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The Impact of Nurture & Trauma on Child Development and Behavior


Pradeep Gidwani, MD, MPH
September 13, 2018

Starting points

- I have no disclosures
- Human Beings are
 - Complex
 - Our understanding is evolving
 - Social and Inter-connected
 - Cannot be reduced to parts
 - Models are useful, but are limited



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Simple Anchors

- The 3 Cs
 - Connection (Need to be seen and heard)
 - Curiosity (Need to know and find out)
 - Creativity (Need for Self Expression)
- The Rs
 - Regularity/Routine
 - Rhythm, Reciprocity
 - Relationships + Regulation = Resiliency
- Making Meaning



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Children live in the context of relationships



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Neurons to Neighborhood 2000

- All Children Are Born Wired For Feelings and Ready to Learn
- Early Environments and Nurturing Relationships Are Essential
- Society Is Changing and the Needs of Young Children Are Not Being Addressed
- Interactions Among Early Childhood Science, Policy, and Practice Demand Dramatic Rethinking



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Section 1

- Child Needs and Development
- Attachment
- Temperament
- Polyvagal Theory and Social Engagement System
- Nurturing Relationships
- Self-regulation and Co-regulation



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What do babies and young children need?



No More Toxic Tub
Getting Contaminants Out Of
Children's Bath & Personal Care Products

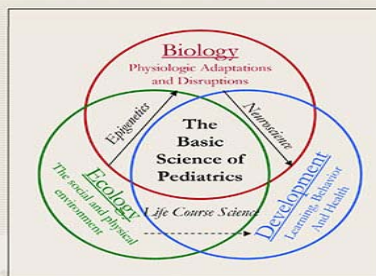


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AAP Technical Report

Eco-Bio-Developmental Model of Human Health and Disease

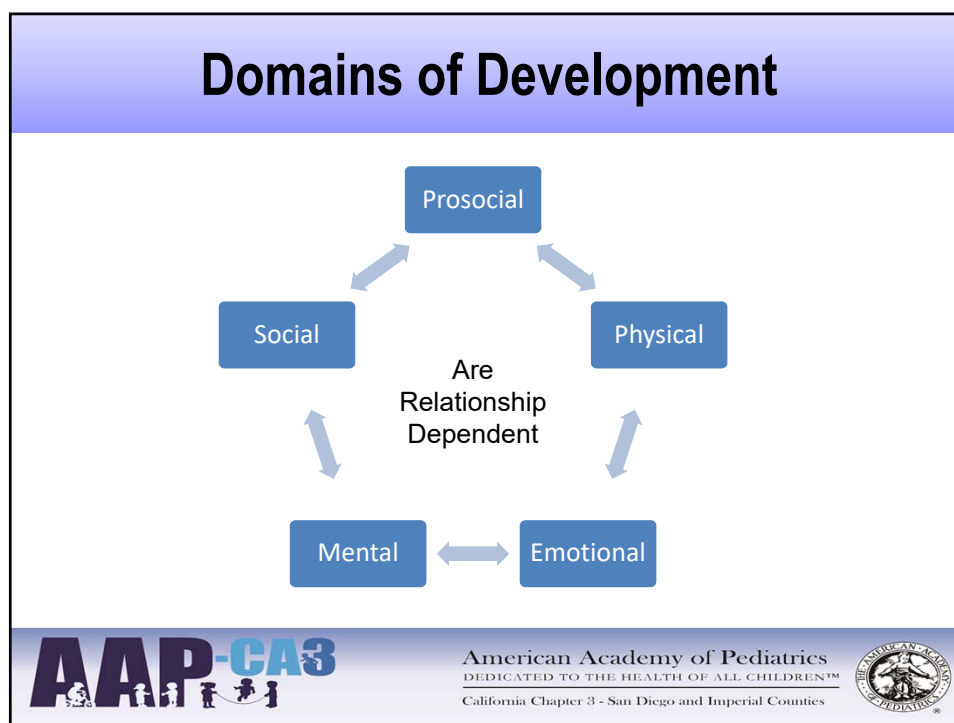
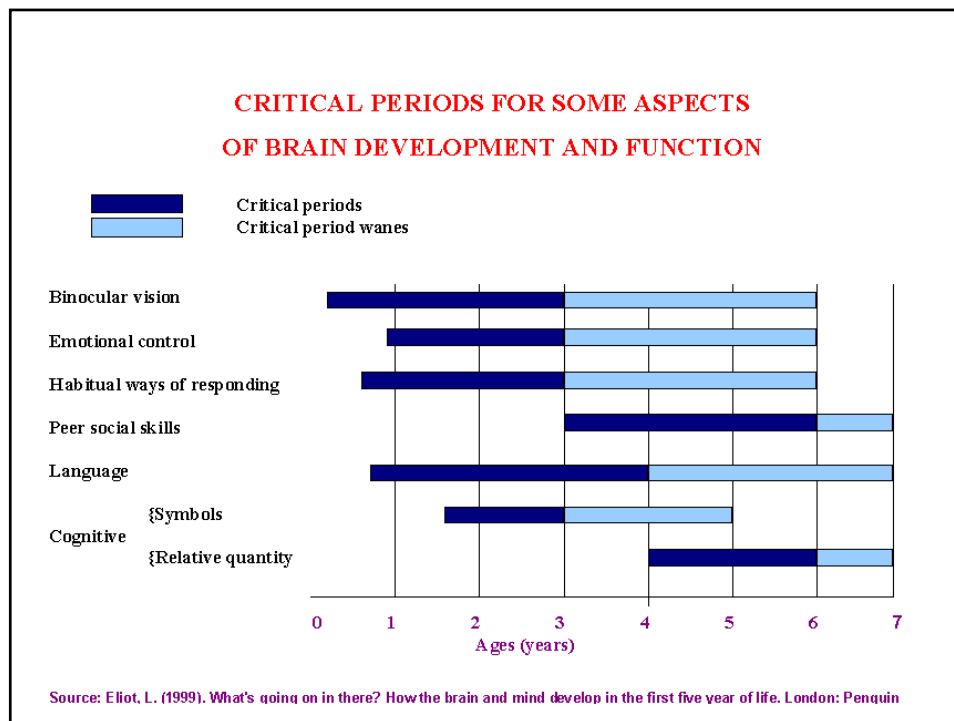


Ecology
Becomes **biology**,
And together they drive **development** across the lifespan

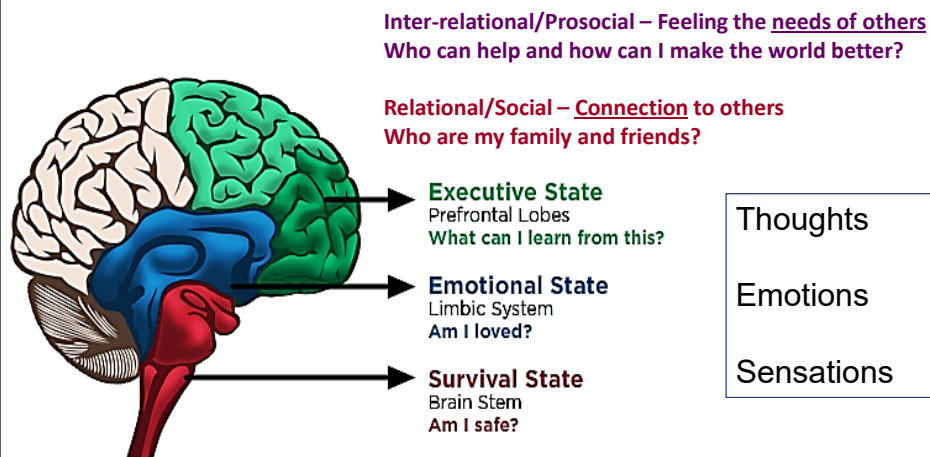


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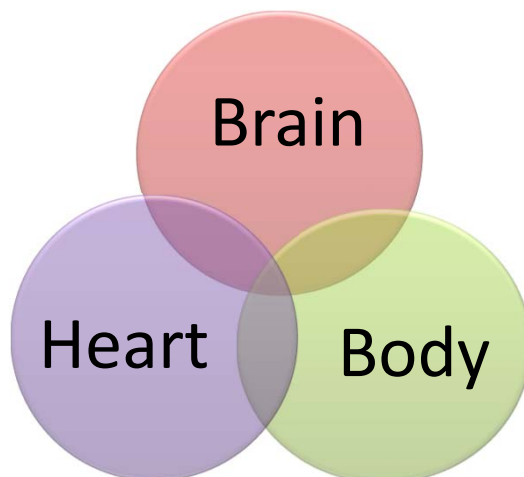
5 Developmental Domains in the Brain



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Our Body's 3 Inputs to our Mind



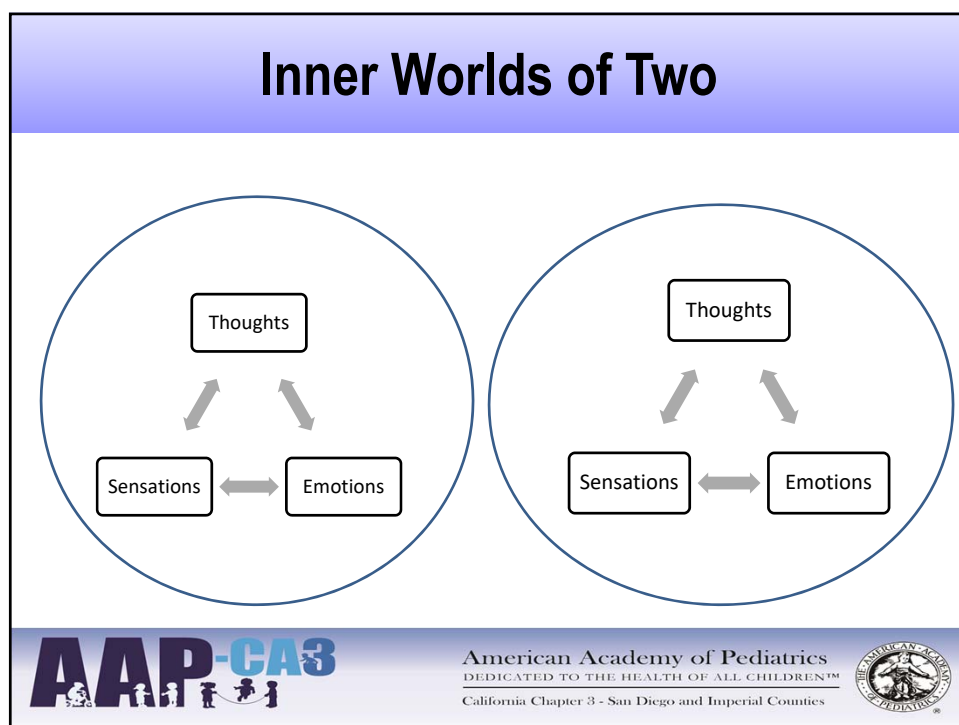
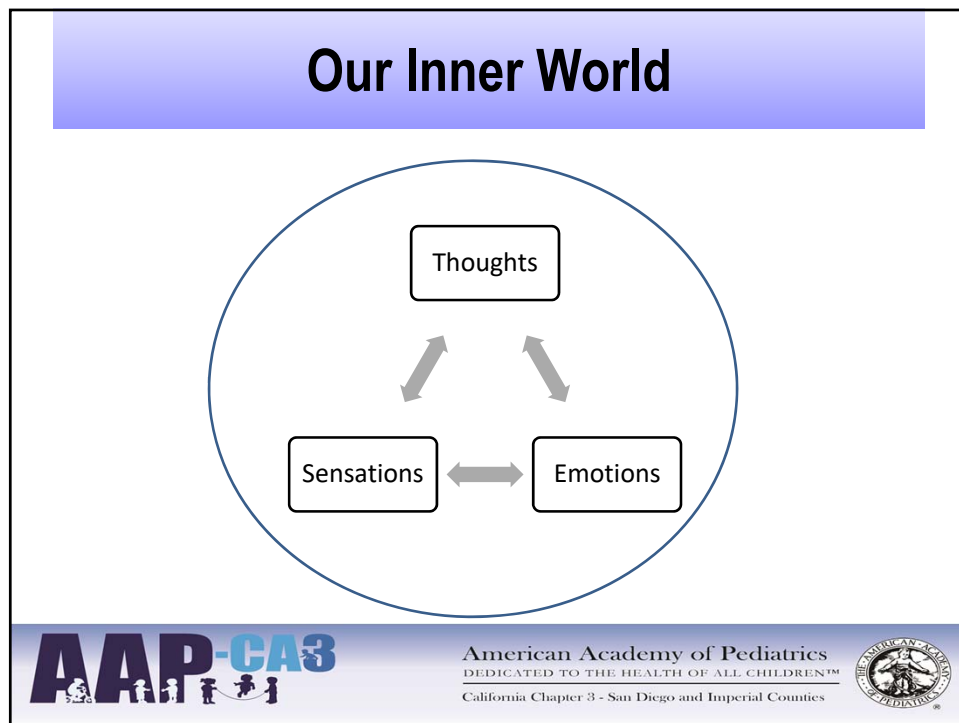
Physical State

