The Behavioral Neuroscience of Posttraumatic Stress Disorder (PTSD) and Barriers to Learning

Callie F. DOWNING
Rebecca J. WEIGLE
Marissa A. HARRISON
Penn State Harrisburg
Psychology Programs
777 W. Harrisburg Pike
Middletown, PA 17057 USA

Abstract

The number of migrants around the world has increased over the last decade, which can be attributed, in part, to increased violence from wars in the Middle East (Böhm et al., 2018; Hahnefeld, 2021; Reavell & Fazil, 2017; USA for UNHCR, 2022). About half of refugees are children (Amnesty International, 2022). These children are at risk of experiencing profound mental health issues (Williams et al., 2016), including posttraumatic stress disorder (PTSD). PTSD has been described as a condition wherein an individual enters "survival mode" (Dyer et al., 2009) and is characterized by anxiety, intrusion symptoms, avoidance of stimuli, negative alterations in cognitions and mood, and marked alterations in arousal and reactivity (American Psychiatric Association, 2013; Fasfous et al., 2021). PTSD can interfere with learning processes due to consequential deficits in verbal memory, top-down processing, and other neuropsychological functions (Herringa, 2018; Samuelson, 2010, 2017; van Rooij et al., 2018; Wrocklage et al., 2016). Researchers have documented poorer learning outcomes in refugee children compared to control (Fasofous et al., 2021). Moreover, deleterious consequences extend beyond childhood. Even after resettlement outside of a refugee camp, psychological concerns can persist, and deficits may be prevalent (Hess et al., 2022). For governments and practitioners seeking to assist refugees, it is important to understand the connection between trauma and learning so as to develop effective interventions and treatments.

The total number of migrants around the world has rapidly increased over the last decade, which can be attributed, in part, to increased violence from wars in the Middle East (Böhm et al., 2018; Hahnefeld, 2021; Reavell & Fazil, 2017). There are nearly 25 million refugees recognized worldwide, including people forcibly displaced from El Salvador, Guatemala, Honduras, South Sudan, Syria, Myanmar, and recently, Ukraine (USA for UNHCR, 2022). It is estimate that half of all refugees are children (Amnesty International, 2022). Not only do refugee children experience a myriad of physical health issues (e.g., infection, malnutrition), they experience profound mental health issues (Mateen, 2010; Williams et al., 2016). It is possible and hopeful that these traumatized children can experience physical healing, but the psychological consequences of being a traumatized refugee can, unfortunately, remain.

Refugees flee to other nations, seeking freedom from persecution (Shacknove, 1985). Countries such as Turkey, the leading host of refugees in the world (USA for UNHCR, 2022),

continue the quest to understand the psychological milieu of migrants so as to develop mechanisms to diminish refugees' struggle and facilitate healing and well-being. Thus, to aid in understanding, in this brief paper, we discuss the behavioral neuroscience of posttraumatic stress disorder (PTSD) and its implications for refugee children's' ability to learn and adjust.

PTSD is a psychiatric disorder that can emerge after experiencing or witnessing a trauma. Traumatic events can include serious injury, sexual assault, or threatened death (American Psychiatric Association, 2013; Mann, 2021). PTSD has been described as a condition wherein an individual enters "survival mode" (Dyer et al., 2009) and is characterized by anxiety, intrusion symptoms, avoidance of stimuli, negative alterations in cognitions and mood, and marked alterations in arousal and reactivity (American Psychiatric Association, 2013; Fasfous et al., 2021). This condition can interfere with learning processes due to consequential deficits in verbal memory, top-down processing, and other neuropsychological functions (Samuelson, 2010; Wrocklage et al., 2016).

Refugees are commonly exposed to multiple traumatic life events, including war, physical violence, sexual violence, and torture. They also witness death and extreme suffering (Kinzie, 2016; Miller & Rasmussen, 2010; Steel et al. 2009; World Health Organization & UNHCR, 2012). Accordingly, evidence suggests that migrants experience a high prevalence of PTSD. Refugee minors are at a heightened risk for PTSD (Hahnefeld et al., 2021; Reavell & Fazil, 2016), with some researchers estimating the prevalence of PTSD in youth migrants to be as high as 50% (McGuinness, 2015). Refugee children who have experienced detention and family separation have an even greater risk (Mace et al., 2014). Thus, migrant children can be profoundly impacted, as the biological, cognitive, and emotional toll of PTSD can reduce lifelong learning and lead to other emotional and behavioral consequences (Hahnefeld et al., 2021; van Rooji et al., 2018; Samuelson et al., 2017). Evidence indeed suggests that refugee children who have entered survival mode, as indicated by biological markers, exhibit a weaker learning performance than healthy controls (Hahnefeld et al., 2021; Samuelson, 2010).

