Trauma, Abuse and the Developing Brain

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General statements

- Trauma can effect developing brains; and that impact is linked to problems with behavior, cognitions and emotional regulation
- Abuse is abuse, but not always traumatic
- Same problems...different approaches
- Having motivation is not a problem... knowing what it is, can be
- “Kids do well if they can”
Defining trauma

- Feeling helpless to change the outcome
- PTSD (diagnosis focuses on three elements)
  - Repeated reliving of memories of the traumatic experience
  - Avoidance of reminders of trauma
  - A pattern of increased arousal
- Fight/flight/fright response
Other perspectives to consider

- Understanding trauma contextually and developmentally
- Abuse happens to you and trauma happens within you
- Differentiating trauma
  - Single event vs. long term
  - Vicarious vs. hands on
- Developmental Trauma Disorder?
Functions of the brain

- **Cerebrum**
  - Frontal Lobe - associated with reasoning, planning, parts of speech, movement, emotions, and problem solving, analytical thought
  - Parietal Lobe - associated with movement, orientation, recognition, perception of stimuli
  - Occipital Lobe - associated with visual processing
  - Temporal Lobe - associated with perception and recognition of auditory stimuli, memory, and speech

- **Cerebellum**
  - Basic vital life functions such as breathing, heartbeat, and blood pressure; regulation and coordination of movement, posture, and balance
Brain functions cont.

- **Limbic**
  - Thalamus-sensory and motor functions
  - Hypothalamus-homeostasis, emotion, thirst, hunger, circadian rhythms, and control of the autonomic nervous system. In addition, it controls the pituitary.
  - Amygdala-involved in memory, emotion, and fear
  - Hippocampus-learning and memory . . . for converting short term memory to long term memory, and for recalling spatial relationships in the world about us
  - Nucleus Accumbens-principle pleasure center of the brain, key part of reward and motivation
The Limbic System

- Cingulate gyrus
- Pineal gland
- Mammillary body
- Thalamus
- Pituitary gland
- Hypothalamus
- Amygdala
- Hippocampus
- Fornix
leftie lucy…rightie tightie

- **Right Hemisphere**
  - The right hemisphere controls the left side of the body
  - Temporal and spatial relationships
  - Analyzing nonverbal information
  - Communicating emotion

- **Left Hemisphere**
  - The left hemisphere controls the right side of the body
  - Produce and understand language
  - Analytic thinking and reasoning
  - Detail oriented
Functions of the brain

Left Brain Functions
- Written language
- Reasoning
- Spoken language
- Scientific skills
- Right-hand control

Right Brain Functions
- Number skills
- Insight
- 3-D forms
- Art awareness
- Imagination
- Left-hand control
- Music awareness
Sensory Development

- **Visual**
  - Least accurate of all senses
  - Does not reach full adult functioning until age four

- **Auditory**
  - Processing problems have some connection to autism and dyslexia

- **Olfactory**
  - Can detect around 10,000 smells
  - 75% of what you taste has to do with smell
  - Only sensory input that is directly connected to limbic system (memory & emotion)

- **Taste**
  - 2,000-5,000 taste buds
  - Four types of taste (sweet, salty, sour, bitter)

- **Touch**
  - First of five senses to develop and most prominent at birth
  - Critical part of growth and nurturing
The brain and trauma

- Trauma generally impacts the limbic system
- Amygdala senses threat and results in a heightened arousal/emotional state
- Frontal lobe (reasoning, thought) and left hemisphere (spoken language) shut down
- When amygdala senses threat, it creates emotional memories in response to particular sounds, images, and sensations it connects to a significant threat
Cont.

- Early trauma can disrupt normal development and impact the cortex’s ability to process and regulate limbic responses.
- Once amygdala is programmed to certain sounds, images and sensations, it is likely to respond to those as a trigger.
Developmental Problems in Pre-frontal Cortex

- Impulse control
- Emotional and behavioral management
- Judgment
- Organization
- Reading environment and social cues
- Attention
- Lying
- Agitation
Memory and Trauma

- Memories are formed after an event and are based upon perception.
- Memories made up of multiple parts that are stored in multiple areas of the brain.
- Different senses process information differently.
- Memories are fluid and are altered every time they are accessed and stored.
- Two basic types:
  - Working memory (frontal lobe).
  - Long term memory (hippocampus & frontal lobe).
Understanding the traumatized child’s response

- Unable to trust environment and to regulate their emotional state
- React to threat or *perceived* threats with fight/flight/fright reaction
- Experience reenactments and their behavior is often misunderstood as “oppositional,” “rebellious,” or “antisocial”
- Behaviors are instinctual and for survival
Lack of cognitive mapping skills leaves them unable to compare and contrast even benign novelty.

What is familiar will be safer, even if it is a predictable source of terror.