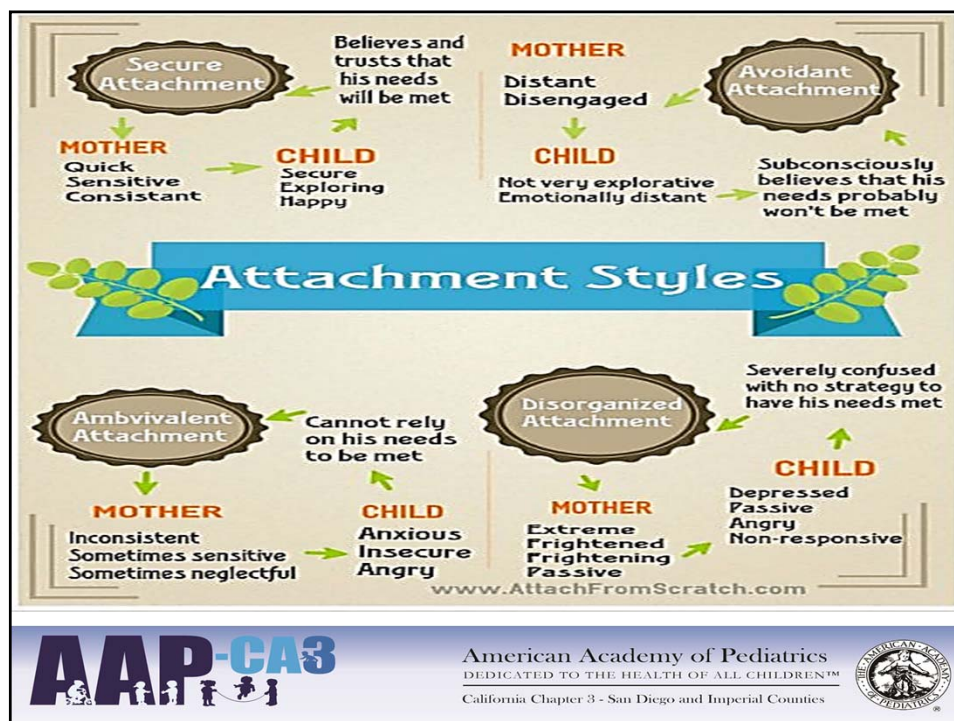
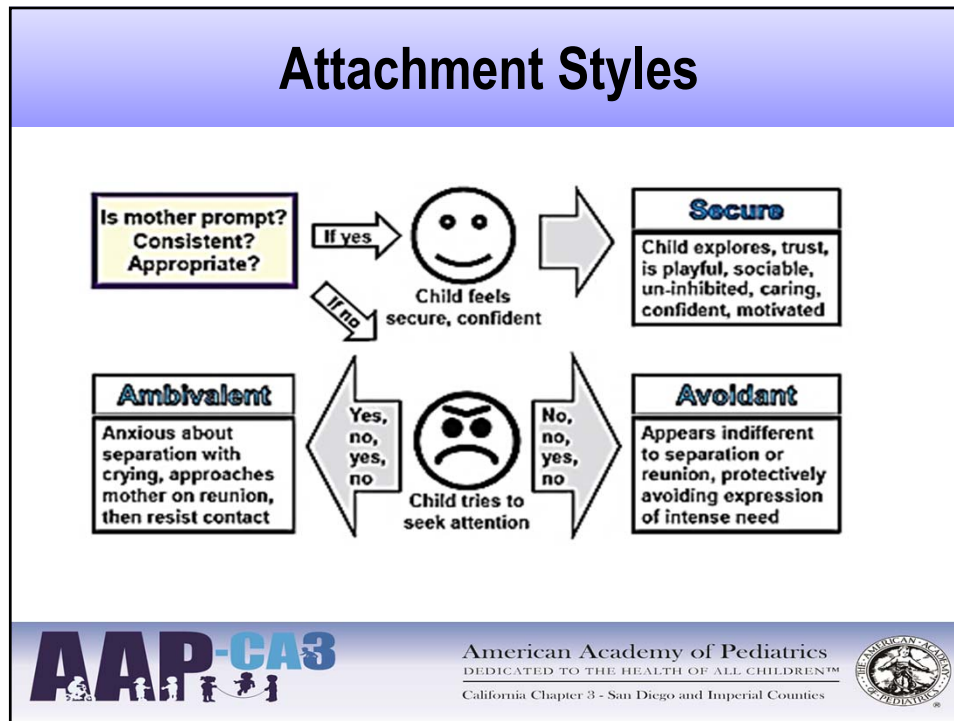
- Tired
- Sleepy
- Hungry
- Thirsty



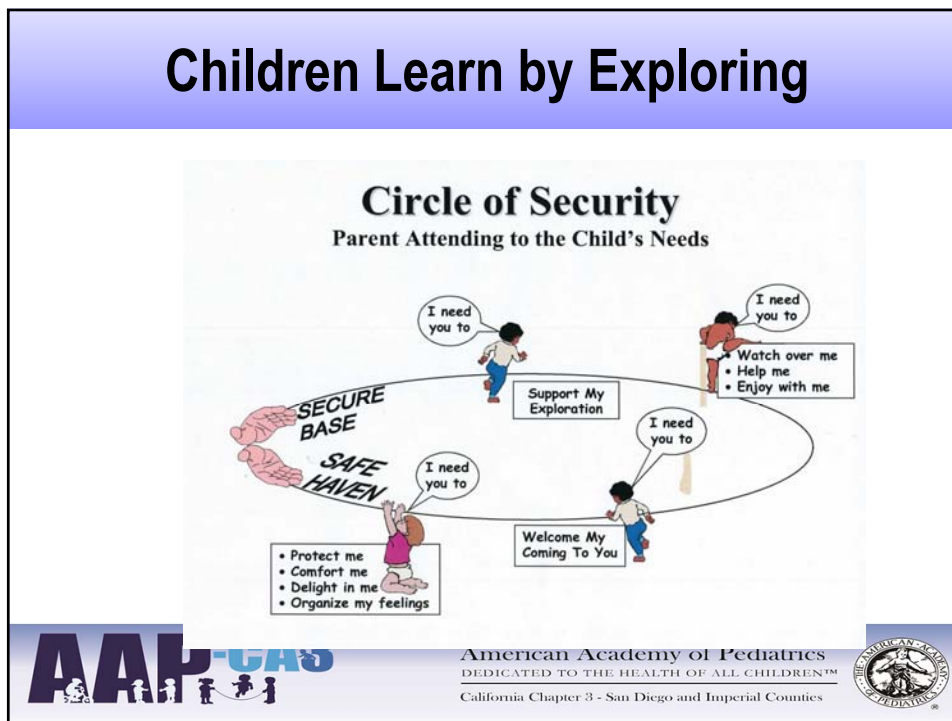
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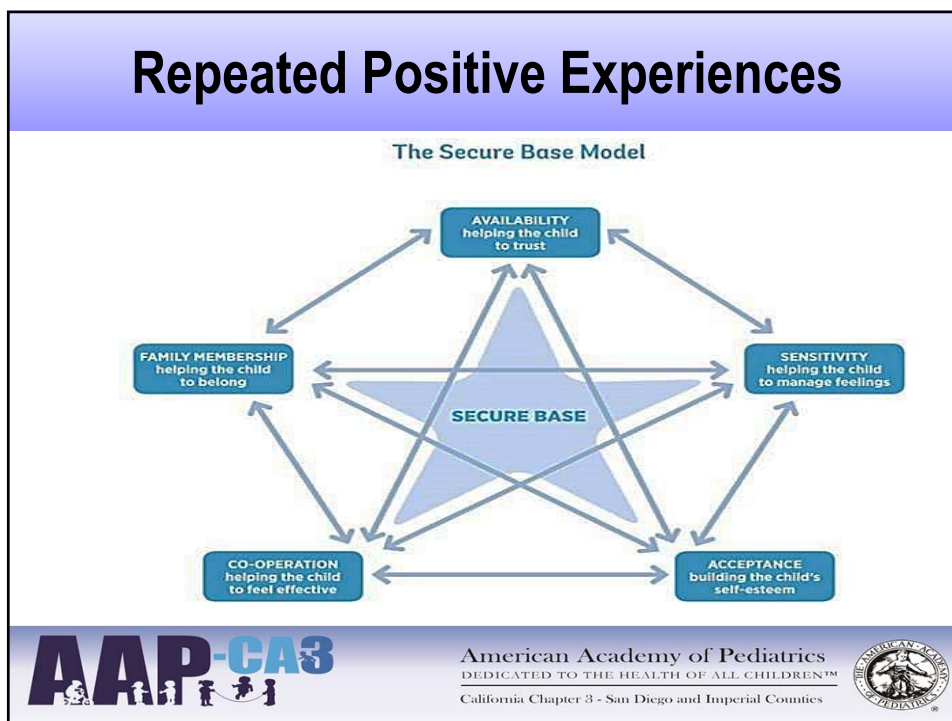




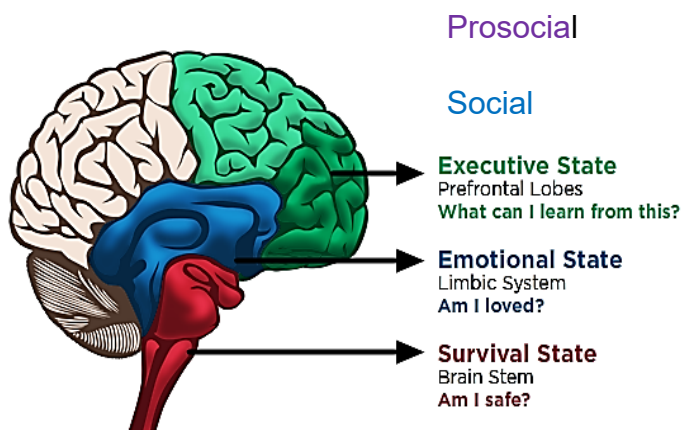
Children Learn by Exploring



Repeated Positive Experiences



Trust = Physically and Emotionally Safe Consistent, and Comforting



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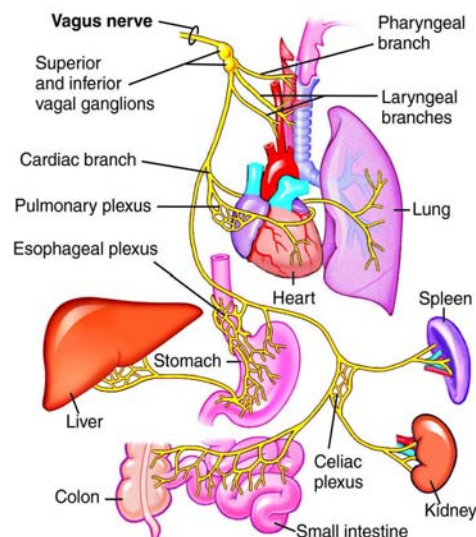
Temperament - Biological Response to our Environments



