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## TOXIC STRESS AND PTSD IN CHILDREN

### Mitigating toxic stress in children affected by conflict and displacement

**Anushka Ataullahjan and colleagues** describe the myriad stressors related to conflict and displacement experienced by children and how best to reduce their negative effect

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Armed conflict and displacement pose a threat to the health and wellbeing of children. As the global community begins to recognize the cumulative effects of conflict and displacement related stressors, our attention has shifted to toxic stress and its short and long term health effects.<sup>1</sup> Toxic stress, regarded as the result of prolonged activation of the stress response, can occur before birth and during childhood is known to contribute to epigenetic changes, with health and neurodevelopmental consequences.<sup>2</sup> However, various social factors and early and appropriate intervention can help mitigate the negative effects.<sup>3</sup>

#### How conflict and displacement affect children

Over 415 million children were living in conflict affected countries in 2018,<sup>4</sup> including 33 million displaced children (16 million refugees and asylum seekers, and 17 million internally displaced children).<sup>5</sup> Although all children are vulnerable to toxic stress, certain subgroups are particularly vulnerable because of their marginalization—for example, orphaned or unaccompanied children, girls, children with HIV infection, and children with developmental disorders or a disability. These groups may face additional stressors and have reduced access to services. The emergence of covid-19 has also raised concerns about spread in conflict affected populations adding to the risk of toxic stress (box 1).

#### Box 1: Covid-19 in humanitarian settings

Conflict affected populations are particularly vulnerable to covid-19. Overcrowding and inadequate water and sanitation systems in refugee camps and informal settlements, coupled with previously existing illnesses, may increase the spread and severity of covid-19.<sup>6,7</sup> Moreover, resource and health system constraints may restrict access to adequate and appropriate care.<sup>6,7</sup> Control measures such as physical distancing may be difficult and may also increase economic precarity, intimate partner violence, and food insecurity in populations already vulnerable because of conflict or displacement.

There are concerns that the health needs of conflict affected populations may be deprioritized by host

governments. In refugee camps in Lesbos, Greece, for example, a lack of government support required grassroots mobilization by refugees to increase awareness, create masks, and improve sanitation in their camps.<sup>8,9</sup> In addition, social isolation and distancing during quarantine are associated with different stressors such as fears, insomnia, anxiety, unfulfilled basic needs, interrupted medical care, and family problems, all of which are common triggers of mental illnesses and suicidal tendencies.<sup>10,11</sup> We must also assume that refugees in host countries will be at greater risk of these problems since they are further socially isolated.

Although swift action is needed to control the transmission of covid-19, it is important to ensure that these control measures are context sensitive.<sup>7</sup> Community based participatory methods can be used to establish youth and community advisory boards to help guide covid-19 mitigation strategies to ensure they are culturally appropriate and thus more effective.<sup>7</sup> Ensuring that the most vulnerable people are protected may require contextually appropriate measures such as isolation at a household level with designated rooms for vulnerable family members; at street or extended family level, where community members swap houses and designate one home for high risk members; or at neighborhood or sector level, where areas of settlements are designated for only vulnerable individuals.<sup>6</sup> The Interagency Standing Committee has created guidelines for managing covid-19 that recommend increasing awareness, strengthening health facilities, and strategic planning.<sup>12</sup>

Conflict and displacement increase toxic stress in children through sudden and extreme trauma exposures such as violence and forced displacement (fig 1). Moreover, the frequency and severity of existing daily stressors such as family violence can increase in response to armed conflict.<sup>1</sup> Data on the number of children affected by conflict who are experiencing toxic stress globally are lacking, but regional studies indicate that it is pervasive. To illustrate, a study from Syria found that 71% of children experienced frequent bedwetting and involuntary urination, which are common features of toxic stress.<sup>13</sup> Further research to accurately quantify the extent of toxic exposures faced by conflict affected children is needed.<sup>14</sup>

