REGULATION, DYSREGULATION, & COREGULATION
THE NEURODEVELOPMENT AND CONSEQUENCES OF EARLY NEGLECT AND ABUSE

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Review of fundamental brain development
Long term consequences of child maltreatment
The lessons of Adverse Childhood Experiences—Corporal Punishment
Regulation, Dysregulation and Co-regulation
Sequential Neurodevelopment

*The Four Essential Principles*

1. The brain is undeveloped at birth
2. The brain organizes from the “bottom up” – brainstem to cortex and from inside out
3. Organization and functional capacity of neural systems is sequential
4. Experiences do not have equal significance throughout development
What we know for sure:

- Child abuse is common
- The consequences of early childhood abuse can be devastating to the brain development of the young child
- Although we can and do treat it, tracks of the developmental damage from early maltreatment can be essentially permanent
BUT HOW DOES CHILDHOOD TRAUMA ALTER DEVELOPMENT?

When distress is overwhelming, or when the caregivers themselves are the source of the distress, children are unable to modulate arousal. This causes a breakdown in the capacity to process and regulate experience. **At the core of traumatic stress is a breakdown in the capacity to regulate internal states.** (van der Kolk, 2002)
ADVERSE CHILDHOOD EXPERIENCES (ACE) STUDY BY CDC AND KAISER

- 17,337 Adult Subjects make up the Total Sample
- 11% Emotionally Abused
- 28% Physically Abused
- 21% Sexually Abused
- 27% Exposed to Drug or Alcohol Abuse
- 19% Exposed to Mental Illness
- 13% Witnessed Violence Toward Their Mothers
- 23% Lost a Parent due to Divorce or Separation
- 63% Experienced at Least One Category of Negative Childhood Experience, and 20% had Three
1. Emotional abuse
2. Physical threats or physical assault
3. Sexual abuse (including inappropriate touch)
4. Emotional neglect: Often feeling unloved, unimportant OR a sense that family didn’t feel close or support each other
5. Physical neglect: not enough to eat, had to wear dirty clothes, and no one to protect you OR parents too drunk/high to care for you or seek medical help

Centers for Disease Control & Prevention
Adverse Childhood Experiences—Questions

6. Parents separated or divorced
7. Domestic violence toward mother or stepmother
8. Household member a problem drinker or used street drugs
9. Household member depressed, mentally ill, or attempted suicide
10. Household member went to prison

Centers for Disease Control & Prevention
Researchers found a strong link between adverse childhood experiences and adult onset of chronic physical illness.

Those with ACE scores of 4 or more had many higher rates of chronic physical disease:
- Chronic pulmonary lung disease
- Hepatitis
- Heart disease
- Diabetes
- Reduced life span
Researchers also found a strong association with emotional illness and behavioral changes:

- Depression
- Delinquency
- Substance abuse of all kinds
- More domestic violence
- Greater chance of suicide
1. Activation of the stress response system
2. Under and over activation of sensitive neurodevelopmental processes
3. Sensitive and critical periods
4. Chronic stress results in altered function and development—e.g., changes in arousal, attachment, reward.
5. Which lead to maladaptive coping mechanisms
6. Which lead to disease, pathological behaviors, and early death
DOSE DEPENDENT DAMAGE

**Childhood Experiences Underlie Chronic Depression**

![Bar chart showing the percentage of women and men with chronic depression based on ACE score.]

**ACE Score vs. Injected Drug Use**

![Bar chart showing the percentage of individuals who have injected drugs based on ACE score.]

**Childhood Experiences vs. Adult Alcoholism**

![Bar chart showing the percentage of adults with alcoholism based on ACE score.]

![Bar chart showing the percentage of present smoking based on ACE score.]

**Health Risks**
The effects of early childhood trauma and stress are not immediately apparent.

Neurodevelopment is progressive, with later stages depending upon earlier foundations.

The changes in the brain are cumulative and make their effects felt over the course of the lifetime.

Consequently, early stress and trauma is initially disguised...or nearly so.
The adverse experience happens in childhood.
It happens *to* the brain and *through* the brain.
The nature of the trauma is psychological.
The subjective perception and meaning of the event is more important than the event itself...
Because the inner experience of the child is the basis of neurodevelopment.

