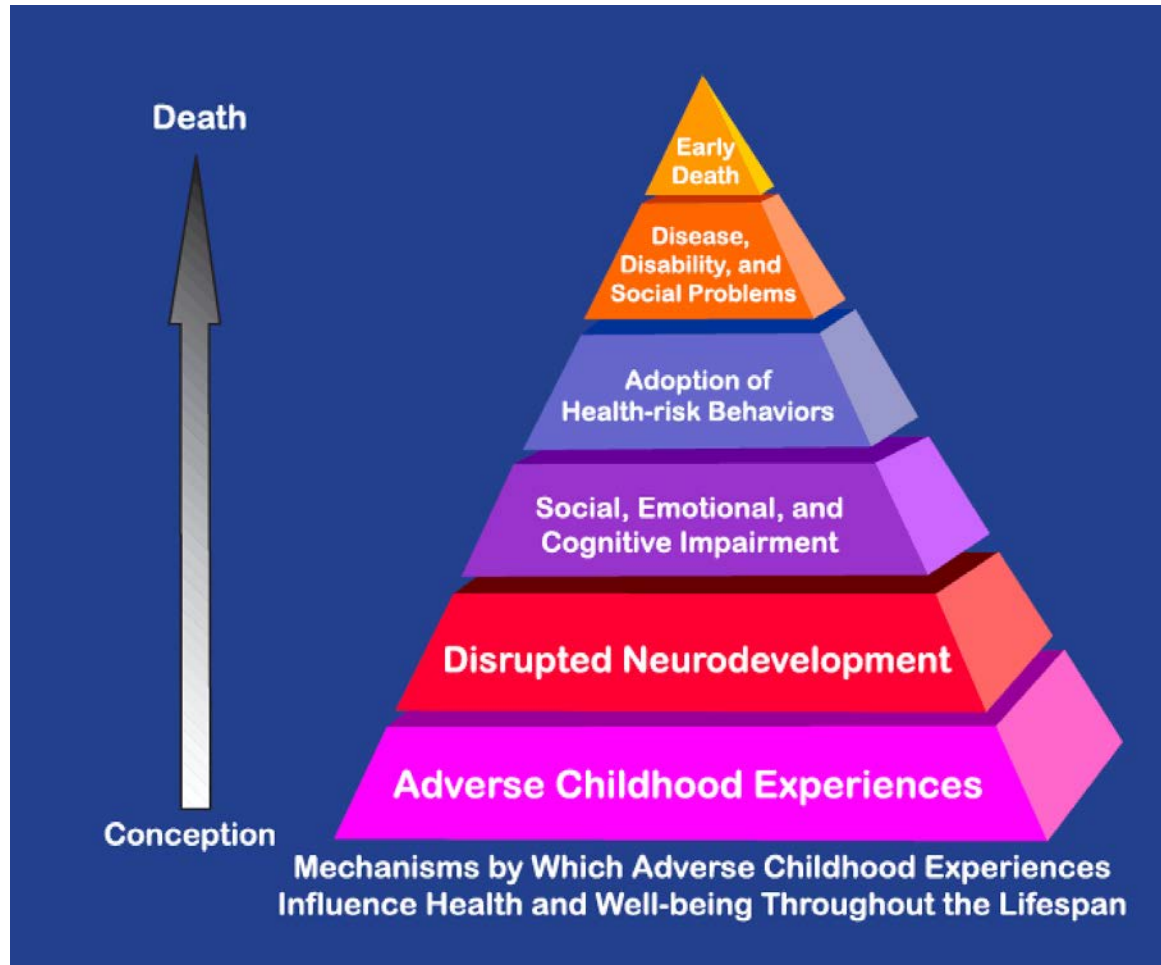
ACE Survey

Prior to your 18th birthday:

- Did a parent or other adult in the household often or very often... Swear at you, insult you, put you down, or humiliate you? or Act in a way that made you afraid that you might be physically hurt?
If Yes, enter 1 ___
- Did a parent or other adult in the household often or very often... Push, grab, slap, or throw something at you? or Ever hit you so hard that you had marks or were injured?
If Yes, enter 1 ___
- Did an adult or person at least 5 years older than you ever... Touch or fondle you or have you touch their body in a sexual way? or Attempt or actually have oral, anal, or vaginal intercourse with you?
If Yes, enter 1 ___
- Did you often or very often feel that ... No one in your family loved you or thought you were important or special? or Your family didn't look out for each other, feel close to each other, or support each other?
If Yes, enter 1 ___
- Did you often or very often feel that ... You didn't have enough to eat, had to wear dirty clothes, and had no one to protect you? or Your parents were too drunk or high to take care of you or take you to the doctor if you needed it?
If Yes, enter 1 ___
- Were your parents ever separated or divorced?
If Yes, enter 1 ___
- Was your mother or stepmother:
Often or very often pushed, grabbed, slapped, or had something thrown at her? or Sometimes, often, or very often kicked, bitten, hit with a fist, or hit with something hard? or Ever repeatedly hit over at least a few minutes or threatened with a gun or knife?
If Yes, enter 1 ___
- Did you live with anyone who was a problem drinker or alcoholic, or who used street drugs?
If Yes, enter 1 ___
- Was a household member depressed or mentally ill, or did a household member attempt suicide?
If Yes, enter 1 ___
- Did a household member go to prison?
If Yes, enter 1 ___
- Now add up your "Yes" answers: _ This is your ACE Score



ACE Pyramid



ACE Study Results

ACE Score	female(%)	male(%)	overall(%)
0	34.5	38.0	36.1
1	24.5	27.9	26.0
2	15.5	16.4	15.9
3	10.3	8.6	9.5
4+	15.2	9.2	12.5

64% had 1 or more ACE's

12.5% experienced 4 or more ACE's



ACE Study Results

ACE category	female(%)	male(%)	overall(%)
• Emotional Abuse	13.1	7.6	10.6
• Physical Abuse	27.0	29.9	28.3
• Sexual Abuse	24.7	16.0	20.7
• Emotional Neglect	16.7	12.4	14.8
• Physical Neglect	9.2	10.7	9.9
• Domestic Violence	13.7	11.5	12.7
• Substance Abuse	29.5	23.8	26.9
• Mental Illness	23.3	14.8	19.4
• Divorce/Separation	24.5	21.8	23.3
• Incarceration	5.2	4.1	4.7
	(N=9,367)	(N=7,970)	(N=17,337)