Little insight into relationship between what they do, what they feel, and what has happened to them (metacognition).
Metacognition

“Capacity to recognize, understand, and reflect upon one’s own thoughts and feelings and the thoughts and feelings of others”

- Critical to developing social skills
- Empathy
- Moral reasoning
- Self-regulation
- Self-agency
- Attachment
Caregivers, children and affect tolerance

- Early experiences occur in context of developing brain, so neural development and social interactions are intertwined
- Secure infants learn to trust both what they feel (affect) and how they understand the world (cognitive)
- Children learn how to regulate their behavior by anticipating their caregivers response to them
- When trauma occurs, child’s response will likely mimic that of parent
If trauma is overwhelming or the parent is the source of distress, children are unable to regulate their arousal.

Distress results in dissociated sensory fragments... children unable to understand what is happening and cannot execute appropriate plan of action.

Secure children learn a complex vocabulary to describe their emotions.
Effects of trauma on the brain

3 Year Old Children

Normal

Extreme Neglect
Left-right hemisphere integration

- Children with abuse histories have less developed corpus callosum
  - Inability to integrate left and right brain
  - Neutral memories activate in left hemisphere
  - Unpleasant memories activate right hemisphere
  - Predominantly bilateral response in non-abused

- The result is more compartmentalizing and less available for analysis and change (especially through language)
Brain chemistry and trauma

- PTSD causes conditioned psychophysical and neuroendocrine responses to reminders of trauma
- People with PTSD found to have low levels of Cortisol (anti-stress hormone)
- Increased arousal (norepinephrine) with low levels of Cortisol provoke indiscriminate fight/fright/flight reactions
Cortisol

- **High levels**
  - Give quick burst of energy
  - Heightened memory
  - Creates homeostasis in body
  - Creates lower sensitivity to pain

- **Prolonged levels**
  - Impaired cognitive performance
  - Suppressed thyroid function
  - Blood sugar imbalances such as hyperglycemia
  - Decreased bone density and decrease in muscle tissue
  - Higher blood pressure, heart disease
  - Lowered immunity and inflammatory responses in the body, slowed wound healing
Effect of Early Stress on Development

- Early stress on children program them to have prolonged stress response
- Common hormones related to stress
  - Vasopressin
  - Oxytocin
  - Cortisol
  - Epinephrine
- Myelination (surrounds nerve fiber)
- Synaptogenesis (formation of synapses)
Language is the source of misunderstanding

Because people with PTSD tend to relive their trauma, they have great difficulty putting it into words.

The process of reliving it, immerses them in the experience and they are unable to analyze the here and now.

The focus of processing trauma often results in talking around it.
Are traditional methods working?

Louisville Science Center

- 10% of what they hear
- 15% of what they see
- 20% of what they see and hear
- 40% of what they discuss with others
- 80% of what they directly experience and practice, and
- 90% of what they teach to another person
Knowing where kids and families are?

- Basic needs (survival: food, drink, shelter)
- Security (safety: protection, security, stability)
- Love/Belonging (family affection, friendship, attachment)
- Esteem needs (responsibility, confidence, achievement)
- Self-Actualize
What approaches should we look for?

- Six components to Complex Trauma Intervention
  - Safety
    - When individual's own resources are unable to deal with threat, they need to rely on others (environment)
  - Self regulation
    - Modulate arousal and restore equilibrium
  - Self reflective information processing
    - Develop ability to process and engage in executive functions
Six steps cont...

- Traumatic experience integration
  - Transformation, incorporation, and resolution of traumatic memories, reminders and triggers

- Relational engagement
  - Creating, repairing or restoring of abilities to attach

- Positive affect enhancement
  - Improving self image, esteem and efficacy
Framework for traumatized youth

- Attachment
  - Structured and predictable environments (R&R)
  - Increase caregiver capabilities
  - Attunement
  - Develop competencies

- Regulation
  - Ability to accurately identify own affect
  - Skills to express/communicate affect safely
  - Ability to recognize and make shifts in emotions

- Competency
  - Opportunities for mastery
  - Develop and maintain connections
  - Building strengths
  - Self efficacy
The therapist’s role in healing

- Accurate assessment protocols
- Desensitization and integration
- Effective treatment should use avoidance to promote awareness
- Knowing feelings, not just sensing them as indications of threat to be avoided
- “Wholebrain”, mindfulness, awareness, and understanding of inner experience
- Attachment, attunement and adaptation
Some approaches to consider

- Sensory based approaches
- Trauma Focused-Cognitive Behavioral Therapy
- EMDR
- Biofeedback/Neurofeedback
- Experiential
- Art therapy
- Music therapy
- Drama therapy
- Brain gym
Treatment Focus

- Controversial, but promising
- Integrate feelings, thoughts, bodily sensations with traumatic experiences
- Help integrate fragmented elements of the past into a tolerable “owned” experience
- Provide bilateral stimulation
- Not necessarily conscious experience
Helpful Websites & References

- www.childtrauma.org/
- www.traumacenter.org/
- www.cdc.gov/
- www.braingym.org/
- Sykes Wylie, M., The Limits of Talk, Psychotherapy Networker, Interview with Bessel van der Kolk.