

Neuroscience of trauma and the Russian invasion of Ukraine

To the editor — The neuroscience of trauma informs us that the Russian invasion of Ukraine may have alarming implications for global mental health, affecting not only Ukrainian but also several Russian individuals, as well as communities worldwide.

Since 24 February 2022, Ukrainian residents have been facing ‘complex trauma’, which combines multiple exposures to trauma, often in a sequential fashion. These individuals are constantly exposed to several forms of trauma: fear of losing life and/or freedom, grief, separation from families, social isolation, social disruption and forced migration, to name a few. Even when these exposures occur in an isolated form, they have long-term sequelae for human psychological and physical health. These sequelae include an increased risk of post-traumatic stress disorder, depression, and anxiety disorders, as well as physical ailments¹. However, when these traumas occur in combination, the effect is amplified and the signatures of trauma may even appear in the germline^{1,2}. Stark evidence comes from studies of survivors of the Holocaust and their descendants that suggest intergenerational transmission of traumas that resulted from war and genocide, implicating both psychosocial and biological routes of transmission^{2,3}. Despite fundamental differences between the war in Ukraine and the Holocaust, some principles of the intergenerational transmission of war trauma may still be pertinent.

The Russian invasion of Ukraine involves a re-exposure to a traumatic stimulus (that is, Russian aggression) that was previously also a cause of much distress and fear among the population (during the annexation of Crimea in 2014). Hence, the current trauma may even have a stronger impact due to altered stress signalling pathways among those who were previously affected. It has previously been shown that individuals who are exposed to violence during childhood are more likely to develop post-traumatic stress disorder upon subsequent trauma in adulthood⁴. This could potentially be related to epigenetic alterations in the molecular cascades that are involved in stress reactivity⁵.

The trauma of this war may not stay limited to Ukrainian individuals. Several

Russian individuals and news outlets who have voiced their condemnation of the attack have been suppressed by detentions and other coercive actions by the Putin administration. Scientific evidence from communities who faced oppression by the Iraqi Ba'ath regime suggests that living under totalitarian regimes is itself a notable risk factor for psychiatric morbidity⁶. Again, parallels can be drawn with the current situation, as the current Russian regime has similarly attacked a neighbouring country and is using pejorative and oppressive tactics against its own disgruntled civilians.

Furthermore, billions of people are watching the war theatre in despair and have expressed feelings of helplessness at the situation. Prolonged or repeated exposures to helplessness — what neuroscientists label as ‘learned helplessness’ — is a major risk factor for depression. In fact, it is one of the best-established ways of studying depression in animal models, in which prolonged dominance and aggression by the dominant animal manifests as depressive symptoms in the animals who feel helpless against the aggression⁷. Notably, one-third to one-half of populations studied in large multicountry cohorts have reported psychological disturbances recently during the COVID-19 pandemic⁸. The appearance of this trauma while the impact of the pandemic is far from over is also likely to accentuate its long-term effects.

Finally, the enormous human displacement during the conflict has been coupled with a large-scale display of relief efforts by aid organizations, as well as civil communities, in countries that neighbour Ukraine (especially Poland). Individuals currently involved in direct relief efforts are at a risk of developing what neuroscientists describe as ‘secondary trauma’ and ‘compassion fatigue’. Secondary trauma and compassion fatigue are particularly common among health-care professionals and relief aid-workers who are involved in compassionate causes; they originate from constant exposure to the trauma and suffering of others. Individuals with a history of childhood trauma, previous psychiatric conditions and those who lack strong social and occupational support are most susceptible to being affected by secondary trauma and compassion fatigue⁹.

Cumulatively, we fear that a large-scale mental health crisis is impending. Targeted investigations and preparatory measures should be implemented by health-care systems and relief organizations to provide mental health support to vulnerable populations without further delay. Environmental enrichment strategies that combine cognitive, social and physical stimulation have shown promise in mitigating the long-term effects of traumatic experiences, including their intergenerational transmission^{2,10}. Applying these strategies to the scenario of forced migration from Ukraine, cognitive stimulation could be provided by engaging the immigrants in free language and skill classes; social stimulation could involve organized efforts for their community integration and resource-sharing; and their physical activities could be promoted through free and/or subsidized access to parks and recreational facilities. Reducing the effects of trauma in Ukrainian individuals directly affected by forced migration will also be beneficial in reducing the secondary trauma and compassion fatigue in those who are involved in relief efforts. Additionally, these individuals can be further aided via positive psychology approaches to convert their compassion fatigue into ‘compassion satisfaction’. At a global scale, media and social media campaigns to raise awareness about the mental health consequences of war, and funding to make [psychological first-aid self-care courses](#) freely available, could be helpful. □

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Competing interests

The authors declare no competing interests.