Age of exposure may moderate the onset of symptoms of PTSD prevalence in children. During middle childhood (approximately 7-11 years old), children are experiencing a heightened development of socioemotional skills, with environmental events impacting typical development. When children of this age range are exposed to trauma, their ability to properly regulate emotions becomes disrupted and increases the risk of developing a psychopathologic disorder (Rachel et al., 2021; Perez-Marfil et al., 2020). The likelihood of developing PTSD or

another comorbid disorder increases rapidly when other risk factors are involved, such repeated trauma exposure, parental loss due to conflict, and other socioeconomic stressors.

Researchers have documented neurological consequences of PTSD, including dysregulation of limbic structures and the prefrontal cortex, decreased executive function, and increased stress hormones (e.g., cortisol, norepinephrine) response in PTSD (Lambert & McLaughlin, 2019; Ma et al., 2017; Morey et al., 2016, van Rooij et al., 2018). Neural changes include decreased gray matter in frontal and limbic regions, such as the dorsal anterior cingulate cortex, ventromedial prefrontal cortex, temporal pole, amygdala, hippocampus (Del Casale et al., 2022; Fasfous et al., 2021; Herringa, 2018; O'Doherty et al., 2017). These regions have been consistently linked with learning processes; for example, the hippocampus is known to play a major role in learning, memory, and neuroendocrine processes (Gianaros et al., 2007). Abnormal frontolimbic development has been linked to weakened emotion regulation, a common marker of pediatrics onset PTSD (Herringa, 2017). A loss of grey matter in these brain regions is also associated with other psychiatric conditions in children and adolescents (Li et al., 2020). Moreover, PTSD involves a vicious cycle—the prolonged symptom expression of PTSD can exaggerate the fear response from the amygdala, causing persistent hyperarousal and overreactive response to threat. The accompanying increased stress neuroendocrine response impedes top-down processing (Arnsten et al., 2015; McLaughlin et al., 2019).

Researchers have documented poorer learning outcomes in refugee children compared to control. Fasfous et al. (2021) used the Battery for Neuropsychological Evaluation of Children (BENCI) to assess and compare neuropsychological profiles in Palestinian refugee children. The results revealed that non-refugee children outperformed Palestinian refugee children in measures of verbal and visual memory, sustained attention, and verbal comprehension. In addition, gender differences emerged whereby non-refugee Palestinian girls outperformed non-refugee Palestinian boys in measures of visual memory, but this was not the case for the refugee group. Higher levels of stress and resulting cortisol may have affected the cognitive performance of the refugee children, thus eliminating the gender difference that is present in the non-refugee sample (Fasfous et al., 2021).

Deleterious consequences extend beyond childhood. Researchers are examining refugee's increased risk of developing neurological disorders and complications that stem past the acute phase of a humanitarian emergency. Refugee camps are not often temporary, which

may result in decades of increased risk of neurologic infections as well as physical and psychological trauma related illnesses (Mateen, 2010).

Even after resettlement outside of a refugee camp, psychological concerns can persist, and deficits may be prevalent, as can be noted with resettled Bhutanese Refugees in the United States. Nearly one in five Bhutanese refugees reported that they experienced psychological distress (Hess et al., 2022). Of marked concern, Bhutanese refugees reported recent suicidal ideation at a rate almost double compared to the United States national average of 4.3% (Ivey-Stephenson et al., 2022). This evidence strongly supports the need for continued support for refugees across the lifespan.

For governments and practitioners seeking to assist refugees, it is important to understand the connection between trauma and learning so as to develop effective interventions and treatments. Whereas this paper presents a biological approach to understanding barriers to learning, it is also important to understand psychological and social factors. For example, clinicians should consider a refugee child's background and education prior to trauma (Mace et al., 2014), as well as mitigating circumstances, such as positive parenting practices.

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