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Polyvagal Theory and Neuroception



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Stephen Porges, PhD

	ANS Component	Behavioral Function	Lower motor neurons
III	Myelinated vagus (ventral vagal complex)	Social communication, self-soothing and calming, inhibit "arousal"	Nucleus ambiguus
II	Sympathetic-adrenal system	Mobilization (active avoidance)	Spinal cord
I	Unmyelinated vagus (dorsal vagal complex)	Immobilization (death feigning, passive avoidance)	Dorsal motor nucleus of the vagus



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Social Engagement System

- A developing neuro-physiological system
 - to regulate contact with the external world
 - to modulate physiological and behavioral state
- In infants, vagal regulation in infants is associated with social behavior, ingestion, and state regulation
- Fussy infants may not experience the soothing effects of feeding



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Social Engagement System

- Voice prosody
- Auditory sensitivities
- Gaze
- Facial expression
- Posture during social engagement
- Mood and affect
- State regulation



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Nurture - to care for and to encourage the growth and development of



Ideally
*Parents and
Caregivers
Are Available,
Attuned, and
Interested*



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Nurturing Relationships are Love in Action



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Nurturing Relationships Builds

- Better brains
- Healthy attachment
- SE intelligence
- Self regulation
- Resilience



Relationships + Regulation = Resilience



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Nurturing Relationships are Inborn



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Self-Regulation Skills

- Allows kids to manage their emotions, behavior and body movement when they're faced with a situation that's tough to handle
- Allows them to do that while still staying focused and paying attention.



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Self-Regulation Metaphor

- Think about:



How parts work together

Engine
Accelerator
Brakes
Gas Tank
Speedometer
Gauges
Tires

Needs to consider

Roads
Weather
Traffic



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Self Regulation Research

- Dr. Allan Schore (2001) sees this transfer of regulation from external (relying on others) to internal (developing the capacities to self-regulate) as the key task of early development
- Some see it as lifelong



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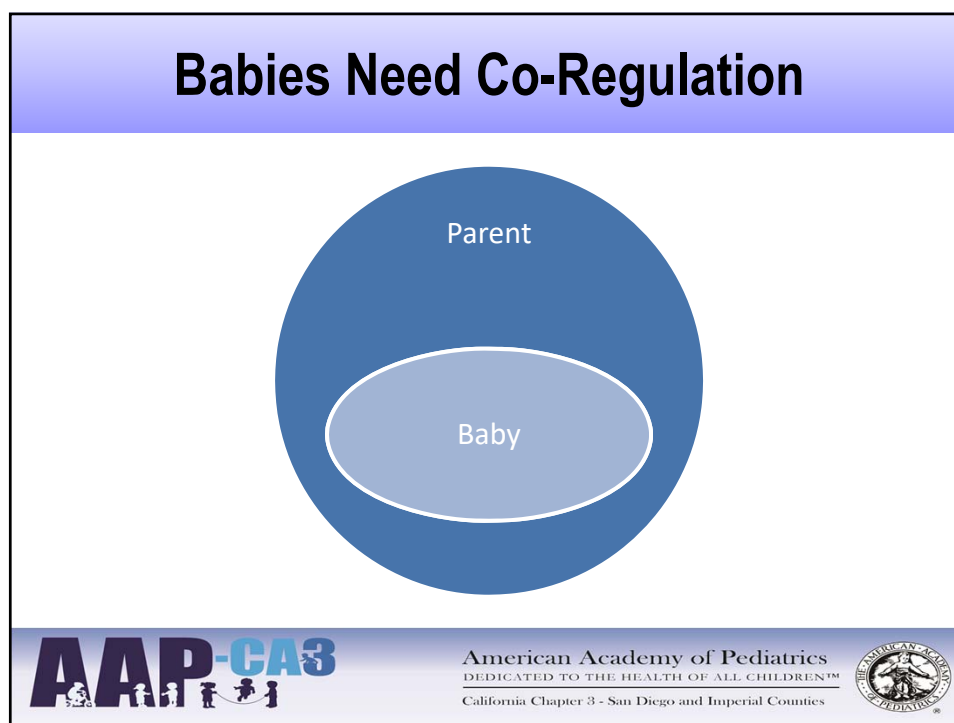
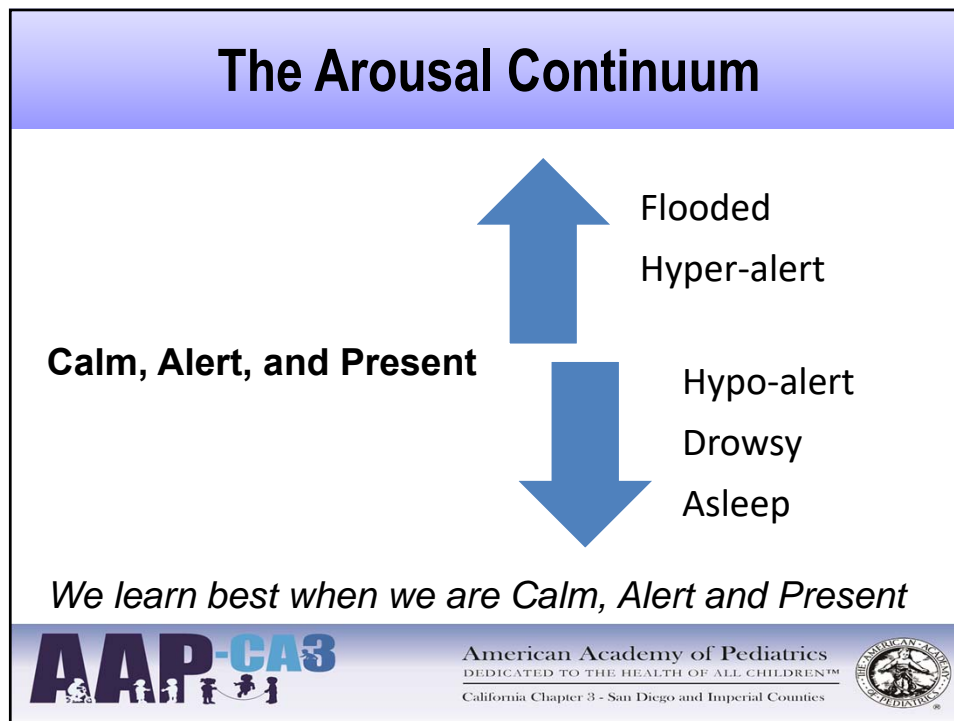
Co-Regulation and Self-Regulation

- Depends on our level of stress and arousal
- Take in information from our environment that is useful or tune out what is not useful
- Critical to self-control and our ability to form relationships with others



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Babies Need External Regulation

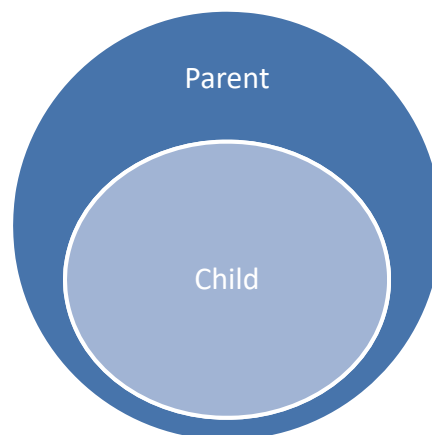
- Babies cannot self-regulate
- Massive brain growth occurs in areas critical to self-regulation in the early years of life
- The primary caregiver serves as an “external brain” *regulating and stimulating* the baby’s brain
- By being regulated, the baby develops the ability to self-regulate



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Children Learn to Self-Regulate



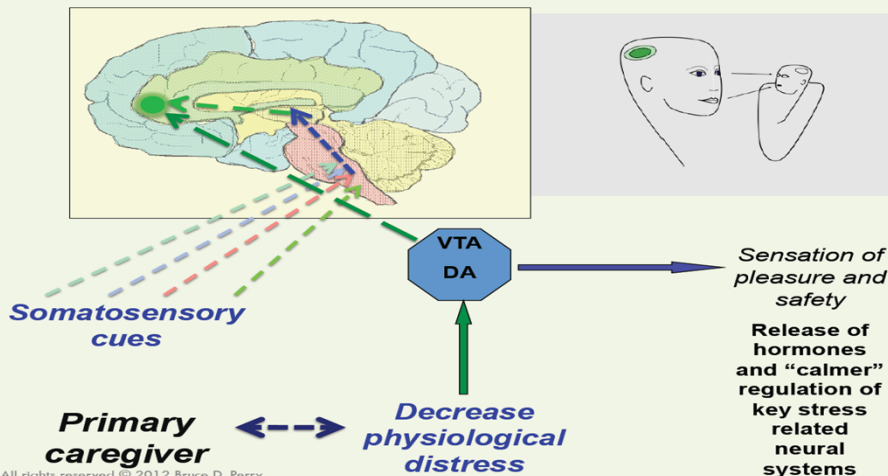
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**When distressed, we all need someone
to respond to us**



