



# Maine Pediatric & Behavioral Health Partnership

## The Impact of Emotional Trauma on Brain Development

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Maine Pediatric and Behavioral Health Partnership (MPBHP) is supported by the Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services (HHS) as part of an award totaling \$1,851,222.00 with zero percentage financed with nongovernmental sources. The contents are those of the author(s) and do not necessarily represent the official views of, nor an endorsement, by HRSA, HHS or the U.S. Government.

MPBHP is a partnership between Maine CDC, Northern Light Acadia Hospital and MaineHealth



MaineHealth

# Learning Objectives

## **Providers will:**

- Be able to describe brain changes caused by early childhood trauma and abandonment
- Be able to identify strategies for talking to parents and patients about the impact of trauma on mood and behavior
- Be able to discuss the relative merits of different types of intervention strategies to address underlying trauma and abandonment.

## **Integrity & Independence in Continuing Interprofessional Development**

**All planners, faculty, and others in control of the content of this educational activity have no relevant financial relationships with ineligible entities (i.e., commercial organizations), except as noted below:**

**All relevant financial relationships have been mitigated.**

# Posttraumatic Stress Disorder

## Overview of DSM-5 criteria:

- A. Exposure to actual or threatened death, serious injury, or sexual violence
- B. Intrusive symptoms associated with the trauma
- C. Persistent avoidance associated with the trauma
- D. Negative change in cognitions and mood associated with the trauma
- E. Marked alteration in arousal associated with the trauma
- F. More than 1 month
- G. Clinically significant distress or impairment
- H. Not due to drugs or medical condition

## More:

- Unless the trauma victim is a close friend or relative, seeing pictures, watching movies, or watching media coverage does not count for meeting criteria A.
- In children older than 6, Intrusive symptoms can present as repetitive play themes; bad dreams may not have recognizable content
- In children younger than 6, persistent avoidance and negative change in cognitions and mood is combined into one (either/or) category.

# Posttraumatic Stress Disorder

## Epidemiology

- Per the NIMH, 3.6% of U.S. adults had PTSD in the past year
- 5.2% female
- 1.8% male
- Lifetime prevalence 6.8%

Harvard Medical School, 2007. National Comorbidity Survey (NCS). (2017, August 21). Retrieved from <https://www.hcp.med.harvard.edu/ncs/index.php>.

- 5.0% of Adolescents have had PTSD at some point between ages 13-18
- 8.0% female
- 2.3% male

Merikangas KR, He JP, Burstein M, Swanson SA, Avenevoli S, Cui L, Benjet C, Georgiades K, Swendsen J. Lifetime prevalence of mental disorders in U.S. adolescents: results from the National Comorbidity Survey Replication--Adolescent Supplement (NCS-A). *J Am Acad Child Adolesc Psychiatry*. 2010 Oct;49(10):980-9. [PMID: 20855043](https://pubmed.ncbi.nlm.nih.gov/20855043/)

## Worldwide Issue

- While trauma exposure is higher in lower-income countries, PTSD prevalence rates are similar across countries
- PTSD rates higher in post-conflict settings

**Epidemiology of posttraumatic stress disorder: prevalence, correlates and consequences**

[Lukoye Atwoli](#),<sup>a,b</sup> [Dan J. Stein](#),<sup>b</sup> [Karestan C. Koenen](#),<sup>c</sup> and [Katie A. McLaughlin](#)<sup>d</sup>  
*Curr Opin Psychiatry*. 2015 Jul; 28(4): 307–311

# Posttraumatic Stress Disorder

## LGBTQ+ Youth

- Rates of PTSD for males and females were dramatically lower for strictly heterosexuals (6.6%:4.0% F:M) than those with any or some same-sex sexual contact; or those considering themselves Bisexual (26.6%:10.3%) or Homosexual (18.6%:13.6%) or Gender nonconformity.

**Elevated Risk of Posttraumatic Stress in Sexual Minority Youths: Mediation by Childhood Abuse and Gender Nonconformity**  
[Andrea L. Roberts](#), PhD, [Margaret Rosario](#), PhD, [Heather L. Corliss](#), PhD, MPH, [Karestan C. Koenen](#), PhD, and [S. Bryn Austin](#), ScD  
[Am J Public Health](#). 2012 August; 102(8): 1587–1593.

- There are multiple other risk factors identified in the DSM-5 categorized in Pre, Peri, and Posttraumatic factor categories. Not surprisingly, early trauma exposure, a previous history of a variety of psychiatric disorders, worse trauma, more personal connection to the trauma were all included.