*So is harsh parenting itself possibly an adverse childhood experience?*
The RELATION of PHYSICAL PUNISHMENT to INTERNAL MORAL DEVELOPMENT

- Physical punishment does not promote long-term, internalized compliance. 85% of studies found physical punishment to be associated with less moral internalization (Gershoff, 2002)
- In fact, physical punishment is positively associated with defiance (Eamon, 2004)
- As well as lack of empathy (Lopez and Bonenberger, 2001)
CORPORAL PUNISHMENT AND AGGRESSION

- Parents often use physical punishment for either aggression (hitting a sibling) or antisocial acts (stealing money) in order to communicate the seriousness of the offense. But in a meta-analysis of 27 studies, all 27 studies proved that physical punishment was associated with more rather than less aggression. (Pagani, *International Journal of Behavioral Development, 2004*)

- Another study proved that 12 of 13 studies positively linked corporal punishment and antisocial behavior. (Gershoff, *Psychological Bulletin, 2002*)
PARENT–CHILD RELATIONSHIPS

Parents often endorse physical punishment in the belief that they are inculcating strong family values. And yet, child corporal punishment also impairs the relationship between parents and children. 13 out of 13 studies found that physical punishment was associated with poorer quality parent–child relationships. *(Gershoff, Psychological Bulletin, 2002)*
SO...GIVEN THIS BACKGROUND FOUNDATION, HOW DO WE REGULATE A CHILD SO THAT SHE BEST DEVELOPS A HEALTHY RESILIENCE AND A NEUROLOGICAL SYSTEM TO SUPPORT THAT?
The primary mechanism for early childhood neurodevelopment is the attachment relationship.

The primary caretaker supplies the neurological stimulation for development:
- Movement
- Touch
- Hearing
- Vision
- Interpersonal interactions

And the child initiates...
The management of positive arousal and gratification through mutual interactional behaviors between two individuals

- Involving Multisensory Interactions
  - *Olfactory*
  - *Visual*
  - *Auditory*
  - *Tactile*
Co-regulation is a right brain event

- It is an implicit, non-verbal, bottom up communication schema that relies on affect recognition, facial matching, attunement and accurate contingent communications

- It communicates the most basic elements of safety and security and mutual affect coordination
THE SOCIAL BRAIN

THE RIGHT HEMISPHERE

- Dominant for Social and Emotional Functioning
- Growth Spurt during the 1st eighteen months
- Motor Development—Eye hand coordination, crawling and walking
- Safety and Danger Recognition
- Autonomic and Physiologic Regulation
- Densely Connected to Subcortical and Brainstem Structures—Physical and Autonomic Functions
  
  (Shapiro, Jamner & Spence, 1997)
MIRRORING: Affect
Synchrony

MIRROR SYSTEMS: Areas in the premotor cortex and Broca’s area are activated during observation, imagination, empathy and execution of motor movements. The mirror system also extends to insula, amygdala, basal ganglia and cerebellum.
Mirror neurons not only simulate observed actions of others in the viewer’s own brain, but also interpret the intention of the action.

While mirror neurons are part of the equipment given to all newborns, the meaning of the action is based upon previous experience.

So in the child’s mind a sudden movement may become the precedent to abuse.
ATTUNEMENT:

- The mother must be attuned not so much to the child’s overt behavior as to the reflections of the rhythms of his or her internal state, enabling the dyad to create “mutual regulatory systems of arousal.” To regulate the infant’s arousal, she must be able to regulate her own arousal state. (Alan Schore 2006)
CO-REGULATION

CONTINGENT COMMUNICATION

- Transaction that involves:
  - Perception of the child’s signals
  - Making sense of the signals in terms of what they mean for the child
  - A timely and effective response
REPAIR

- When there is the inevitable rupture in the ideal attuned, contingent communication, repair is an acknowledgement of the disconnection and the attempt to reconnect.
Infant–Mother dyads (n=101) were assessed as to co-regulation patterns over the last 6 months of the first year.
- Trend toward increasing symmetry
- Quality and symmetry of co-regulation patterns at 6 months predicted attachment status at 12 months.
- Symmetry at 6 mo also linked to psychomotor and mental development at 9 mo (Evans & Porter, 2008)
Mothers with history of abuse themselves responded to a video of a smiling but not a crying infant with arousal.