Source: <http://www.cdc.gov/ace/prevalence.htm>



ACE Study Results

- ACE = 0
 - 56% demonstrated/reported no high risk behaviors
- ACE = 4 or more
 - 14% demonstrated/reported no high risk behaviors
 - 86% demonstrated/reported high risk behaviors
- Intensity, duration, and repetition were not evaluated by the ACE study, but importance was supported by other researchers



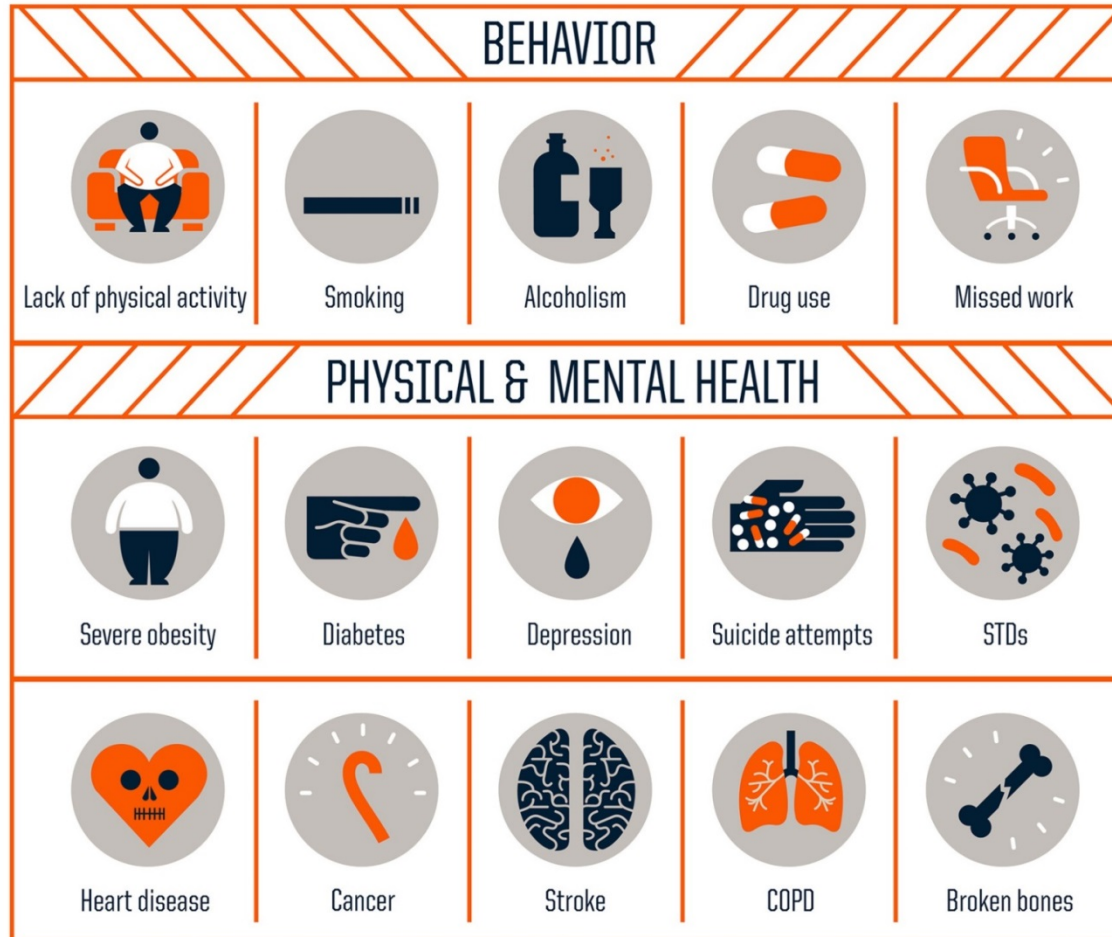
ACE Study Results

- The ACE Score is used to assess the total amount of stress during childhood and has demonstrated that as the number of ACEs increase, the **risk for the following health problems increases in a strong and graded fashion:**
 - Alcoholism and alcohol abuse
 - Chronic obstructive pulmonary disease (COPD)
 - Depression
 - Fetal death
 - Illicit drug use
 - Ischemic heart disease (IHD)
 - Liver disease
 - Risk for intimate partner violence
 - Multiple sexual partners
 - Sexually transmitted diseases (STDs)
 - Smoking
 - Suicide attempts/self-harming behaviors
 - Unintended pregnancies
 - Early initiation of smoking
 - Early initiation of sexual activity
 - Adolescent pregnancy
 - Obesity/eating disorders
 - Multiple mental health diagnoses (Complex or Developmental Trauma Disorder)