Positive Relationships Down Regulates Stress



Positive Relationships Down Regulates Stress



Safety

Pleasure

Hormonal

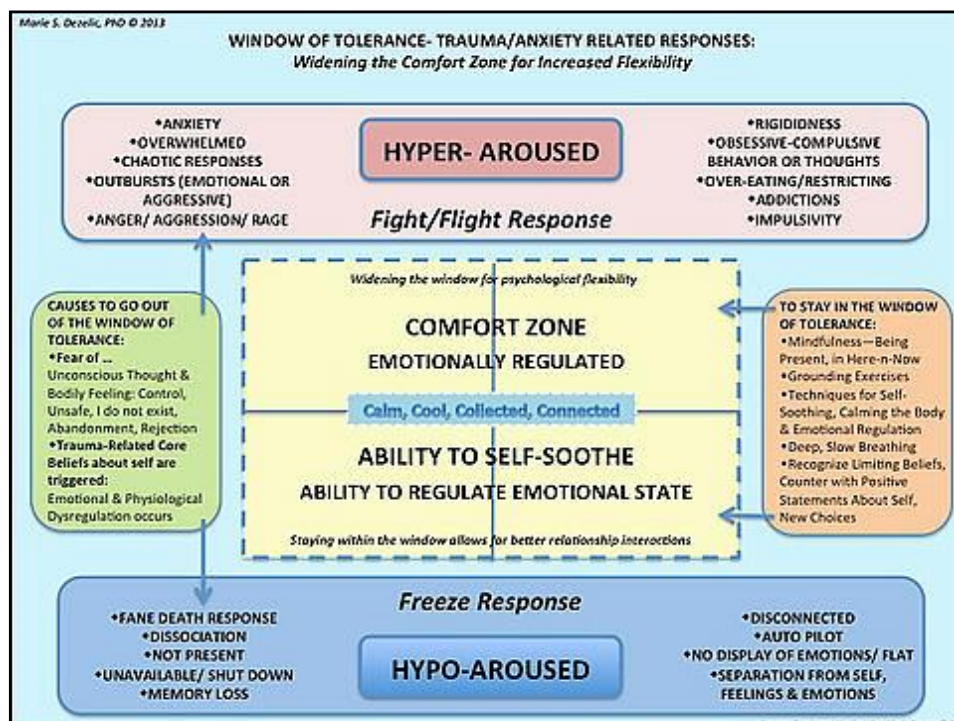
Cascade

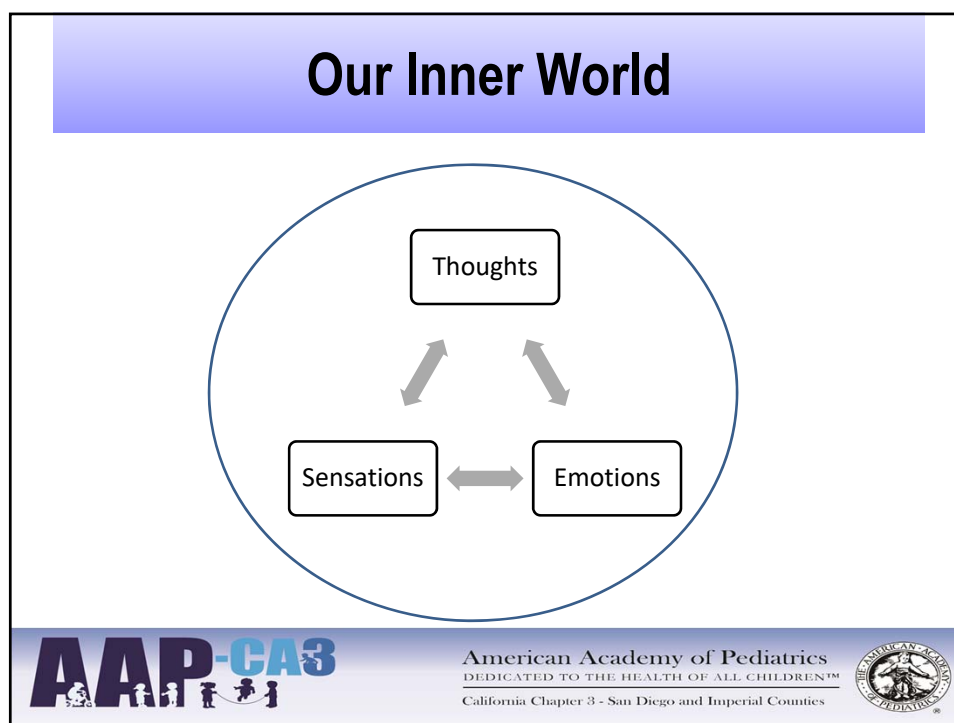
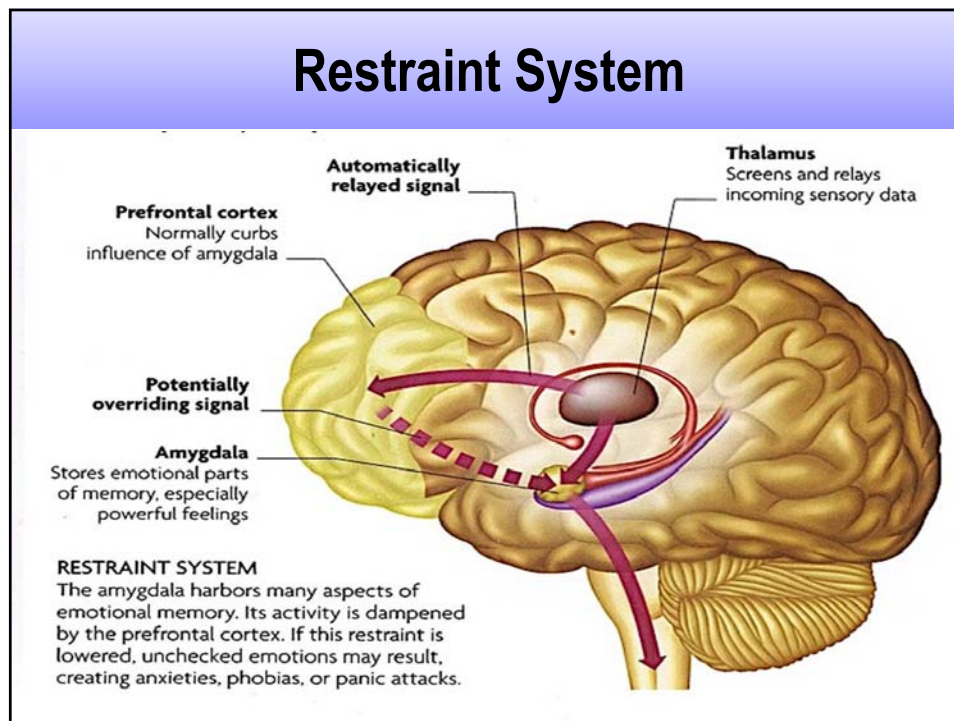
Creates Calm



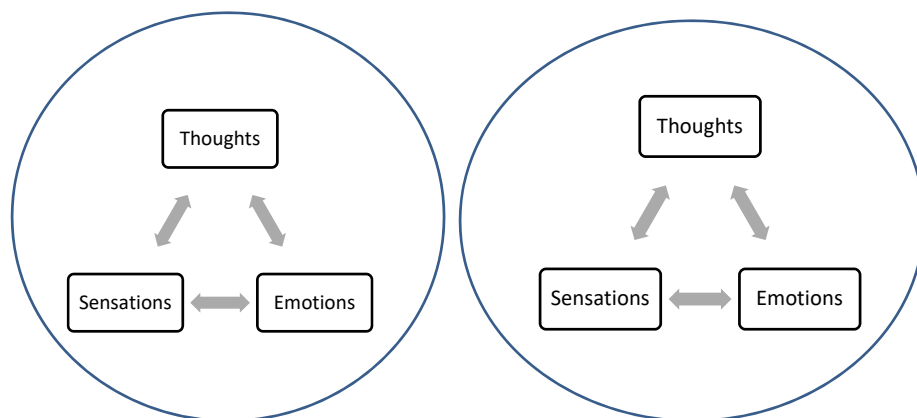
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Inner Worlds of Two



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Regulation across 5 Dimensions

Prosocial – Feeling the needs of others
Who can I help and how can I make the world better?

Social – Connection to others
Who are my family and friends?



Executive State
Prefrontal Lobes
What can I learn from this?

Emotional State
Limbic System
Am I loved?

Survival State
Brain Stem
Am I safe?

Thoughts
Emotions
Sensations



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Section 2

- Definition of Trauma
- Stress Basics
- Developmental Impact of Stress



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Definition of Trauma

- Trauma is often the result of an overwhelming amount of stress that exceeds one's ability to cope, or integrate the emotions involved with that experience
- Trauma differs between individuals, according to their subjective experiences



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Childhood Trauma

- The physical and emotional responses to events that threaten the **life or integrity of the child or of someone critically important to the child**
- Traumatic events overwhelm a child's capacity to cope and elicit feelings of terror, powerlessness, and out-of-control physiological arousal
- Failure to provide sensitively responsive and mutually confirming interaction during developmentally important periods of life



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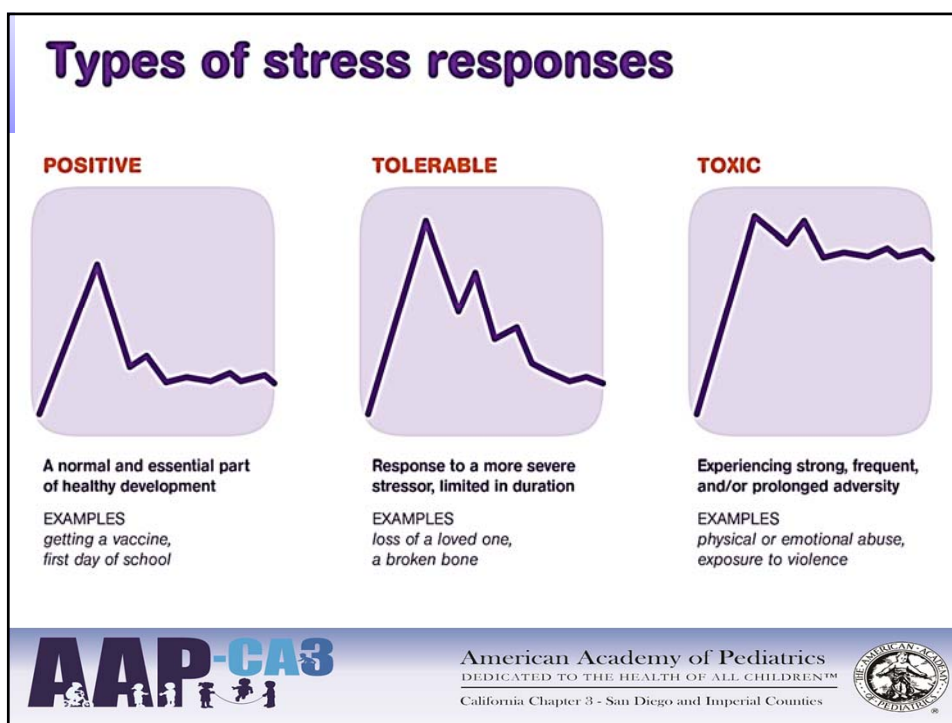
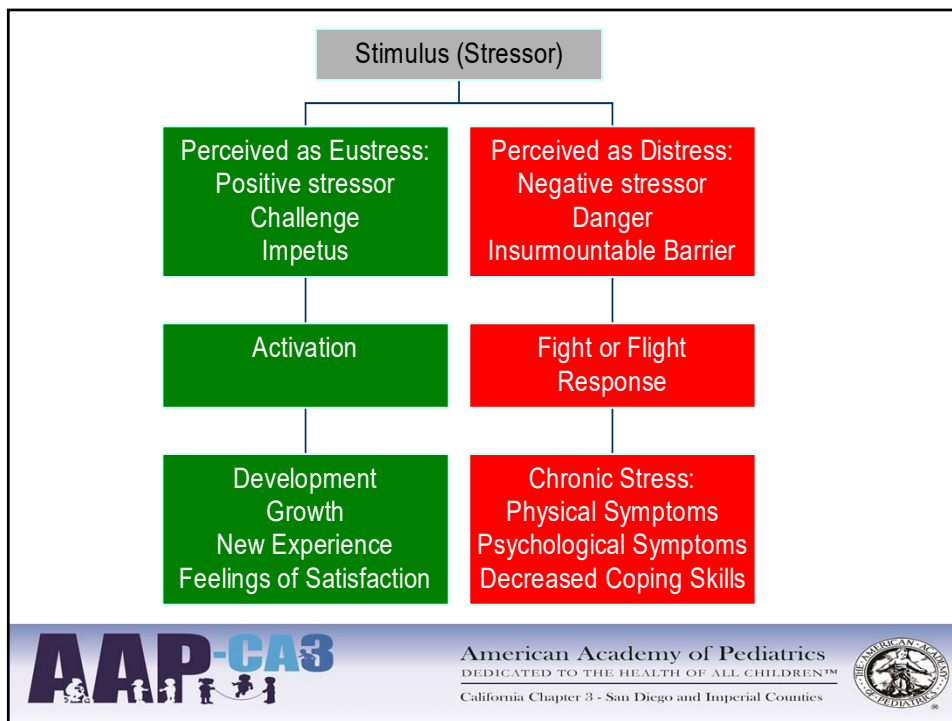
Vulnerability of the Developing Child

- Dependent on caregiver for support and context
 - Lack of physical ability to shield self
 - Lack of emotional resources
 - Lack the ability to discriminate novelty from threat
 - Need for child to stay with caregiver even if caregiver is the source of arousal/trauma
- Immature alert/alarm systems