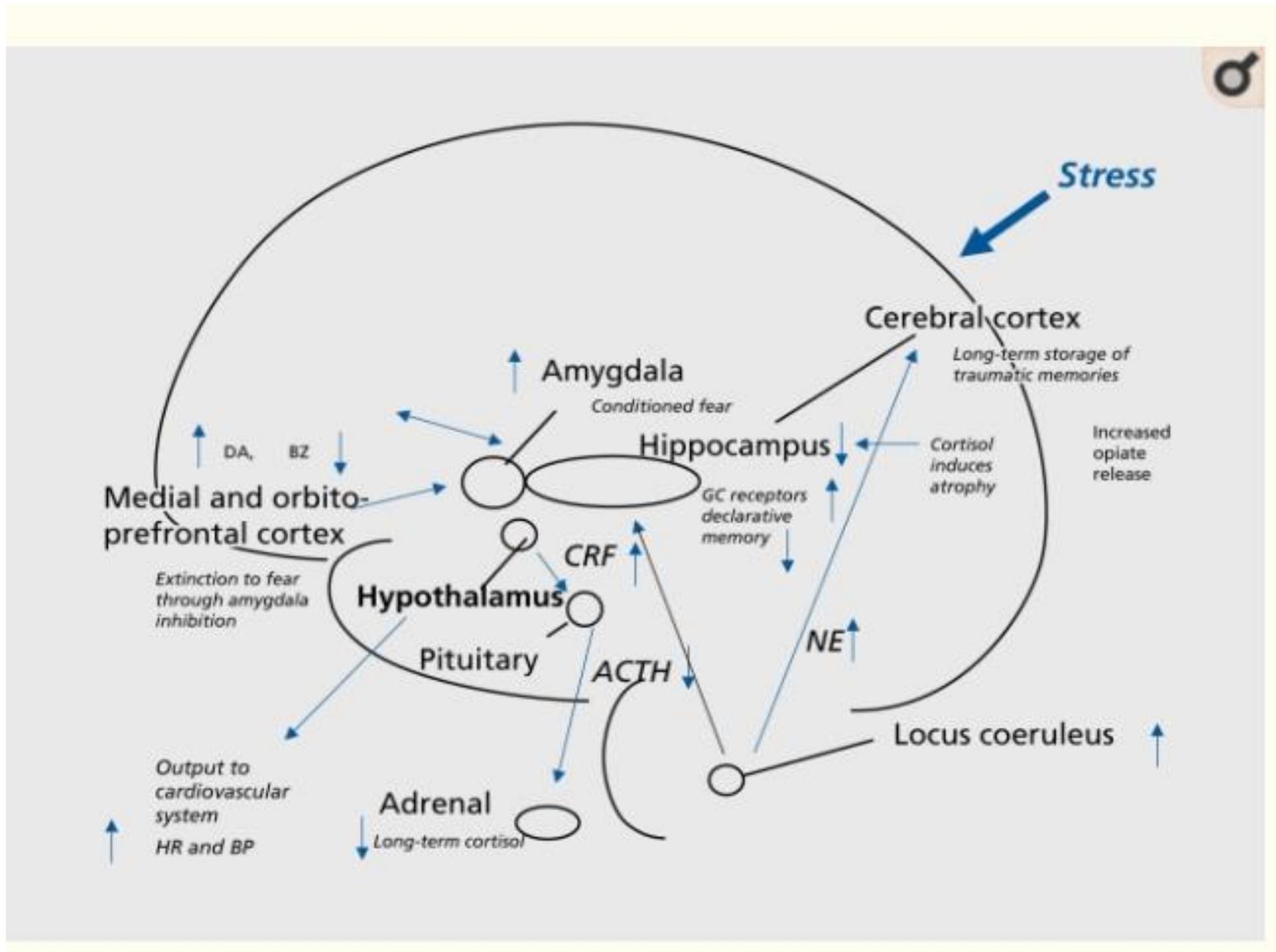
## Functional Consequences of PTSD

“High levels of social, occupational, and physical disability, as well as considerable economic costs and high levels of medical utilization.”

quote from DSM-5

# **Reactive Attachment Disorder Disinhibited Social Engagement Disorder**

- While beyond the scope of this talk, these diagnoses (which pre-DSM-5 were subsumed under the Reactive Attachment Disorder of Early Childhood label) are a result of early childhood neglect/abandonment and can produce far reaching emotional and behavioral sequelae like what can be seen with PTSD, as well as similar changes in underlying neurophysiology.



# Hippocampus and Cortisol

- Children subjected to traumatic stress showed decreased volume of their hippocampus (memory processing and emotion)
- Theory
  - Cortisol leads to deleterious effect on hippocampal size.
  - Decreased hippocampus size corresponds to more difficulty processing trauma
  - This difficulty produces increase stress
  - Increase stress causes increased Cortisol

# Stress and HPA Axis

Stress perceived by the brain causes release of Corticotropin Releasing Factor (CRF) by the hypothalamus.

- CRF interacts with the Pituitary to produce ACTH which is a hormone that induces the Adrenal Glands to produce Cortisol (a glucocorticoid).
- CRF also mediates fear-related behaviors including stimulating the Locus Coeruleus and causing a release of Norepinephrine throughout the brain.
- Norepinephrine increases alerting and vigilance behaviors

# Traumatic Stress and Future Stress Response

- Early Traumatic Stress appears to cause an increase in the Cortisol response and Norepinephrine response to future stresses.
- Antidepressant treatments may block the effects of stress and promote neurogenesis.

# Brain Plasticity

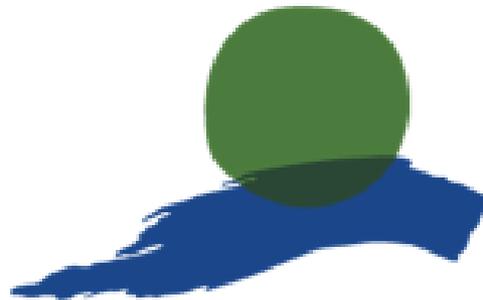
- An infant can have damage to one side of its brain and develop skills using the other side of the brain—”plasticity”
- The same plasticity may have negative connotations for very young children exposed to abuse or maternal deprivation. This child’s brain may program an organism's biological response to stressful stimuli.

# Other Brain Structures impacted by Traumatic Stress

- Decreased anterior cingulate volumes, increased amygdala function, decreased medial prefrontal/anterior cingulate function.

# Treatment

- Cognitive Behavioral Therapy (Trauma focused CBT) often accompanied by psycho-education and parent involvement
- Play Therapy
- Eye Movement Desensitization and Reprocessing (EMDR)
- Medications: (adjunctive if at all)
  - Antidepressant medications
  - SSRI's
  - Prazosin may be specifically helpful for nightmares associated with PTSD
  - Alpha-2 agonists (Clonidine and Tenex)



# Maine Pediatric & Behavioral Health Partnership

[www.BHpartnersforME.org](http://www.BHpartnersforME.org)

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