Source: <http://www.cdc.gov/ace/findings.htm>

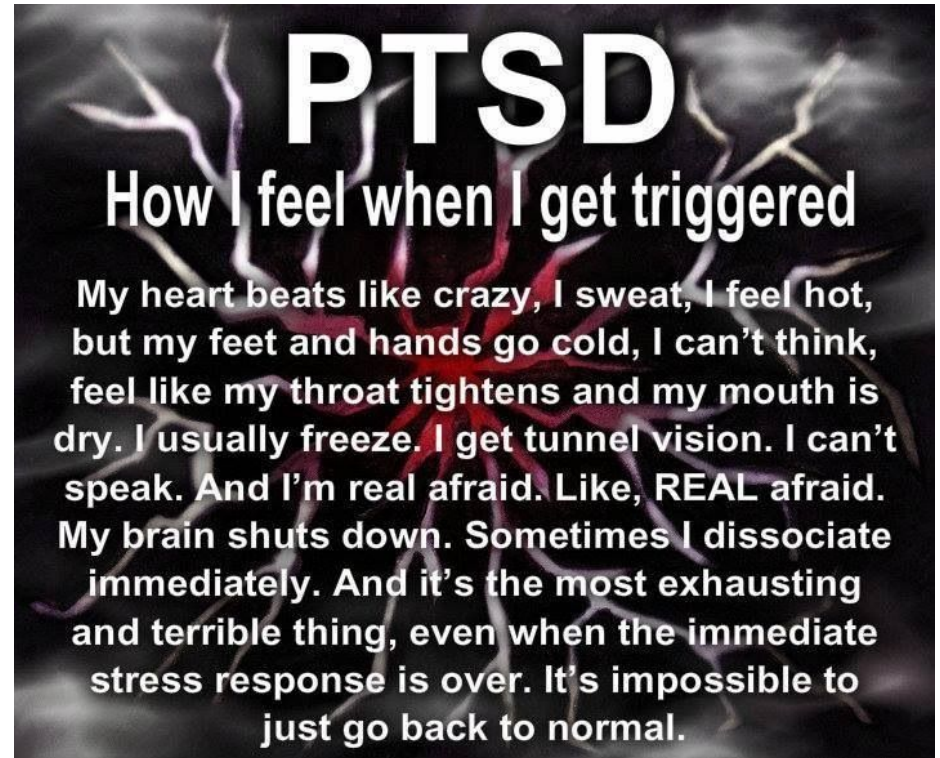


Linking Behavior to Health Outcomes



Example: Trauma According to the DSM5

- The individual was exposed to:
 - ▣ Death
 - ▣ Threatened death
 - ▣ Actual or threatened serious physical injury
 - ▣ Actual or threatened sexual violence



Complex Traumatic Disorder

Developmental Trauma Disorder

- Multiple or prolonged exposures to adversity, specifically in the developing person.
- Long term health risks

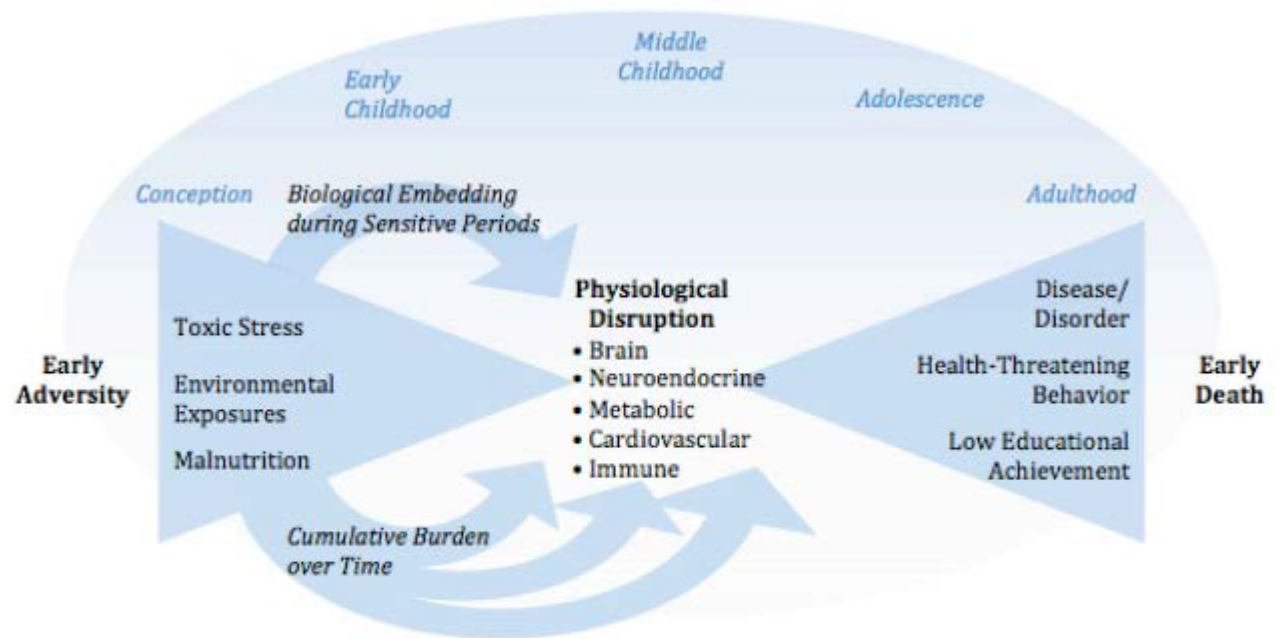


Fig. 1: The Childhood Roots of Health Disparities: How Adversity Is Built Into the Body

Complex Traumatic Disorder

Developmental Trauma Disorder

- ***“Because the children’s brains are still developing, trauma has a much more pervasive and long-range influence on their self-concept, on their sense of the world, and on their ability to regulate themselves.”***
- “Typical Patterns of successive disorders”¹:
 - Infants- Regulatory disorder
 - Pre-School- Attachment Disorders with or without disinhibition
 - School Aged- Hyperkinetic Conduct Disorders
 - Adolescence- Conduct and Emotional Disorders
 - Adults- Personality Disorders, Substance Abuse Disorders, Self-harming, and Affective Disorders
- **Disrupted affect regulation**
- **Highly reactive to stress**
- **Impulsivity/hyperactivity**
- **Disrupted attachment**
- **Isolation**
- **Behaviors:**
 - **Depression**
 - **Suicide**
 - **Substance abuse**
 - **Sexual promiscuity**
 - **Domestic violence**

Sources:

1. Schmid, Petermann, and Fegert, 2012.
2. DeAngelis, 2007



Stress and Disease

- “The linking mechanisms appear to center on behaviors such as smoking, alcohol or drug abuse, overeating, or sexual behaviors that may be **consciously or unconsciously** used because they have an **immediate pharmacological or psychological benefit** as coping devices...”



Source: Felitti, et. Al, 1998, p 252 – 253.



Pathologic Behavior or Coping Mechanisms?

