Neurobiological Perspectives in Trauma-Informed Care

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September 27, 2016
Adult vs. Child Traumatic Stress Distinctions

Sustained high levels of stress are both *psychological* assaults on the mind and *biological* assaults on the brain, with bidirectional intersections making either indistinguishable during early development.

Common types of traumatic stress:

- Posttraumatic Stress Disorder (PTSD)
- Complex Trauma
- Intergenerational Trauma
- Developmental Trauma
- Vicarious and Secondary Traumatic Stress
Symptomatology Intersections...


For more: M.H. Teicher, Director, Developmental Biopsychiatry Research Program, McLean Hospital (Harvard Medical School Affiliate)

https://drteicher.wordpress.com/tag/child-abuse/
Traumatic stress considerations…

Developmental:

- Early, multiple, acute and prolonged exposure to toxic stress, often interpersonal in nature with threats to social and relational security.

- **From caregiving system includes:** physical/sexual/emotional abuse and caregiver neglect

- **Compromised neurodevelopment:** decreased integration of sensory, emotional and cognitive systems into a cohesive whole
Traumatic stress considerations...

Lifespan:

- **From social systems includes**: stigma (e.g., discrimination based on race, ethnicity, gender/gender identity, sexual orientation, mental and physical abilities/expressions, etc.), alienation, chronic and prolonged bullying, and deficit-focused interactions.

- **From institutional systems includes**: pathology-focused interactions, witnessing violence, seclusion and restraint, separation from family and friends, isolation from cultural heritage, compromised autonomy, intrusive medical procedures and/or medication side-effects.

- **From extreme cultural adaptation contexts**: abrupt or extreme change in environment, new sensory perceptions with deprivation of familiar sensory perceptions (e.g., sights, sounds, tastes, smells, temperatures, time, spatial orientation, etc.)
Shonkoff’s Stress Taxonomy
(Shonkoff & Phillips, 2000; Shonkoff & Garner 2012)

**Positive Stress**
- Moderate and short-term elevations in stress hormones, heart rate and blood pressure
- Adaptive response supportive to developmental processes in the context of supportive relationships that serve to facilitate regulatory processes involved in returning to homeostatic baselines.

**Tolerable Stress**
- Time-limited moderate to high physiological responsivity that could compromise biological development if not for stable and supportive relationships fostering adaptive responses similar to the relational role in positive stress

**Toxic Stress**
- Extreme, reoccurring and sustained stress response system activation in the *absence* of co-regulating protections associated with stable and supportive relationships

For more: The Center on the Developing Child, Harvard
[http://developingchild.harvard.edu/](http://developingchild.harvard.edu/)
Trauma-Informed Principles

1. Traumatic stress awareness of self and others
2. Emphasis on safety and trustworthiness
3. Opportunities for choice, collaboration, and connection
4. Strengths-based, asset-focused, skill-building
Blind Spot

Everyone has one...

On an index card or post-it note, draw a filled in dot (about the size of a grain of rice) and an X about 1 inch parallel to the dot on the right.

1. With your right hand, cover your right eye so it cannot see.
2. Holding the index card in front of your face, use your left eye to look at the X while slowly bringing the index card closer to your nose.
3. Use your peripheral vision to pay attention to the dot while continuing to look at the X.
4. Once the index card is about 1 inch away from touching your nose, you should notice the dot disappears (If you are touching your nose with the index card you have gone too far so need to pull the card back a bit).

When we don’t have all of the information, our brain simply fills in the blank…
Environmental familiarity

**Sight:**
- Do I look like others in my community?
- Can I read signs that are posted?
- Does nature and vegetation look the same as what I am used to seeing?

**Smell:**
- What does my food smell like?
- Does my home have familiar smells in it?
- Am I smelling nature or exhaust in my community and is this different from where I come from?
- Is my sense of smell affected by my medication?

**Taste:**
- Am I eating what I am used to eating?
- Is my taste affected by medication?

**Sounds:**
- Do I hear my language spoken?
- Do I hear familiar music?
Emotions vs. Feelings

**EMOTION**

- Automated program of action; unlearned; carried out by our bodies

**FEELING**

- Composite perceptions of what happens in our body and mind when emoting

Damasio, Antonio. “Self Comes to Mind” 2010
Memory Manifested

**Implicit memory:**

- Memory characterized by a lack of conscious awareness in the act of recollection.
- Mostly experienced in the body but can be expressed through stress responses involving thinking and feeling.
- Example: “I don’t like my teacher because I don’t trust his smile”
Memory Directed

Explicit memory:

- Memory in which there is a conscious recollection of an experience.
- Helps us to make sense out of implicit memory experiences.
- Mostly experienced in thoughts and “ah-ha” moments.
- Example: “I feel uncomfortable around my teacher sometimes because his smile reminds me of how my abuser used to smile after hitting me”
Left Brain & Right Brain

• Autobiographical memory is located in the right brain and without integration with the left brain remains unconscious/inaccessible to conscious thoughts.