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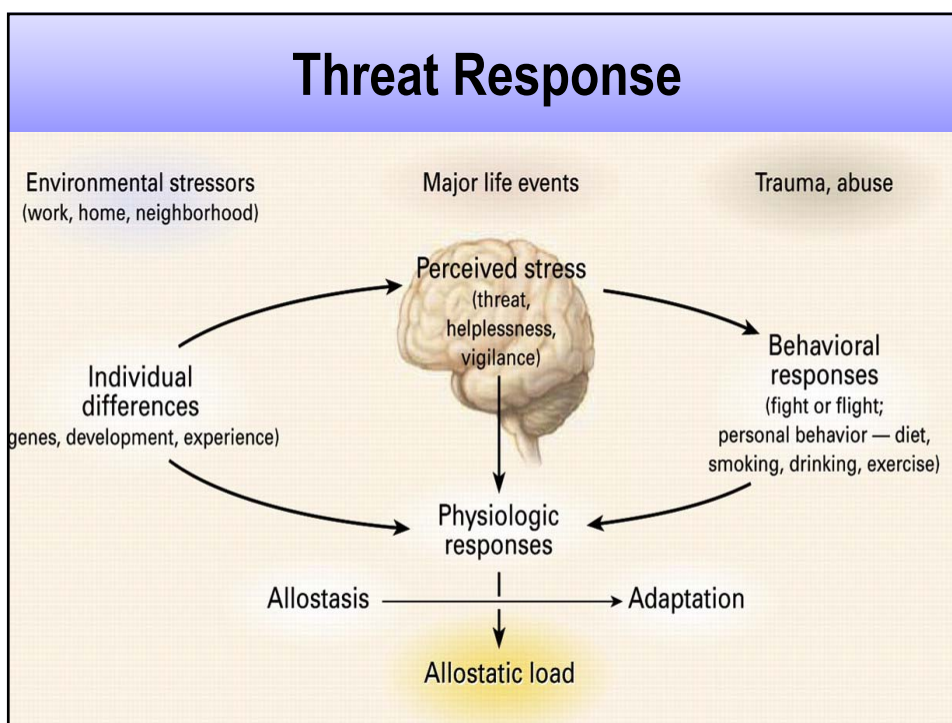
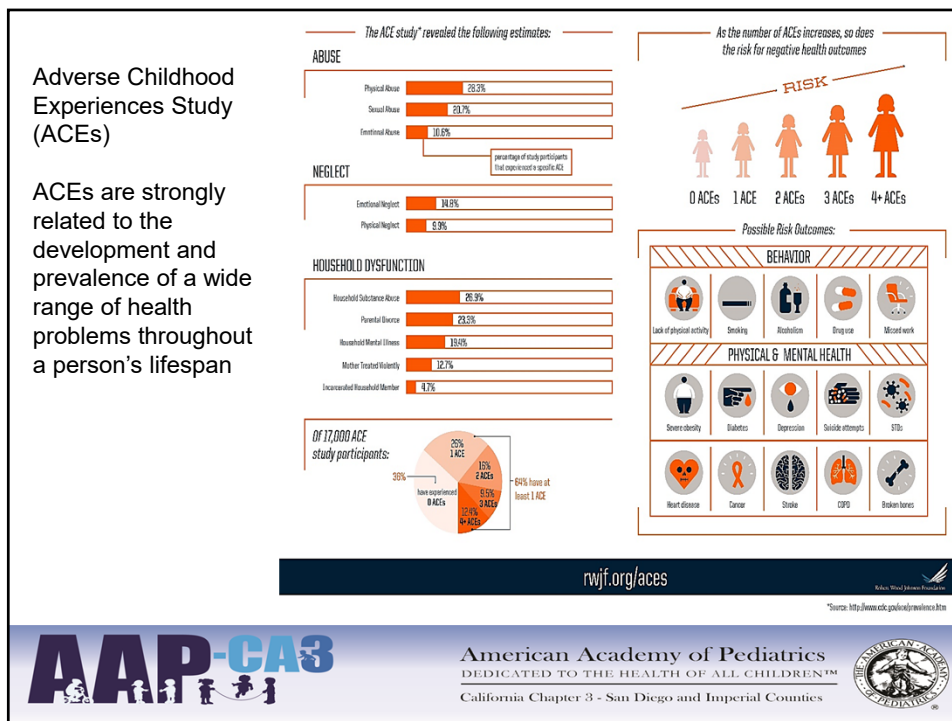


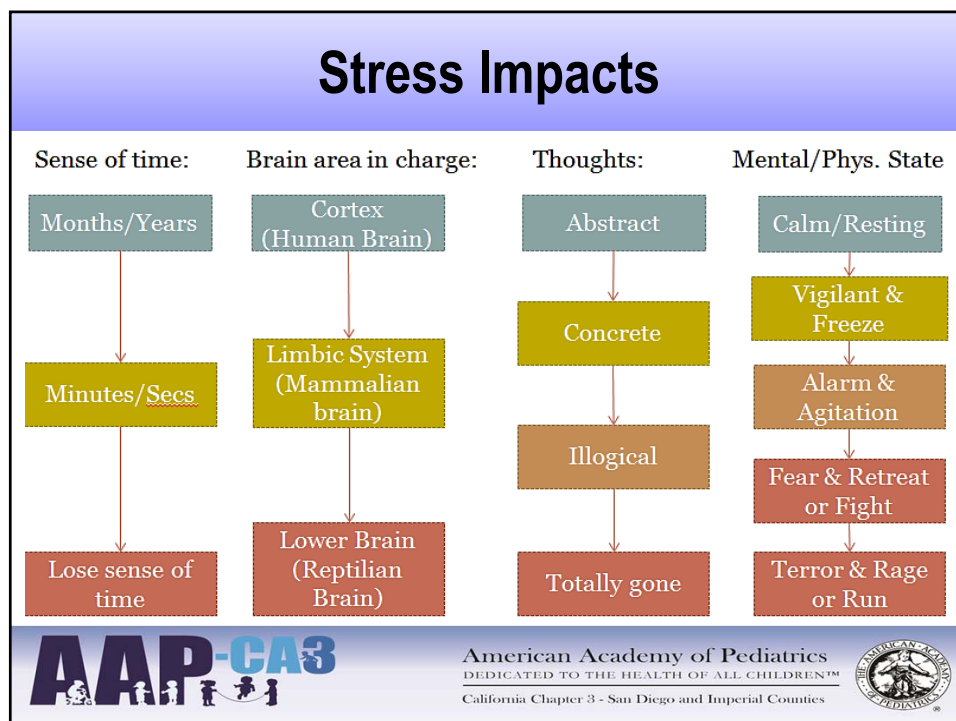
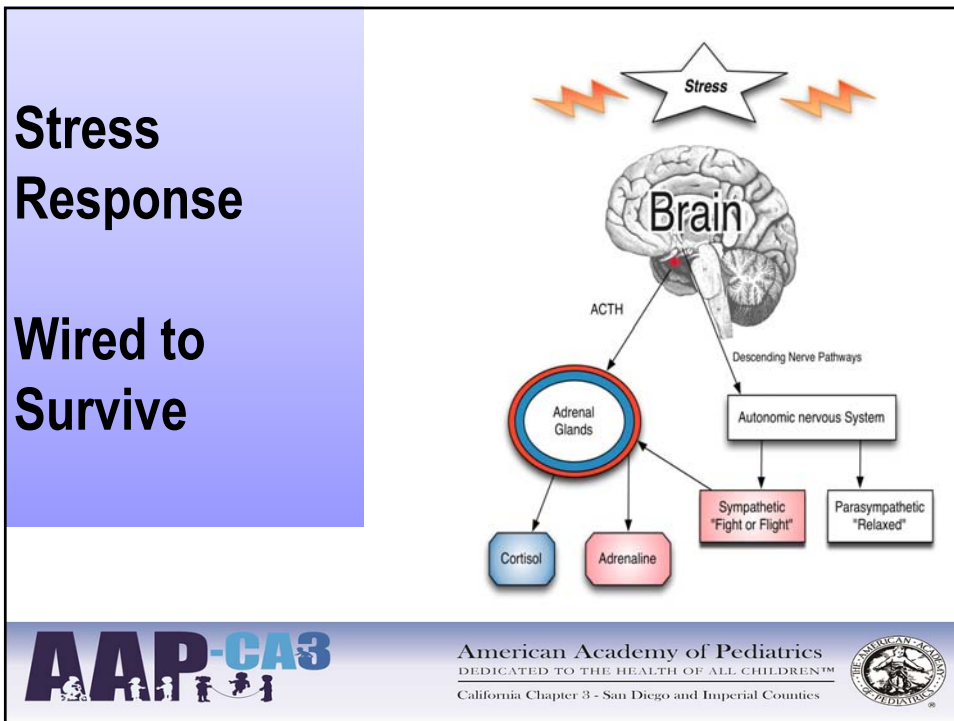
Sometimes the person is the stessor



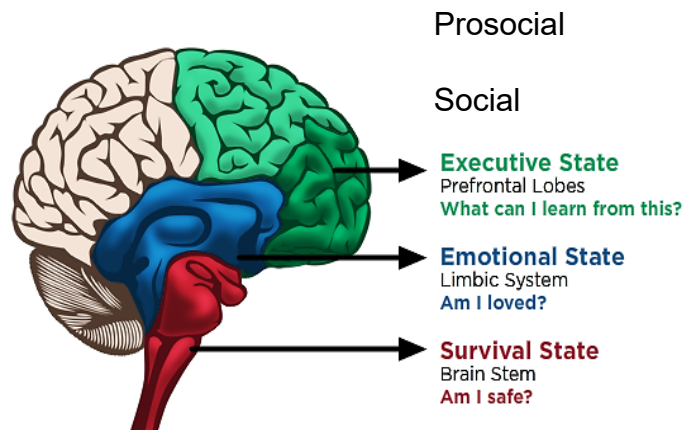
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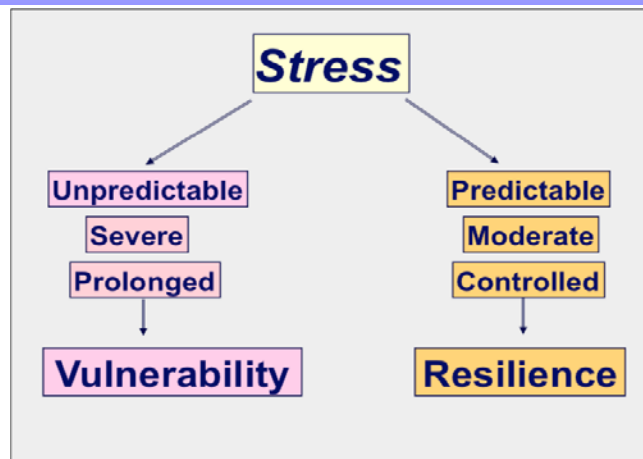
Threat and/or Toxin at each level



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Vulnerability and Resilience