- Nicotine
- Alcohol
- Methamphetamines
- Overeating/Obesity
- High Risk Behaviors



Sources: <http://www.nlm.nih.gov/medlineplus/ency/article/000953.htm>;
<http://www.drugfreeworld.org/drugfacts/crystalmeth/history-of-methamphetamine.html>

Unhealthy Coping Skills

- **The individual is responding appropriately to inappropriate internal signals**
- There is not a lack of “will power” but rather dysfunctional HPA axis and brain functions that result in high risk behaviors and unhealthy coping mechanisms.
- The person is influenced by the environment and reciprocally influences the environment.
- *...“attention is on the goodness of fit between an individual or group and the places in which they live out their lives”*

Homeostasis and Stress

- Homeostasis

- Working toward a balance in all systems
 - Variable depending upon conditions



- Stress

- Anything that knocks you out of balance



- Stress response

- **Allostasis**- set points can be regulated in a variety of ways to achieve homeostasis
- Regaining homeostasis through physiologic or behavioral changes
 - HPA axis, nervous system, cytokines
 - Reactions/habitual actions
- Body's efforts to regain homeostasis



Stress

- Acute Stress

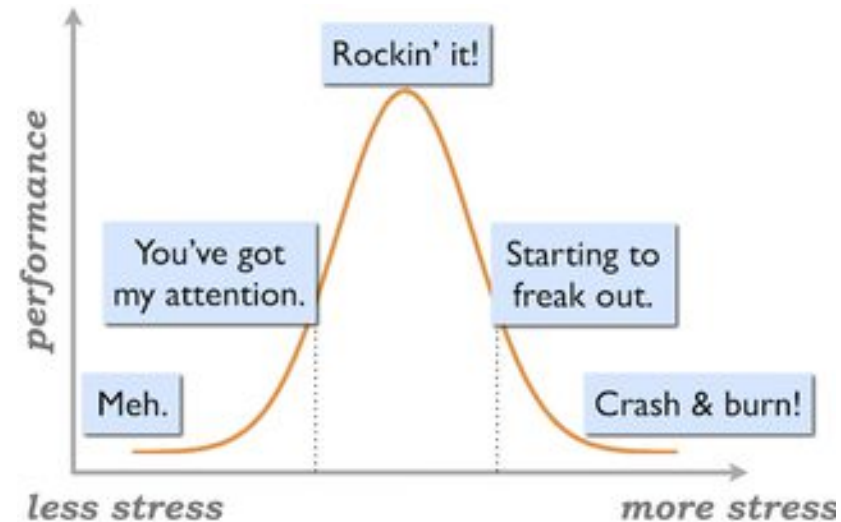
- Traffic, deadlines, relationships, budget, imminent harm

- Chronic Physical Challenges/Stress

- Hunger (food instability), exposure to elements, drought

- Psychological and Social Disruptions

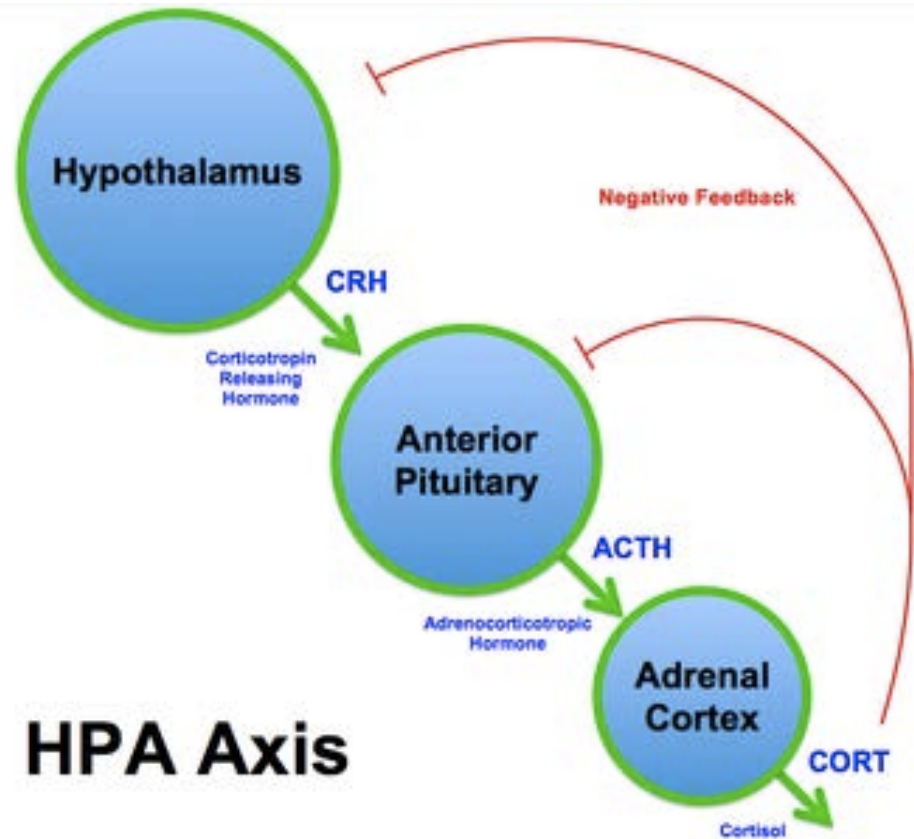
- Emotional, daily demands, competition, interpersonal violence, unpaid bills, etc.
- "A large body of evidence suggests that **stress-related disease emerges**, predominantly, out of the fact that we so often **activate a physiological system** that has evolved for responding to acute physical emergencies, but we **turn it on for months** worrying about mortgages, relationships, and promotions."



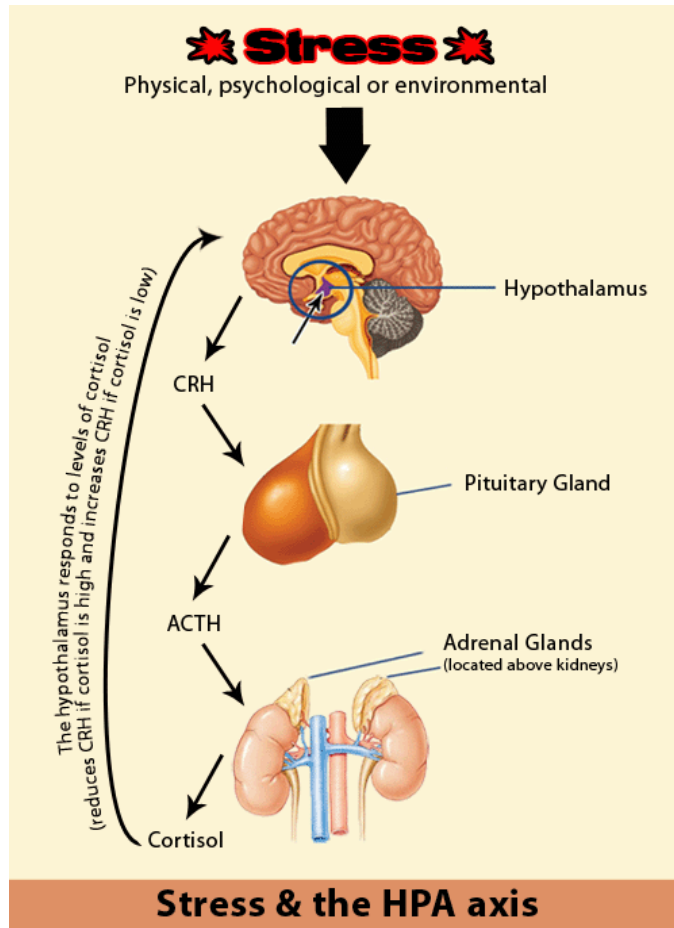
What do Stress Neurotransmitter-Hormones do?