• Disconnection can result in unknown and reactionary emotional states, depression and anxiety disorders, and memory limitations (to name a few)

• Trauma or sustained high stress in childhood damages the corpus callosum, which connects the left brain from the right brain.
Trauma and the Developing Brain

- Enlarged ventricles
  - Set of 4 interconnected cavities where cerebrospinal fluid (chemical stability, nutrient delivery, buoyancy) is produced
  - Protects brain

- Reduced hippocampal volume
  - Learning
  - Memory
  - Navigation and spatial memory

- Reduced corpus callosum volume
  - Cerebral hemispheric integration
  - Interconnect areas of motor cortex
  - Communicates somatosensory information
Q&A with Speakers

• Type your questions in the Chat Box
• Email to events@amsssa.org
Neurobiology

Mind

Prefrontal Cortex
Brain Stem
Limbic System
Neural Networks

- The brain holds about 10 billion neurons that all interconnect to form neural networks.

- Neural networks become stronger and more complex with repeated exposure to thoughts, feelings, behaviors, and perceptions.

- A neuron may be perceived as a thought, feeling, behaviour, or perception in its biological form.

- “Neurons that fire together wire together” – Donald Hebb
Neural Networks: Clear and Developed Paths
Neural Networks: Interconnections
Neural Networks:
Acute Traumatic Stress
Neural Networks:
Challenges with New Neural Networks
Homeostasis vs. Allostasis

**Homeostasis**

Standard operating process stays within strict boundaries (e.g., body temperature)

**Allostasis**

Process of making special adjustments of those boundaries according to the broader needs of the organism (e.g., stress)

*Allostatic Load = Total cost of these adjustments (e.g., lifetime chronic stress impact on overall health)*

(Cacioppo & Patrick, 2008)
Homeostasis and chronic traumatic stress

“PTSD develops following exposure to events that overwhelm the individual’s capacity to re-establish homeostasis. Instead of returning to baseline, there is a progressive kindling of the individual’s stress response...even minor reminders of the trauma may precipitate a full-blown neuroendocrine stress reaction.”

(van der kolk, 2003)
Involved neurochemicals…

- Chemicals that tell the brain what to think, feel, and do.
  - Epinephrine (adrenalin)
  - Norepinephrine
  - Oxytocin
  - Cortisol
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<th>What is Cortisol?</th>
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**Cortisol (stress hormone)**

- **Cortisol protects the body:**
  - Proper glucose metabolism
  - Regulation of blood pressure
  - Insulin release for blood sugar maintenance
  - Immune function
  - Inflammatory response

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**Can too much Cortisol harm the body?**

*With extreme and consistently high stress levels, the body experiences:*

- Impaired memory and thought processes
- Widespread cell death
- Decreased developmental capacity
- Physical ailments such as:
  - Suppressed thyroid function
  - Blood sugar imbalances
  - Higher blood pressure
  - Lowered immunity
Oxytocin

- Bonding chemical & social regulator
- “chemical of calm” (Cacioppo & Patrick, 2008)
- Functions as both a neurotransmitter and hormone
- Can reduce stress, increase pain tolerance, reduce distractibility, help us feel relationally connected to others
Stress responsivity and maladaptive patterns

“Within this zone, a person can contain and experience affects, sensations, and thoughts and can process information effectively ... without disrupting the functioning of the system.”
Ogden & Minton (1999)

“Poor tolerance for arousal is characteristic of traumatized individuals.”
Modulation of primary regulatory systems

Most treatments approach emotional and behavioral symptoms here:

Cerebral intentionality is a **top-down process** (e.g., talk therapy, contingency-based programs/token and level systems)

Relational-based environments and interventions that factor in sensory input offer the most promise for trauma resolution and regulation of biological stress responsivity

Traumatic stress origin is located here:

Somatosensory states (e.g., sight, sound, taste, touch, smell, etc.) are **bottom-up processes**.

Approaches targeting visceral access are most effective at comprehensive stress regulation (e.g., meditation, mindfulness, relational transference, yoga, behavioral conditioning, etc.)
4 Safety Categories

- Implications for wellbeing
  - Reconceptualizing ‘recovery’ as a process of ‘resolution’ versus final destination

- Implications for developmental safety
  - Reconceptualizing “child protection” as an experiential process versus an event or singular ‘change’ of environment

- Implications for role of emotional and behavioral regulation
  - Reconceptualizing individual ‘regulation’ as contingent upon relational factors mediating ‘co-regulation’ processes
Conclusion

The work we do to promote healthy development, safety, well-being, and resolution is inexplicably connected to the work we do to stay emotionally grounded, secure, socially connected, and resolved in our own personal lives.

We are all interconnected in biological, psychological, and social ways. Accordingly, any line dividing ‘us’ from ‘them’ is illusory at best.
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