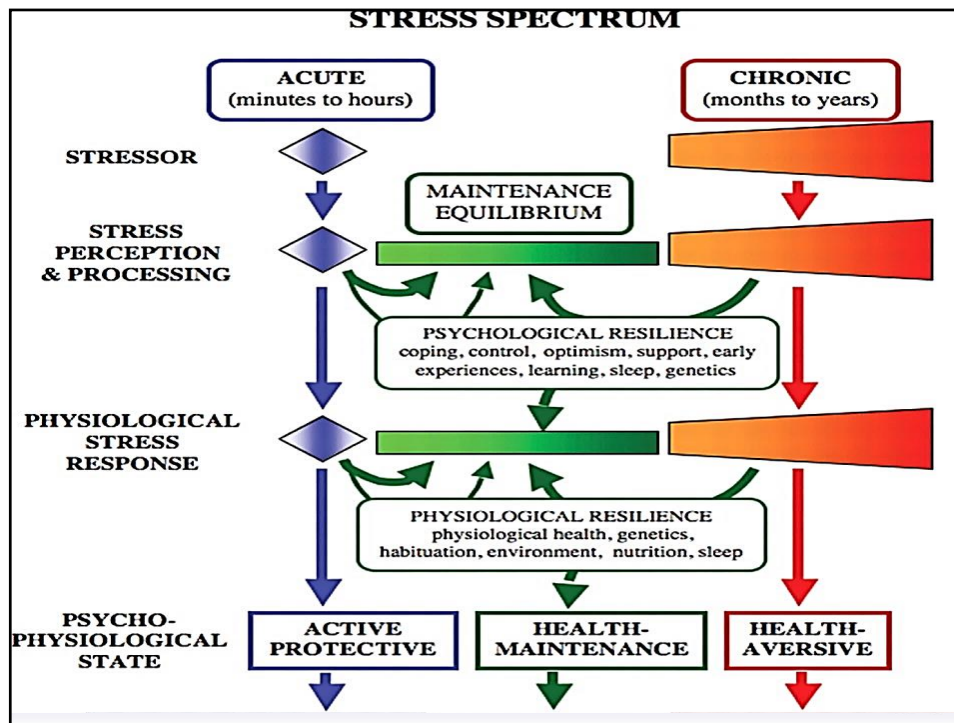
Relationships
are needed

Relationships
+ Regulation
= Resilience



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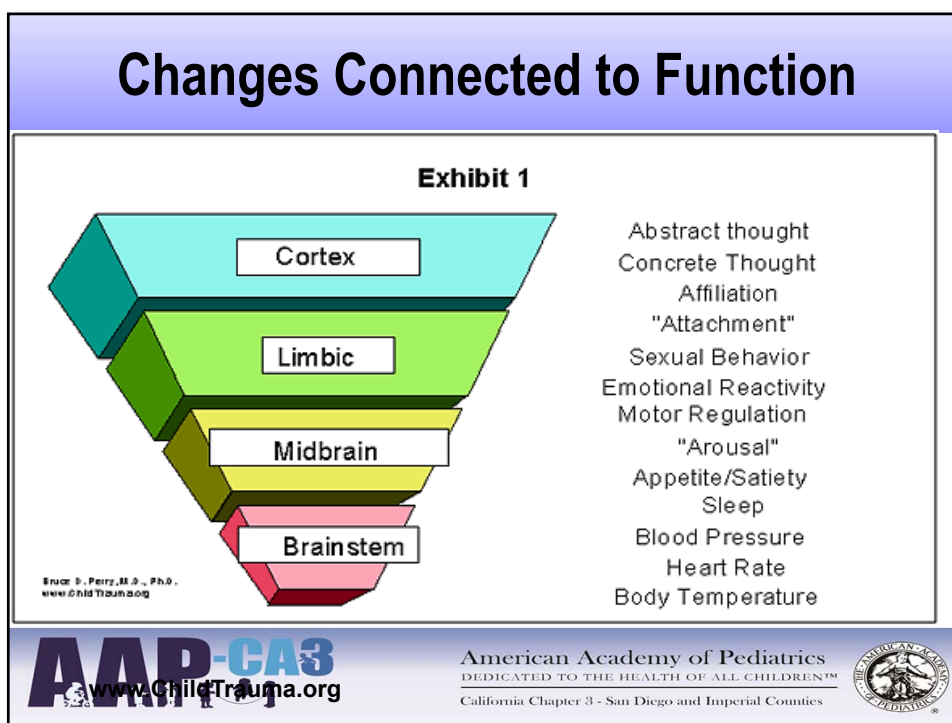
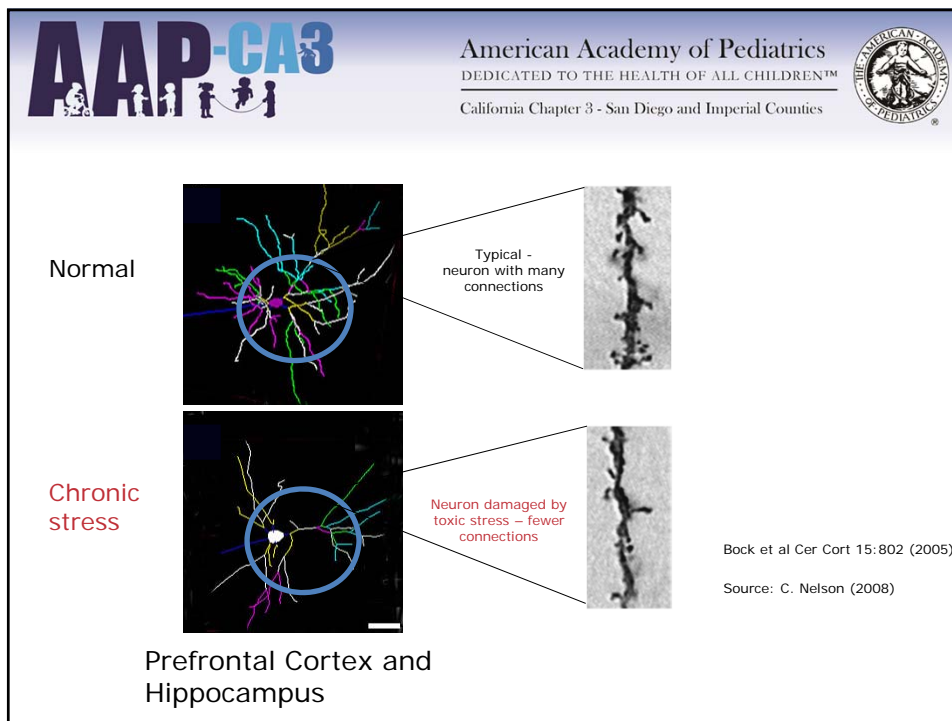
Developmental Impacts of Stress

- Biologic Effects
 - Brain abnormalities
 - Hormone dysregulation
 - Immune dysfunction
- Psychosocial or Relationship Effects
 - poor attachment
 - poor socialization
 - poor self-efficacy
- Behavioral



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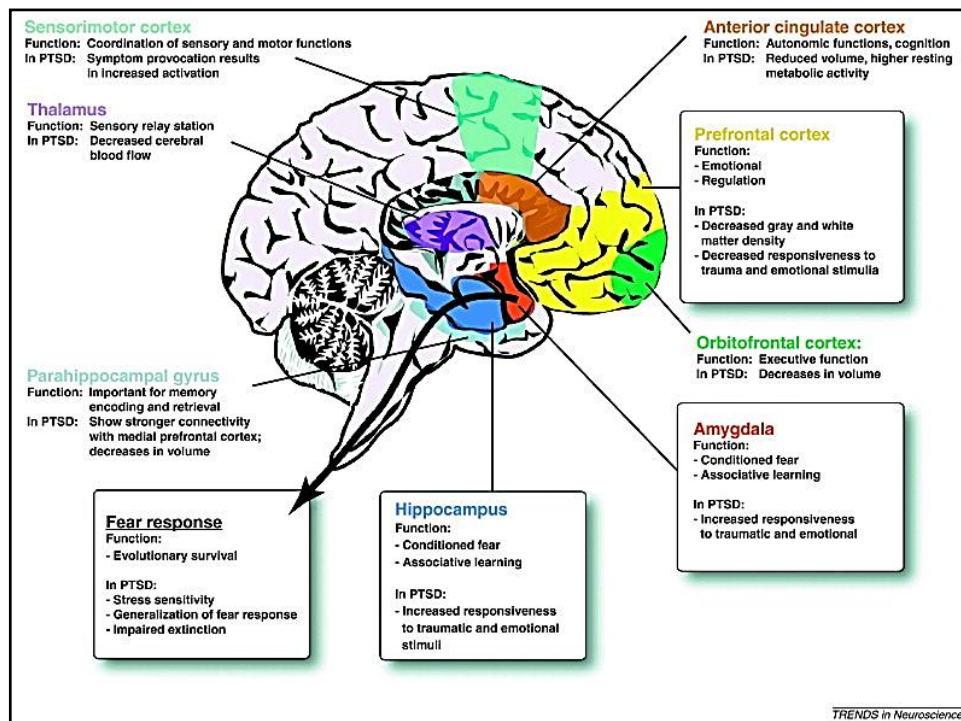


Long term Changes in the Brain

- Mood and attachment (changes in serotonin and GABA receptors) altered
- Memory and learning difficult (hippocampus)
- Increased high-risk and pleasure-seeking behavior (changes in the nucleus accumbens -reward center of the brain)



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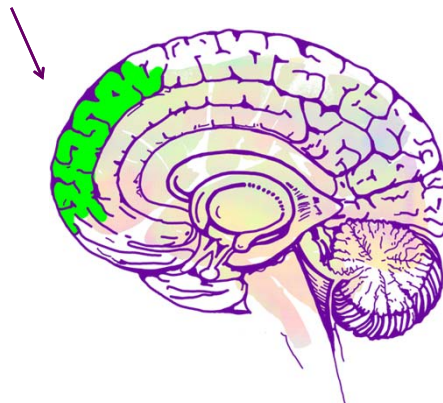


Physical Punishment and the Developing Brain

- In case-control study with non-clinical sample of young adults, harsh corporal punishment associated with reduced gray matter volume in prefrontal cortex

Tomoda et al, 2009

Prefrontal Cortex



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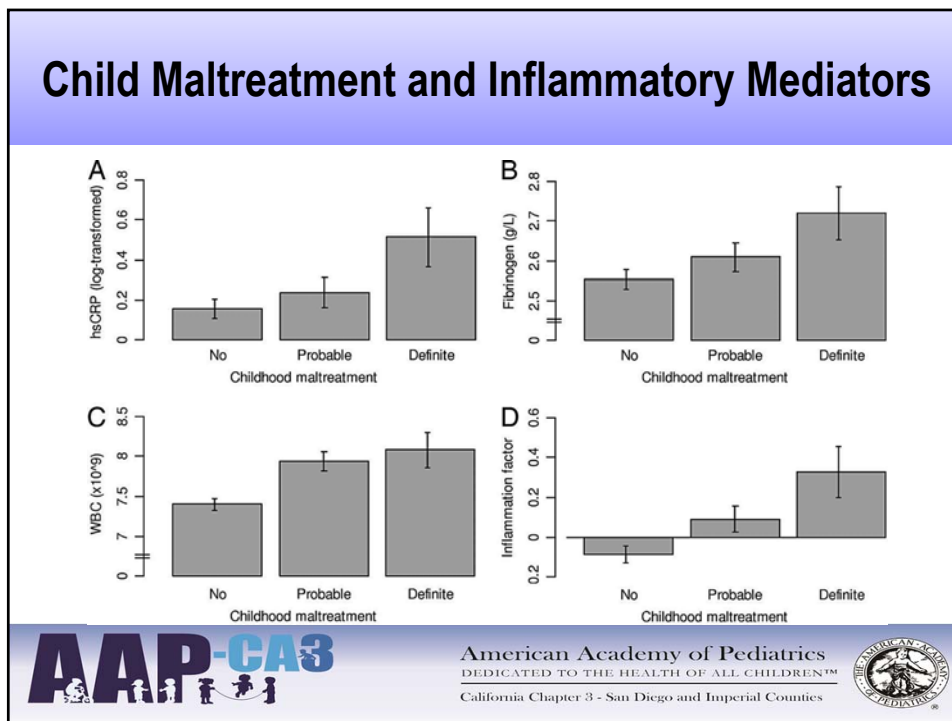
Changes in the Hormonal System

- Fight or flight or flee response dysregulated
- ↑ responses to subsequent stressors (hyper-arousal, irritability) loss of feedback inhibition



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- **Head Start Children (N=50)**
 - 60% had violence exposures < 4 yrs.
 - Mean ACE >3
 - Mean ACE of their Parents is >5
 - 2/3rs of children with Positive ACE screen had one report of social-emotional development concerns (by teacher and parent DECA)

Source: C. Blodgett, 2012

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Research – Chronic Stress and Behavior

- Threat perturb the hypothalamic-pituitary-adrenal axis and promote inflammatory contributes to CVD and a propensity toward depression and aggression (Kemeny, 2009)
- Kindergarteners' chronic exposure to parental conflict ↓ cortisol reactivity - predicted developing externalizing behavior two years later (Davies et al., 2007)
- Parental verbal abuse, even absent other forms of abuse, affected brain white matter tract integrity -affected areas of the brain - verbal IQ, depression, and anxiety. (Choi, Jeong, Rohan, Polcari, and Teicher, 2009)



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Behavioral Effects of Childhood Trauma

- Attachment: The world and other people are unsafe, uncertain and unpredictable.
 - withdrawal and difficulty forming relationships
- Physical: Problems with movement and sensations
 - Hypersensitivity to physical contact or insensitivity to pain
 - Problems with sleeping and eating
- Emotion Regulation: Difficulty regulating their emotional and physical states.
- Behavioral control: Poor impulse control, risky behaviors, and aggression towards others.
- Development/Cognition: Inattention, learning difficulties, regression of previously attained milestones, and either global or domain specific developmental delays (e.g. speech/language, motor skills, self-care abilities, etc.)