Epinephrine and Norepinephrine

- Increases 'fight or flight' response
- Decreases 'rest and digest' activities
- Active within seconds to minutes
- Clear from system quickly



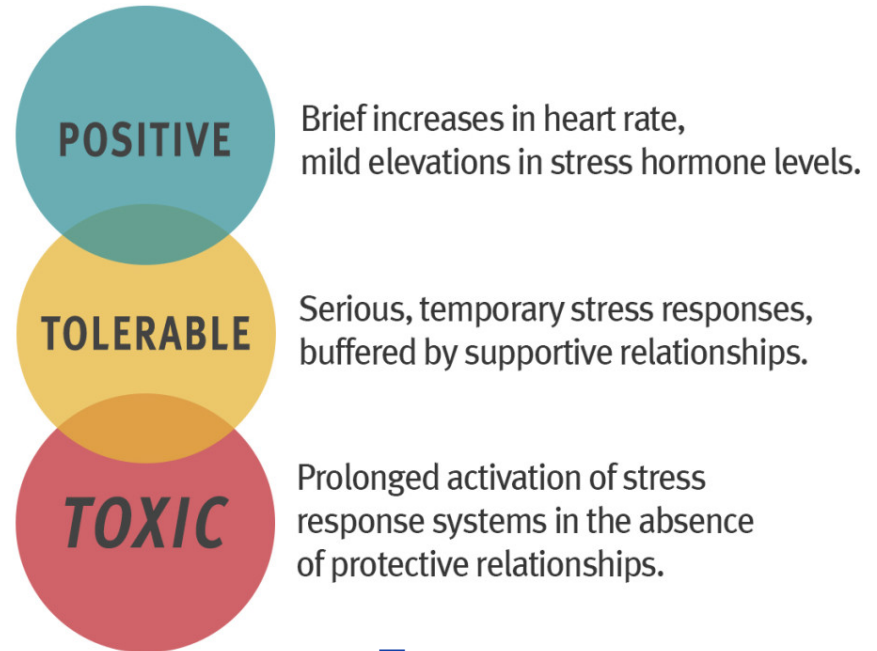
Cortisol



- Cortisol is released in response to stress:
 - Delivering available glucose to the brain
 - Generating new energy from stored reserves
 - Diverting energy away from low-priority activities (such as the immune system) in order to survive
 - Delayed release/activity
 - **However, prolonged cortisol secretion results in significant physiological changes**

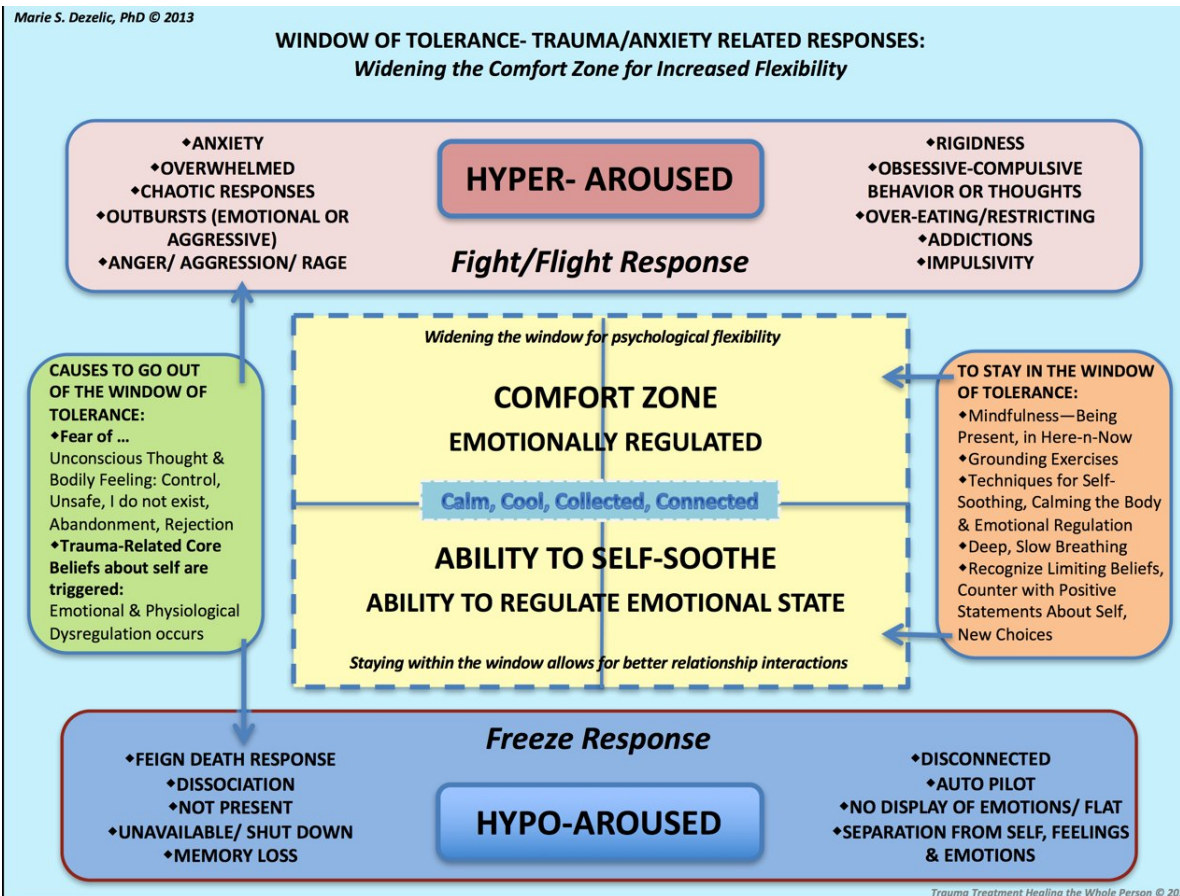
Stress versus Trauma: Trauma is in the “eye of the beholder”