Mothers with their own history of abuse are more likely to demonstrate an insensitivity and lack of attunement to infant’s emotional cues. *(Casanova & Domanic, 1994)*
Mothers with histories of abuse respond with arousal to pictures of smiling, but not crying, infants (Casanova et al, 1994)

Mothers with their own history of abuse are more likely to demonstrate an insensitivity and lack of attunement to infant’s emotional cues (Casanova & Domanic, 1994)

Mothers with unresolved and incoherent narratives of their abusive early life and rearing are more likely to abuse their own children (Bernstein and Putnam, 1996)
Co-regulation creates a “buffer” for the child which makes an otherwise toxic stress tolerable (Shonkoff, Boyce, & McEwen, 2009)

The presence and active engagement of the caretaker to both shield the child and interpret experience helps to digest stressful events
In the absence of crucial early regulatory attachment experiences, normal set points for self-control and arousal may be missing, and yet not be evident until age appropriate developmental standards are called for.

The deficits manifest eventually in aggression and hypervigilance.
THE MEASUREMENT OF ATTACHMENT
The most fundamental behavioral definition of attachment is "proximity seeking by a child when she/he senses discomfort or danger."

Individual responses to stress are variable, based upon temperament and prior experience, but if there is a secure attachment they always involve proximity seeking toward an attachment figure.

If there is not a secure attachment the proximity seeking differs in kind and quality.
The Strange Situation procedure measures types of attachments—Secure and Insecure (the latter called either avoidant or ambivalent)

An additional category was added called Disorganized Attachment—inconsistent, approach–avoidant, freeze and isolate
Of the four categories of attachment (Main and Solomon, 1990) maltreated children represent as much as 82% in the Disorganized Attachment category (Carlson & Cicchetti, 1989).

Compared to 19% in the non-abused group.

The intrusion of fear into the attachment-comfort equation. The source of security is also the source of danger.

The unresolvable dilemma.
THE DEVELOPMENTAL ORIGINS OF DELINQUENCY
The CONSEQUENCES of ABUSE and NEGLECT SHARE MANY of the SAME CORE FEATURES as DELINQUENT BEHAVIOR

- Dysregulation of Arousal
- Dysregulated Moods—Labile and Unpredictable and Unmanaged
- Dysregulated Behavior—Explosive and Aggressive and Impulsive
- Poor Interpersonal Relations—Impaired Attachments and Empathy
- Impaired frontal “Executive Functions” like Insight, Introspection, Patience, Prediction and Planning
ADVERSE EXPERIENCES IN DELINQUENTS

Figure 2. Prevalence of ACE Description Indicators by Gender

- Emotional Abuse
- Physical Abuse
- Sexual Abuse
- Emotional Neglect
- Physical Neglect
- Parental Divorce or Separation
- Family Violence/DV
- Household Substance Abuse
- Household Member Incarceration
“People with childhood histories of trauma, abuse and neglect make up almost the entire criminal justice population in the U.S. ” (van der Kolk, 2004)
The three fundamental effects of abuse and neglect all directly underlie the core behaviors of serious behavior disturbance:

- **Dysregulation of arousal**
- **Attachment disturbance**
- **Dysregulation of reward**
THE REGULATION OF AROUSAL
THE DEVELOPMENTAL ORIGINS OF DELINQUENCY

- **BASIC REGULATORY FUNCTIONS** are **NORMALLY ESTABLISHED in INFANCY and EARLY CHILDHOOD**
  - Through the protection of the infant from environmental and interactional stressors
  - By the external regulation of the infant who is not initially capable of self-regulation
The PERSISTENT FEAR RESPONSE and the SIGNS of HYPERAROUSAL:

- Impulsivity
- Reactivity
- Aggression
- Hyperactivity

DIAGNOSED AS:

- ADHD
- Bipolar Affective Disorder
- Learning Disability
- Conduct Disorder
THE DEVELOPMENT OF ATTACHMENT
THE DEVELOPMENTAL ORIGINS OF DELINQUENCY

- Attachment and Development
  - Critical, early and encompassing

- Early Templates for Relations

- The Management of Aggression through Empathy
Empathy is a complicated derivative of the interaction of multiple neural networks.