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Past of Mental Health Understanding Problems

- Genetic or heritable vulnerability
- Congenital
 - Physical malformation
 - Exposure to chemicals or infection
 - Birth Trauma
- Learned Maladaptive Behavior
- Psychological Conflict
- Social relations problems
- Caregiver/child relationship
 - Attachment and Loss
 - Temperamental mismatch
- Medical problems
 - In child
 - In caregiver
- Physical trauma
 - Head injury
 - Broken bones, burned skin
 - Dog bites



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Now we must add 2 more

- Interruptions of development
- Psychological Trauma
 - Physical abuse
 - Sexual abuse
 - Emotional abuse
 - Neglect



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Interruptions of Development

- Inexperienced caregiver
 - Lack of support for caregiver
 - Lack of capacity of caregiver
- Loss of Continuity of Affectionate care
 - Removal from home; change of placement
 - Loss of parent, nanny, sibling
- Problems of Sensitive Responsiveness and Mutually Confirming interactions
 - Inability to attune to child's states

Challenges that are not overcome early

- Sleeping
- Eating
- Speech and language
Fine and gross motor development
- Social development
- Behavioral problems
(aggression, emotional dyscontrol, anxiety, depression, attention)



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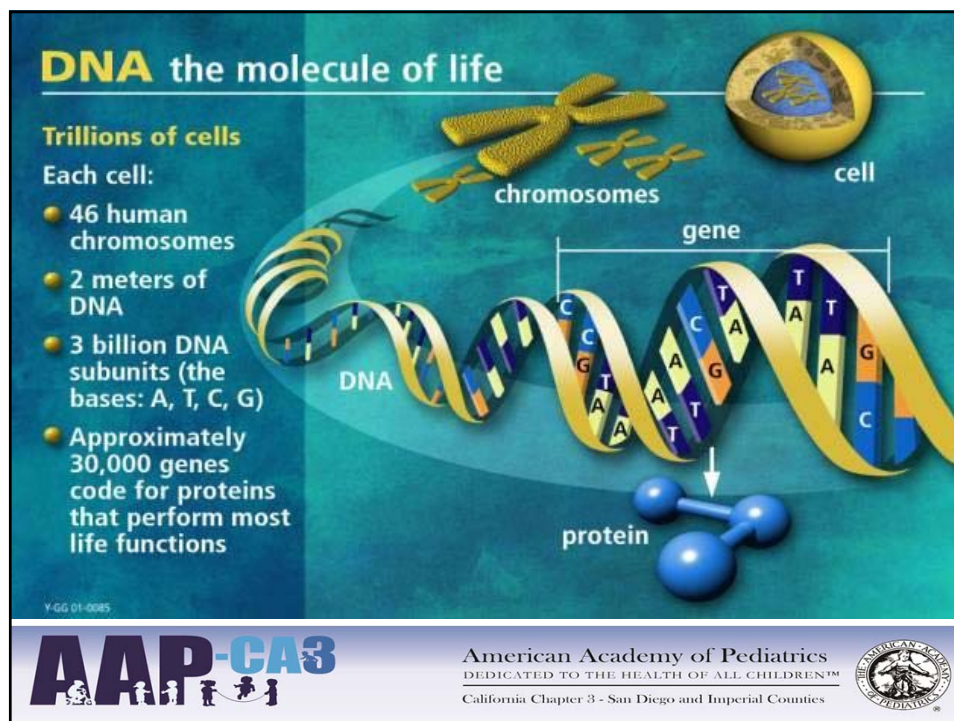
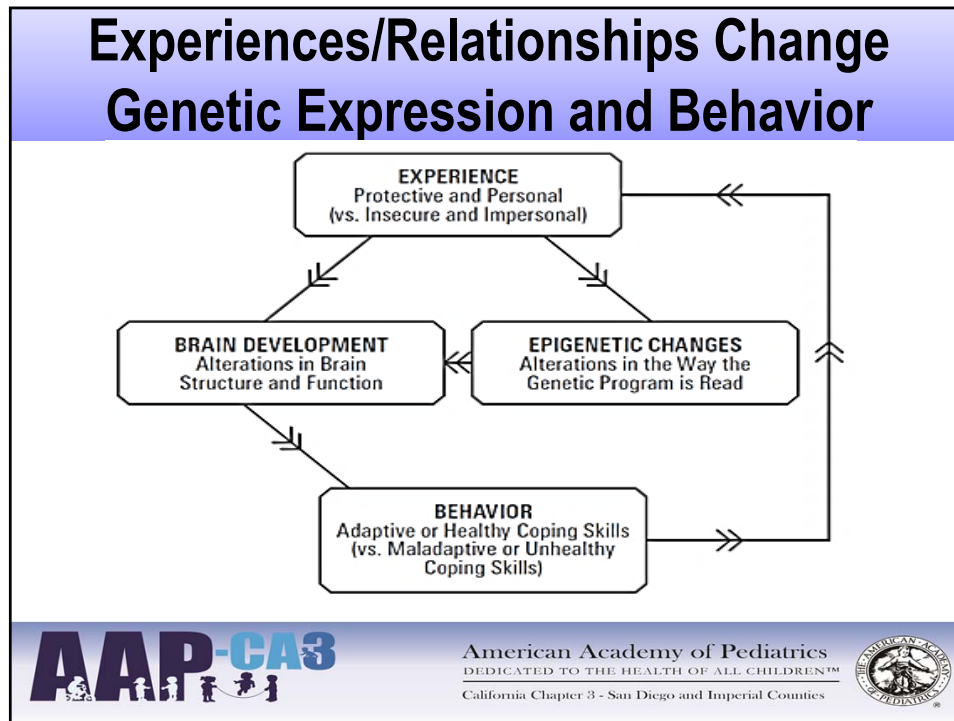
Section 3

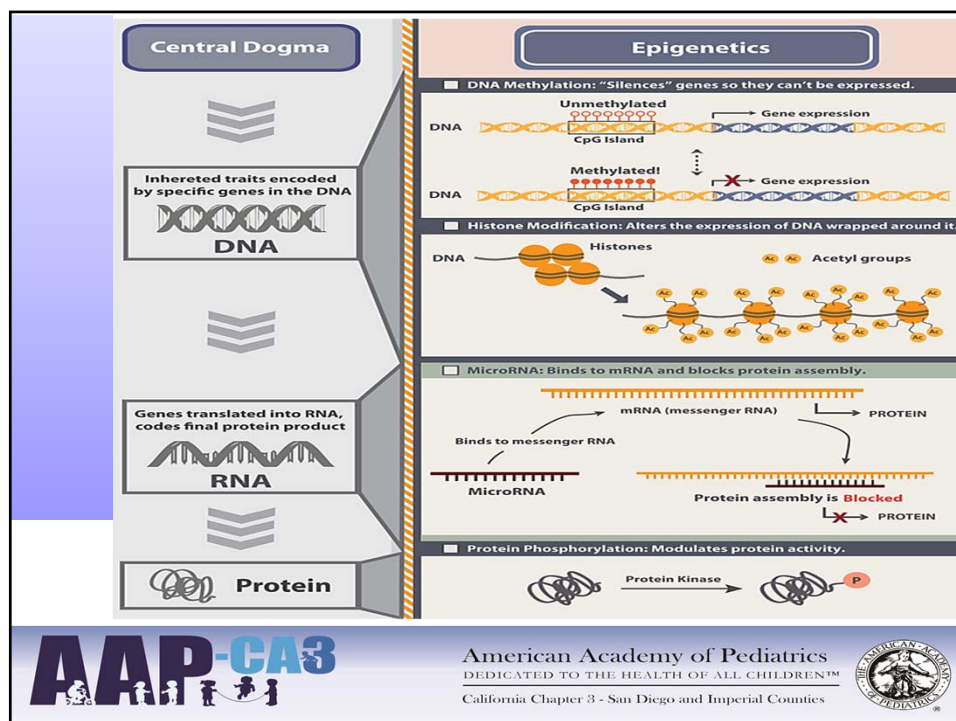
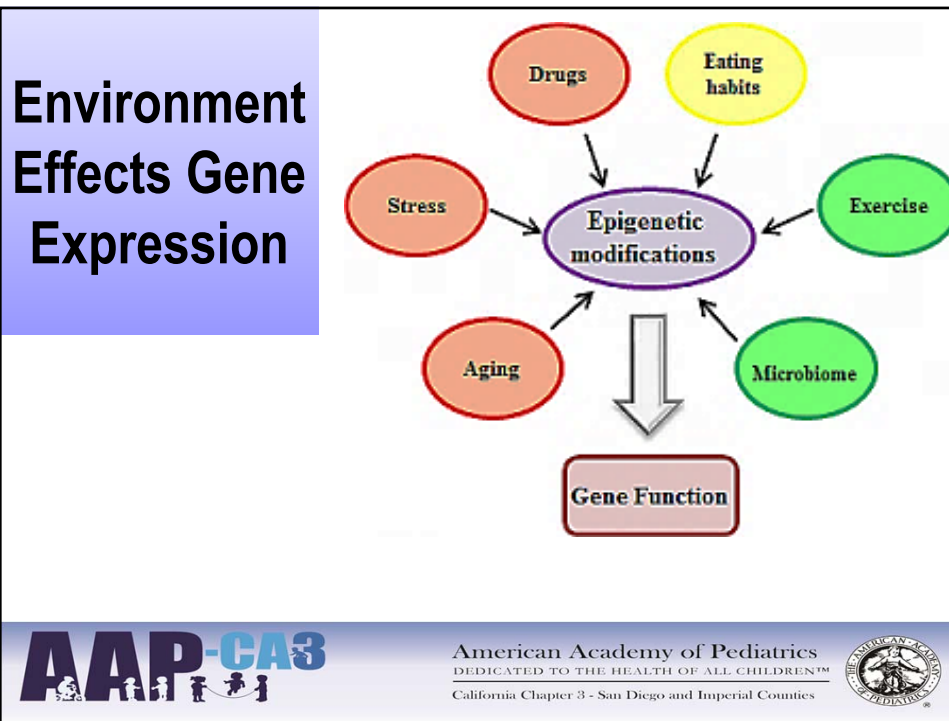
- Genetics
- Epigenetics



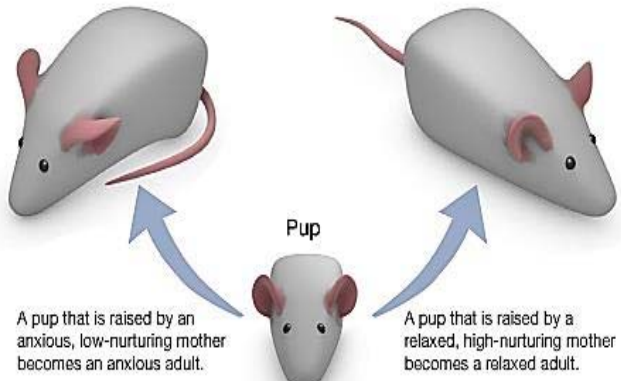
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Mouse model



- High Licking Moms Deactivates Methyl in Pups
- Activate GR Gene
- GR Protein in the Cytoplasm increased
- Binds Cortisol
- Pups are Less Stressed and Recover faster
- Changes in Hippocampus




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
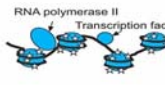



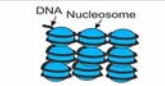




Methylation - Turn On or Off


A




B

DNA Methylation	Histone Modifications	Noncoding RNAs	Gene Expression
			
			

Yang and Schwartz. *AJRCCM* 2011;183:1295-301.