- ***“Extreme stress, outside of the range of normal human experience. Such events cause intense physical and psychological suffering...take an individual’s perception beyond their normal capacity for coping.”***
- Interferes with 4 basic life foundations:
 - ▣ Self control
 - ▣ Sense of invulnerability
 - ▣ Safeness of the world
 - ▣ Meaning of life



Eustress
Distress
Trauma

Window of Tolerance



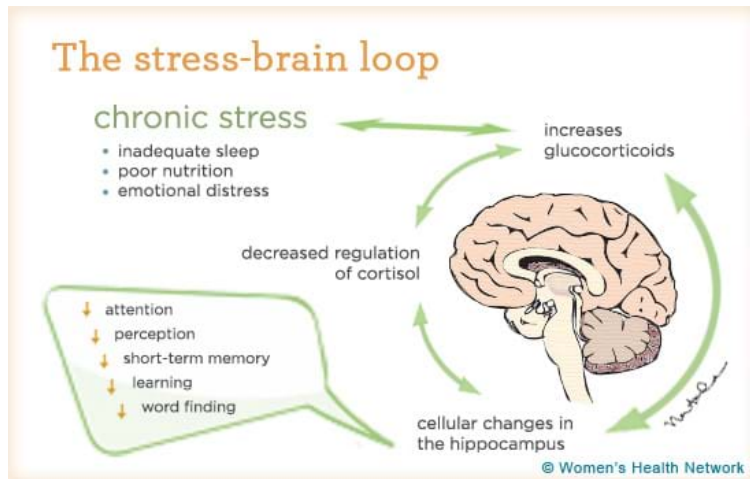
Reactions to Trauma

Short Term

- Alert- observe rather than experience
- Control emotions and feelings
- Act normal/façade
- Don't think about it- detaching from memory

Chronic

- Hypervigilance, flashbacks, sleep disruption
- Numbing, isolation, inappropriate anger
- Intrusive thoughts, unable to relate to others
- Dissociation, isolation, numbing



Hypercortisol: Too Much Cortisol

- **Impaired Stress response:**

- Sympathetic-Adrenal-Medullary Axis, Limbic System's amygdala, Hypothalamic-Pituitary-Adrenal Axis
- Hans Seyle's Generalized Adaptation Syndrome
 - Alarm
 - Resistance
 - Exhaustion

Hans Seyle, MD (1953)

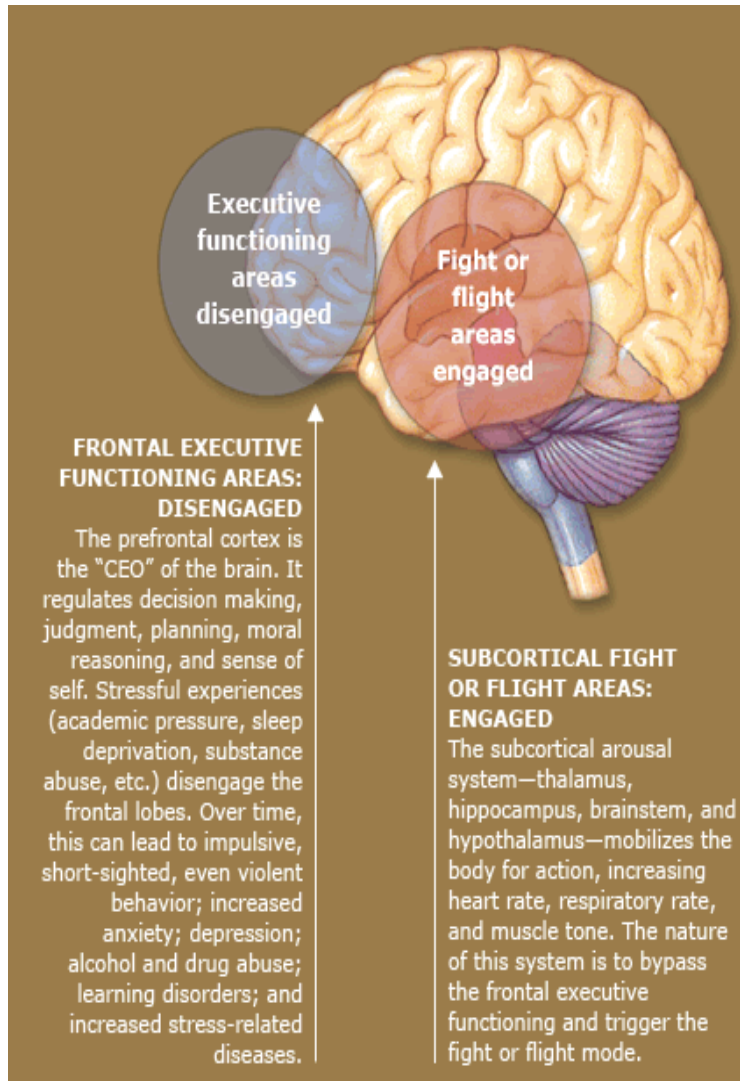
- **Impaired Neurodevelopment-**

- "early life constitutes an important period of development during which neural systems are open to lasting alteration" (Kindsvater & Geroniski, 2013)
- 2 Windows of Vulnerability -
 - Early childhood
 - Adolescence
- "First 6 years are critical"-at birth- 25% adult sized brain by age 6- 90% of adult sized brain

- **"Freeze" reaction-** "peritraumatic dissociation"-

- Stress cascade of HPA axis without the physical response of 'Fight or Flight' to physiologically regain homeostasis leaves a cortisol excess.
- Chronic stress without a physical 'Fight or Flight' leaves too much cortisol in the system , which causes significant physiologic changes.

Stress and the CNS



- “Over time, this can lead to impulsive, short-sighted, even violent behavior; increased anxiety; depression; drug and alcohol abuse; learning disorders; and increased stress-related diseases.”