The core “social brain” components interact to first perceive the social signals of others, to then interpret them for distress, and to act on this information accordingly.

The components of empathy require early attachment and support by consistent and nurturing caretakers.
Very early infant foundations of empathy are found in initial bonding operations:
(Meltzoff and Decety, 2003)
◦ Imitation of facial expressions
◦ Response to distress calls of other infants
◦ Eye contact and response
◦ Imitation of vocalizations

Refinement and advancement of empathic responses develop into early adulthood
THE REGULATION OF REWARD
NEUROCHEMICAL BASIS OF ATTACHMENT AND BONDING

- Attachment and nurturing are highly rewarded activities early in life
- Neurotransmitters initiate and accompany early developing interpersonal interactions
- Also the reverse: Nurturing and attachment behaviors stimulate the production of particular reward neurotransmitters and proliferate the neurons which produce them
THE SOCIAL BRAIN

NEUROCHEMICAL DRIVEN ATTACHMENT
“The pathways that mediate the hedonic properties of psychostimulants evolved as neural systems for social attachment.”

(Insel and Young, 2001)
THE SOCIAL BRAIN

- ENDORPHINS (opiates)
  - Overall decreased pain and increased well being
  - The satisfaction of proximity in both mother and infant is mediated by opioid neurotransmitters
  - Endorphins promote a sense of safety and comfort for the infant in the presence of the mother
  - Administration of opioids decreases affiliation and attachment behaviors in both infant and mother rats
  - Opiates decrease caretaking behaviors in parents
  - Opiates reduce the pain of separateness and satisfy the craving for satisfying attachments
DOPAMINE (cocaine, stimulants)

- Dopamine drives the central reward system, including but not limited to social interactions and attachment
- By rewarding certain actions and responses, dopamine directs the learning of attachment
- Repeatedly separating rat pups from caregivers decreases dopamine production and increases reactivity to stress. It also increases sensitivity to cocaine as a reward. (Meany, Brake and Gratton, 2002)
- As the one of the end targets for the dopamine reward system, the frontal lobes organize and reinforce both addiction and attachment
Lack of early life attachment leads to underdevelopment of reward systems. Therefore, the reinforcing effects of relationships or intimacy is minimal. External stimulation of these reward systems using dopamine-stimulating (e.g., cocaine) or opioid-like drugs becomes an alternative route to reward.
QUESTIONABLE THERAPIES

- Medication
- Verbal / Insight Therapies
- Cognitive / Behavioral Interventions
- Coercive Contingent Interventions
- Correctional Interventions
- Hospitalization / Residential
RECOGNIZE and TAKE INTO ACCOUNT

• The early experience and current home life of the students in the room
• The associations they have with school and academics
• The actual developmental age of the student
DEVELOP A THEORY TO GUIDE YOU

• Don’t do what your parents did
• Don’t “follow you gut”
• Read for new ideas
• Think through your actions and plan according to your theory
• Don’t carry yesterday’s problems forward
“CHILDREN DO WELL WHEN THEY CAN”

Ross Greene

“ATTRIBUTE TO CHILDREN THE BEST POSITIVE MOTIVE CONSISTENT WITH THE FACTS”

Alfie Kohn
CO-REGULATION OF CHILDREN: PRINCIPLES and PRACTICES

- Relational (with another human)
- Relevant (developmentally-matched)
- Repetitive (patterned)
- Rewarding (pleasurable)
- Rhythmic (resonant with neural patterns)
- Respectful (child, family, culture)

Bruce Perry
CO-REGULATION OF CHILDREN: PRINCIPLES and PRACTICES

- **REGULATE**—establish a sense of calm security and physical well being
- **RELATE**—establish human contact through voice, eye contact, touch
- **REASON**—decide together how to solve the problem at hand
END