

The Neuroscience of Trauma

How Trauma Affects Biology
and What We Can Do about It

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Purpose & Agenda

The purpose of this presentation is to share with clinical staff the neurobiological effects of trauma and implication for treatment.

- What is Trauma?
- How Trauma Affects Biology
- Treatment Considerations

More than 50% of adults in the United States have experienced at least one major trauma.

What is Trauma?

- DSM-5 definition: “Exposure to actual or threatened death, serious injury, or sexual violence in one (or more) of the following ways”:
 - Directly experiencing the traumatic event
 - Witnessing in person the event as it occurred to others
 - Learning the event occurred to a close family member or close friend (must have been violent or accidental)
 - Experiencing repeated or extreme exposure to aversive details of the event
- Briere & Scott (2015) definition includes major threats to psychological integrity: “...an event is traumatic if it is extremely upsetting, at least temporarily overwhelms the individual’s internal resources, and produces lasting psychological symptoms.”

Therefore, more individuals in the general population have experienced trauma than only those that meet the DSM-5 criteria, and many of those respond well to trauma-focused therapies.

Neurobiological Effects of Trauma in Children

Siegel (2002) summarizes that traumatic experiences, especially those occurring in early childhood, affect the way the brain develops, including those areas of the brain responsible for:

- Memory and language
- Emotional and behavioral regulation
- Interpersonal relatedness

The healthy development of the amygdala, or the emotional control center within the limbic system of the brain, is dependent on external experiences as well as genetic factors and temperament. The experience of a child as the amygdala develops shapes the person's internal maps of the world. If the baby feels safe and loved, the child will grow up curious and playful. If the baby feels neglected or unwanted, this will affect the child's play, cooperation, and sense of safety, (Vernick, 2016).

Siegel, D. J. (2002). The developing mind and the resolution of trauma: Some ideas about information processing and an interpersonal neurobiology of psychotherapy. In F. Shapiro, *Paradigm Prism*. APA Press.

Vernick, L. (2016, January 2). *Understanding trauma* [Video]. YouTube. <https://www.youtube.com/watch?v=DcjkOUt09t4&t=1187s>

Neurobiological Effects of Trauma in Adults

Adults experiencing traumatic events undergo biological changes in adrenal and cortisol responses that can cause dysregulation of both the limbic system and brainstem and can affect:

- Immune and stress responses
- Serotonin levels
- Neurogenesis, or cell growth within the nervous system
- Decreased activation of the hippocampus which can affect learning and memory

(Briere & Scott, 2015)

Learned helplessness as the result of being unable to escape the trauma wires the brain in such a way that leads the person to believe they could not escape future threats of trauma. The limbic system and brainstem activate hormones to self-protect, yet the person cannot do anything to protect themselves. Then the rational brain evaluates why the person didn't do anything to protect themselves, which then produces feelings of guilt and shame (Vernick, 2016).

Briere, J. N. & Scott, C. (2015). *Principles of trauma therapy: A guide to symptoms, evaluation, and treatment* (2nd ed.). Sage Publications, Inc.

Vernick, L. (2016, January 2). *Understanding trauma* [Video]. YouTube. <https://www.youtube.com/watch?v=DcjkOUt09t4&t=1187s>

Not only are we treating individuals who are experiencing psychological effects of trauma, but we are treating people who have actual biological effects of trauma which affect their present experience.

Implications & Treatment Considerations

Pharmacology

Because trauma response involves genetics, underlying neurophysiology, stress response, and traumatic exposure, it is unlikely that there will be one ideal medication to treat posttraumatic outcomes

Medications should be prescribed based on treating different symptom clusters

(Briere & Scott, 2015)

Movement

We must attempt to rewire the affected limbic portion of the brain by encouraging physical exercise, relearning to experience the body, learning something new or challenging with the body

Intentionally practice body language that emits capability and strength

Experiencing successful movement helps people to recover from learned helplessness and begins to empower them. As people grow and learn new things, their brains become rewired to believe they are not stuck

(Vernick, 2016)

Thank you.