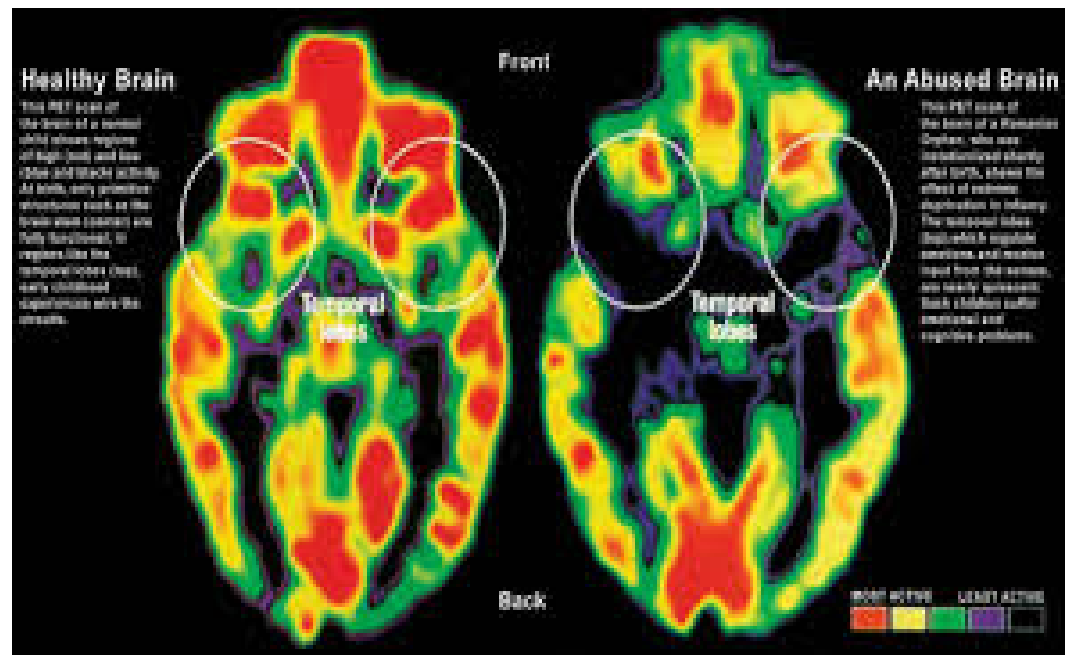
Source: Knitbakerun.com



Stress and the Brain

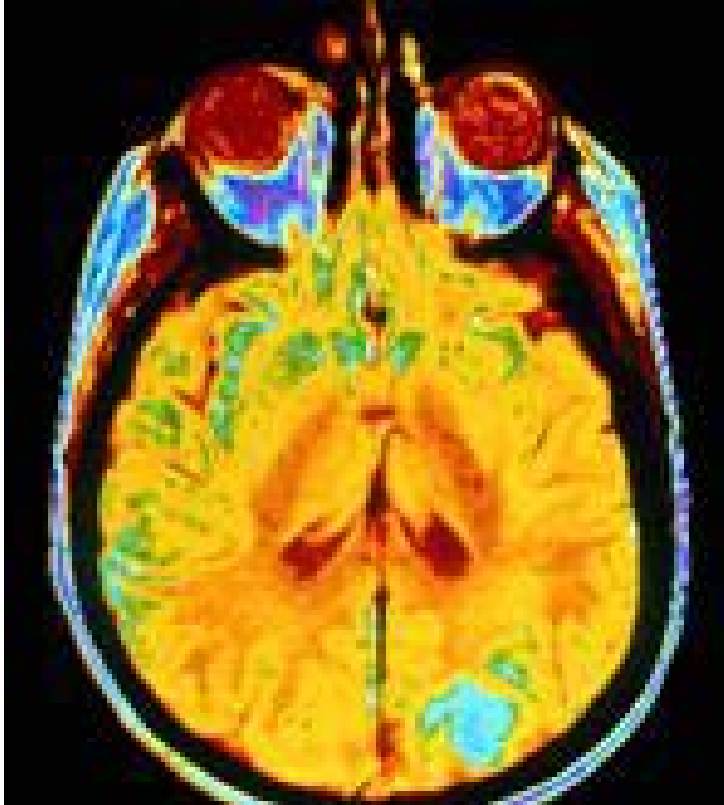
“When you are born into a family where your birth is not the happy occasion it should be, where the parents lives are dominated by their addictions, their mental health issues, their own gaping unmet needs, where there is no home to go home to, where your cries are ignored or simply not understood, where you are left in your cot all day, where no one looks into your beautiful eyes with love and hope, where no one checks that you’ve got ten amazing little fingers and toes

Then to put it simply, the brain does not develop in the same way.”



Source: <http://lovemanytrustfew.wordpress.com/tag/brain-plasticity/>

Abuse and the Brain



- “Child abuse changes the brain,” a new study says
 - By Maureen Linke, USA TODAY
 - 12/5/2011 2:02 PM
- Experiencing or witnessing abuse as a child can have a profound effect on a person's development, but a new study out today shows just how it can affect changes in the brain.
- Children exposed to family violence show the same pattern of brain activity as soldiers exposed to combat, a new study says.

[The Science of Neglect...](https://www.youtube.com/watch?v=bF3j5UVCSCA)
<https://www.youtube.com/watch?v=bF3j5UVCSCA>

Effects of Child Abuse

“Effects of child abuse and neglect, if untreated, can last a lifetime, study finds”

- In the first major study of child abuse and neglect in 20 years, researchers with the National Academy of Sciences reported Thursday that the damaging...
...untreated, the effects of child abuse and neglect, the researchers found, **can profoundly influence victims' physical and mental health, their ability to control emotions and impulses, their achievement in school, and the relationships they form as children and as adults.**

Brigid Schutte, Sept. 12, 2013. The Washington Post



Effects of Child Abuse Continued...