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Histone Tail

CHROMOSOME
CHROMATIN FIBRE
NUCLEOSOME

Genes are turned on and off by modifications to the tails of histones, such as acetylation.

Writers
Enzymes that add histone modifications.

ERASERS
Enzymes that remove histone modifications.

READERS
Proteins that bind to histone modifications and alter gene activity and protein production.

EPIGENETICS
A mechanism for regulating gene activity independent of DNA sequence that determines which genes are turned on or off:

- o in a particular cell type
- o in different disease states
- o in response to a physiological stimulus

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Methylation Off Turning On Gene Expression

Gene

Histone tail

Histone

Methyl group

DNA inaccessible, gene inactive

Methylation of DNA and histones causes nucleosomes to pack tightly together. Transcription factors cannot bind the DNA, and genes are not expressed.

Histone tail

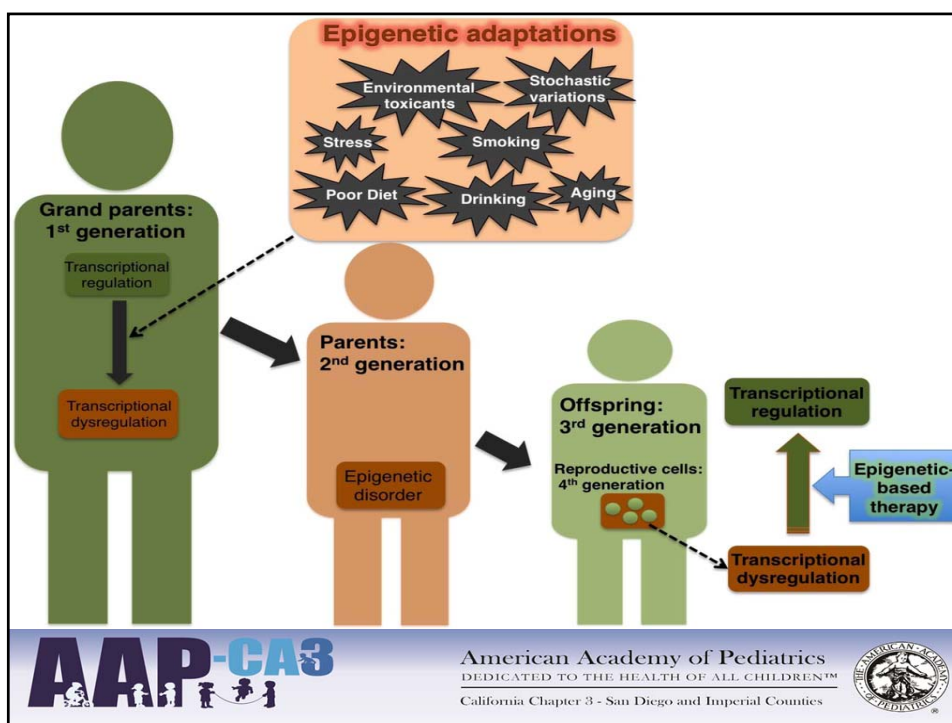
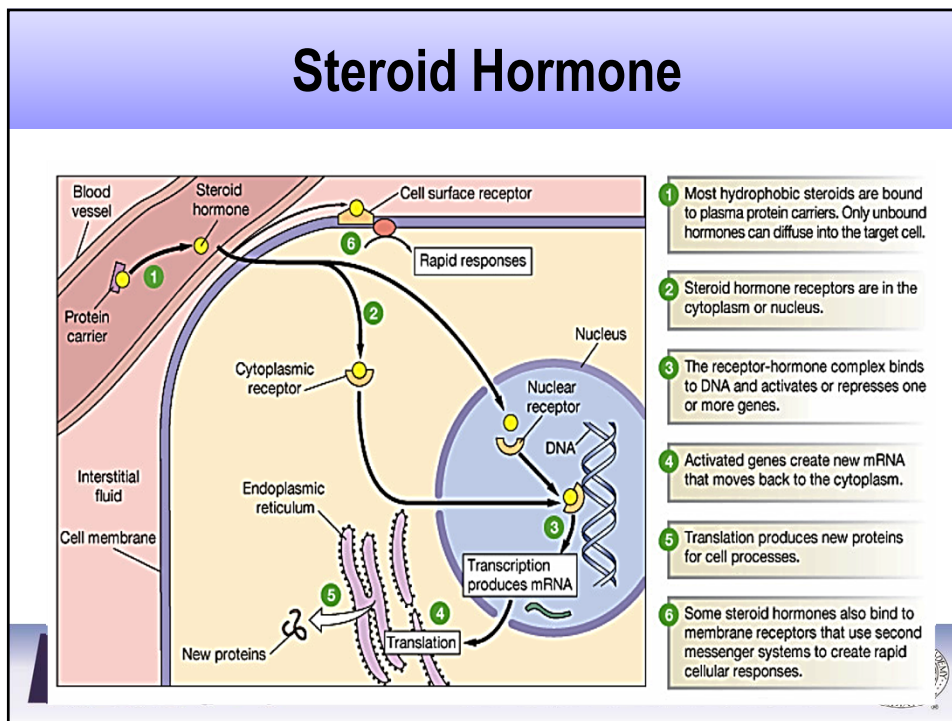
Acetyl group

DNA accessible, gene active

Histone acetylation results in loose packing of nucleosomes. Transcription factors can bind the DNA and genes are expressed.

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Section 4

- What can we do
- What works



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An Early Brain and Child Development Agenda

- Promote healthy relationships
- Promote the healthy early childhood foundations for life course health
- Promote kindergarten readiness and life long success
- Decrease toxic stress effects on health and developmental trajectories
- Strengthening the systems and community supports to address the social determinants of health



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86

Good News

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

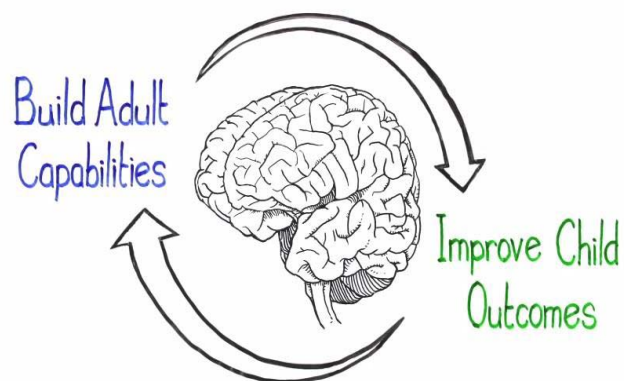


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Focus on the Adults who Care for Children

If we really want to achieve breakthrough outcomes for children experiencing toxic stress, then we have to transform the lives of the adults who care for them.



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5 Protective Factors

1. Parental resilience
2. Social connections
3. Knowledge of parenting and child development
4. Concrete support in times of need
5. Social and emotional competence of children
(Nurture and Attachment)



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A Parent Agenda

- Parent Skills
 - Knowledge of parenting and child development, Parental resilience
- Parent Support
 - Social connections, Concrete support in times of need
- Parent Mental Health and Wellness



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Parent Mental Health

Addresses

- Trauma focused
- Attachment based
- Self-Regulation and Co-Regulation
- Parent Child Interaction
- Family Therapy



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Parent Mental Wellness Skills

- A broad range of psychological and behavioral problems ↓ as people learn to become more psychologically flexible

(Baer, 2003; Biglan, Hayes, & Pistorello, 2008; Brown & Ryan, 2003; Davidson et al., 2003; Grossman, Niemann, Schmidt, & Walach, 2004; Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Kabat-Zinn, 1982, 2005; Langer, 2000).

- Growing evidence shows that this facilitates emotional regulation

(Kashdan & Rottenberg, 2010)



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Affect regulation

- Affect regulation, or emotion regulation, is the ability of an individual to modulate their emotional state in order to adaptively meet the demands of their environment.
- Individuals with **a broad range of affect regulation strategies** will be able to flexibly adapt to a range of stressful situations.



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Increasing our Understanding – Insight and Empathy

- What emotion is at play?
 - What it is trying to express?
 - What is under it?
 - A fear
 - A belief
 - An experience



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How Fight Flight Freeze Look in Parents

Fight

- Anger
- Rage
- Irritation
- Frustration
- Blame

Flight

- Fear
- Panic
- Anxiety
- Worry
- Concern

Freeze

- Shame
- Helpless
- Depressed
- Numb
- Shut Down
- Trapped
- Dissociated



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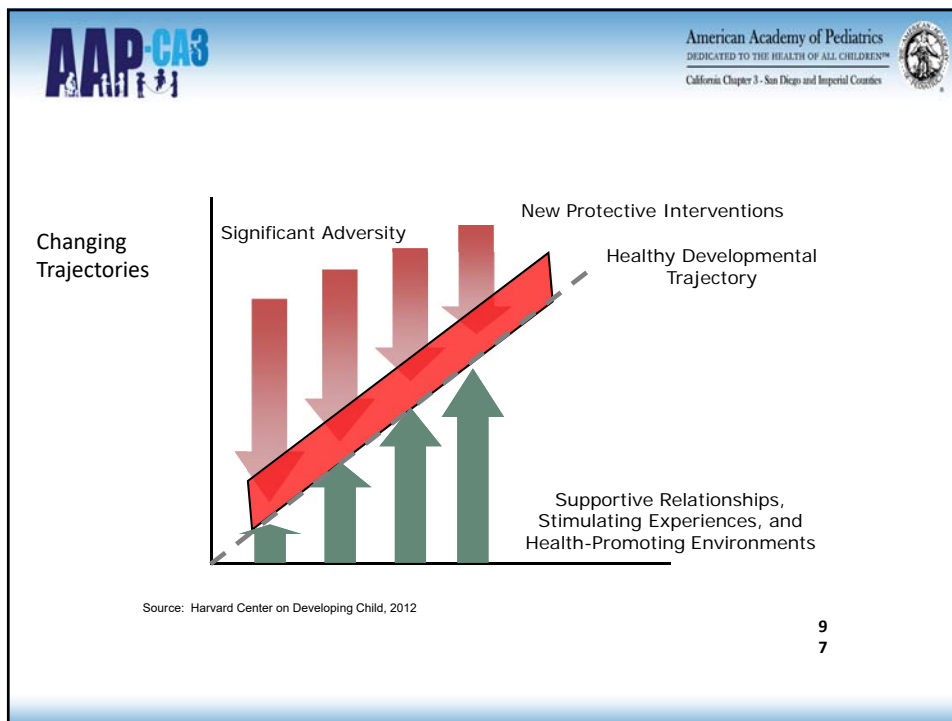
Family Interventions

- **Parenting Programs** (Incredible Years, SafeCare, Strengthening Families Program, Adolescent Transitions Program)
- **Home Visiting Programs** (Nurse Family Partnership -NFP and Healthy Families America -HFA)
- **Comprehensive Early Education Programs** (Perry Preschool Program, Carolina Abecedarian Project, Child-Parent Centers)
- **New Beginnings Program**, an intervention for families undergoing divorce



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Universal Human Experience – Importance of

- Safety and Stability (Regularity/Routine)
- Rhythm and Reciprocity
- Relationships builds Regulation to create Resiliency
- The 3 C's
 - Connection (Need to be seen and heard/to belong)
 - Curiosity (Need to know and find out/to understand)
 - Creativity (Need for Self Expression)
- Making Meaning



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