- In 2012, *Medical News Today* reported on a position statement from the American Academy of Pediatrics, which states that mental abuse in young children can be just as damaging as physical abuse.
- Cortisol damages hippocampal neurons (volume loss)
 - ▣ PTSD
 - ▣ Depression
 - ▣ Aging
 - ▣ Stroke

Diseases and Conditions associated with Hypercortisolism

- Mental Illnesses
 - ▣ Schizophrenia, Bipolar Disorder, Psychotic Depression
- Unhealthy Coping Strategies
 - ▣ Alcohol and substance abuse, over-eating, self-harming,
- Attention Deficit Hyperactivity Disorder (ADHD)

Hypocortisolism- or lack of cortisol response

Adrenal Fatigue vs. Too much negative feedback

- Different than Addison's Disease (autoimmune)
- Predisposing factors
 - Linked to
 - Parental PTSD
 - Maternal depression
 - Previous trauma or abuse
 - Early Life Stress
 - Duration
 - Repetitiveness
 - Intensity
 - Hopelessness

Diseases Associated with Decreased Cortisol

- Adrenal Fatigue- a long list
 - Coronary Artery Disease, Stroke and Type 2 Diabetes
 - Fibromyalgia
 - Chronic Fatigue Syndrome
 - Chronic Pain
 - Mood Disorders- Depression
 - Autoimmune Diseases
 - Malignancy
 - PTSD
 - Asthma
 - Dementia
 - Environmental Allergies/ Atopic Conditions
 - Weight Gain/Obesity

The Link Between Childhood Stress and Disease

“...approaching the attachment figure that is also neglectful, abusive, or otherwise frightening, yields an increasing degree of imminence of threat, and therefore evokes a succession of defensive subsystems (flight, freeze, fight, submission).

The conflict between approach and avoidance that cannot be resolved by the child promotes a structural dissociation of the attachment system and the defensive system.”

Higher rates of childhood maltreatment

- Low Socio-Economic Status
- Early Parenthood
- Larger family
- Domestic violence exposure
- 25% reported cases have previously documented maltreatment of children
 - Services are not working for family reunification, but parental bonding is important for neurodevelopment.
- Targeted towards
 - The oldest children in family
 - Low Self-esteem
 - High Aggression
 - Low- Verbal Skills
 - Disability/frequent illness



What factors of the abuse impact the long term outcomes?

- The nature
 - Frequency, intensity and duration
- The relationship
 - Between the perpetrator and the victim
- The response
 - How others respond to disclosure
- The individual
 - Personal resilience



Stress and Resilience

- What is stressful to one person is a healthy challenge to another.
- Individualized
- Eustress versus distress



Stress and Resilience

• External Assets:

- Support-
 - family, community, neighborhood, school
- Empowerment-
 - community values youth as resources, ensures safety
- Boundaries and expectations-
 - positive role models, higher expectations
- Constructive use of time-
 - creative activities, time at home

• Internal Assets:

- Commitment to learning-
 - reading for pleasure, home work, bonded to school
- Positive values-
 - caring, honesty, integrity
- Social competencies-
 - resistance skills, interpersonal
- Positive identity-
 - Self-esteem, sense of purpose, personal power

Source
www.search-institute.org



Resilience

“The Greek root word for ‘crisis’ means ‘to sift.’

Sifting suggests we are letting go of what is no longer necessary but retaining the essence.

Resilience represents this capacity to sift: to let go and hang on simultaneously.

The challenge is knowing what and how to let go.”



Follow up ACE Study

- Neurodevelopment is effected
- **ACEs are hidden and tend to be overlooked**
- Significant memory impairment
- Cumulative effects
- Common pathway
 - HPA axis dysfunction/adaptation

PREVALENCE OF INDIVIDUAL ACES



Source: Anda, Felitti, Bremner, Walker, Whitfield, Perry, Dube, Giles, (2005) The enduring effects of abuse and related adverse experiences in childhood, *European Archives Psychiatry Clinical Neurosciences*, 256(3), P 174- 186.

Why Pay Attention to Stress?

The ACE's and Preventable Disease

- 1900-
 - Infectious disease leading cause of death
 - Infant mortality 100 – 150/1000 live births
 - Life expectancy about 50 years
- 2000-
 - 40% deaths caused by tobacco, diet and alcohol
 - Cardiac disease leading cause of death
 - Infant mortality < 10/1000 live births
 - Life expectancy about 75 years





Sources: Foege, 1998.

<http://www.infoplease.com/ipa/A0005148.html>



Why Pay Attention to Stress?

The ACE's and Poverty

- ACE Exposures
- 
- Poor school adjustment
- 
- Discipline problems, high risk behaviors
- 
- Special education or dropping out of school
- 
- Continued cycle of poverty

ACE Study Conclusions- Prevention Approaches

- ACEs are common and have strong long-term associations with adult health risk behaviors, health status, and diseases.
- **Increased attention needed on primary, secondary, and tertiary prevention strategies:**
 - **Primary-** proven difficult; "...will require societal changes that improve the quality of family and household environments during childhood."
 - Example: San Diego County, California's "Healthy Steps" program
 - **Secondary-** requires (1) increased recognition of their occurrence; and (2) understanding of coping devices often used to reduce emotional impact.
 - Increased physician training necessary to recognize and coordinate those affected
 - **Tertiary-** difficult challenge; relationship between childhood experiences and adult health status is often overlooked.
 - American Medical Association recommends screening women for exposure to violence at every entrance to the health system.
- **"Further research and training are need to help medical and public health practitioners understand how social, emotional, and medical problems are linked throughout the lifespan."**

CDC Strategies to Prevent ACEs

- 5 Strategies:
 - Strengthening Economic Supports for families
 - Changing social norms to support parents and positive parenting
 - Quality child care and early learning
 - Enhancing parenting skills to support healthy childhood development
 - Intervening to lessen the harms and prevent future risks



Strategies for Prevention/Intervention

- **ASK...** Universal Screening for child abuse and neglect are not TABOO, they are common and need to be addressed
- **Education**
 - Community education
 - Multi-disciplinary participation in “Trauma Informed” educational programming.
- **Workforce development** to ensure trauma informed approaches are considered/implemented through education/continuing education
- **Community Advocacy-**
 - Philadelphia ACE Project <http://www.philadelphiaaces.org/about>
- **Political Advocacy-**
 - Trauma informed policy to strengthen families and their abilities to remain bonded
 - Trauma related services accessible to the most vulnerable
 - Funding research to better understand trauma’s impact, prevention, and intervention



Questions and Answers



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