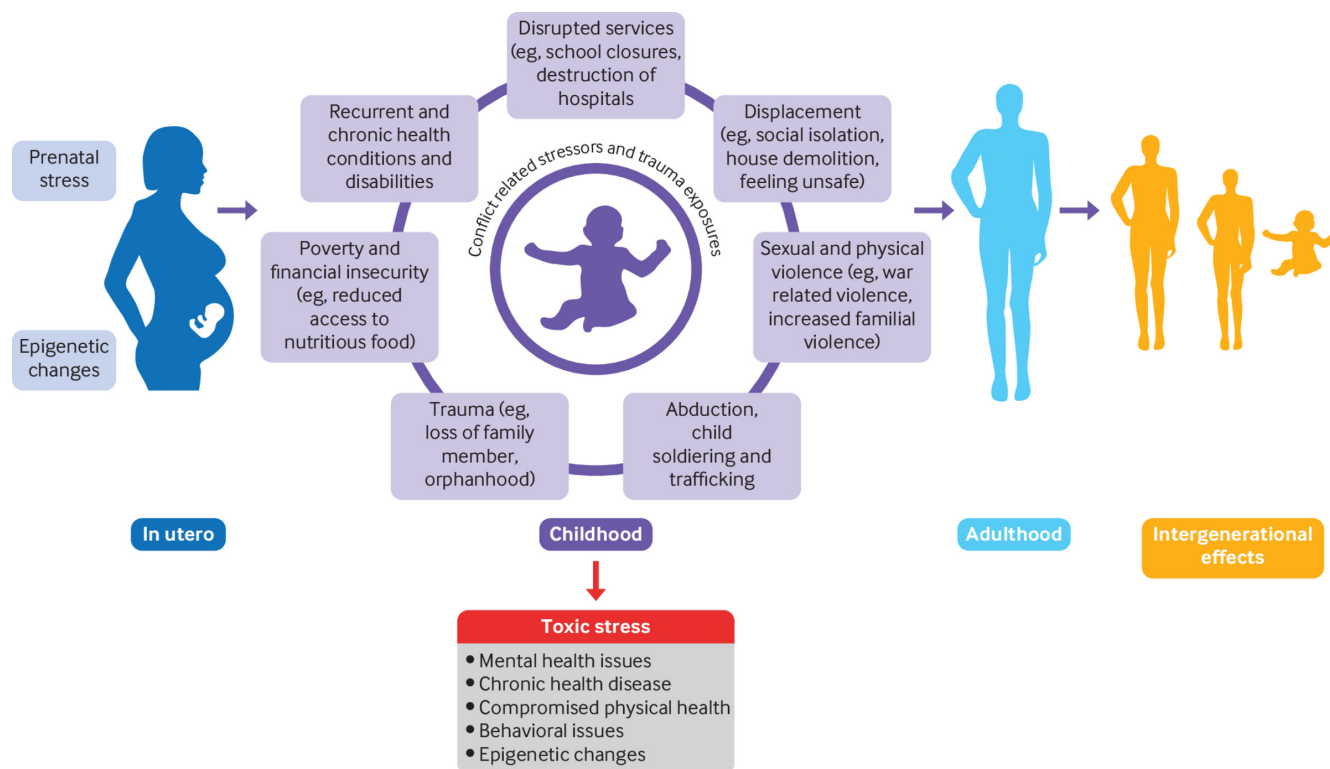


Fig 1 | Conflict related stressors and trauma exposures and their effect through the life course

Active conflict disrupts economic activity and food systems, pushing many families into poverty.<sup>15</sup> Overhead bombing and artillery fire can damage health, water, and electricity infrastructure, thereby decreasing access to health services, increasing displacement, and physical injury.<sup>15</sup> The interruption of immunization schedules may cause outbreaks of previously uncommon infectious diseases, as was seen with polio in Syria in 2013.<sup>15 16</sup>

Early and repeated exposure to violence can have lifelong effects, including propagating social norms tolerant of violence.<sup>17</sup> The United Nations Security Council's monitoring and reporting mechanism tracks data on six grave violations against children during armed conflict: killing and maiming, sexual violence, attacks against schools or hospitals, abduction, denial of humanitarian access, and recruitment by armed forces and groups.<sup>18</sup> All of these grave violations contribute to toxic stress.

Most people affected by conflict are not externally displaced and continue to live in active conflict zones, while some are internally displaced.<sup>19</sup> For those who are forcibly displaced, the process of displacement can introduce a range of adversities. Raids on homes, schools, and villages as well as political oppression characterize preflight insecurity. Many families remain internally displaced for extended periods, unable to access adequate health, educational, and social services.<sup>20</sup> During displacement, children may be exposed to increased environmental, social, and physical hazards, including crowded and makeshift living conditions with poor access to water and sanitation. Diseases such as malaria, tuberculosis, and cholera are easily transmitted in these contexts.<sup>21</sup>

Forcibly displaced children and families are often exposed to extreme temperatures and novel disease vectors.<sup>22</sup> The lost boys of Sudan provide a good example of the physical hardships encountered by unaccompanied minors during displacement. While

traveling thousands of miles, many lost their lives to armed militia, wild animals, malnutrition, and exposure to the elements.<sup>22</sup> Young children, and girls in particular, may be targets of sexual violence as part of systematic militarized action such as the genocidal rape seen in countries from the Balkans to the Great Lakes region in sub-Saharan Africa<sup>23</sup> or exploitive exchanges by UN peacekeepers, as noted in several countries, including the Central African Republic, and Democratic Republic of Congo.<sup>24 25</sup>

When resettling as refugees in host countries, children may experience stress related to social dislocation, isolation, and adjusting to an unfamiliar language and culture.<sup>26</sup> Separation from family networks can disrupt children's access to traditional knowledge and protection systems.<sup>26</sup> Moreover, resettlement policies may further disadvantage asylum seekers by accommodating them in impoverished areas.<sup>27</sup> Navigating a foreign legal system can be challenging, particularly for orphaned or unaccompanied children.<sup>26</sup> Disrupted educational systems and lack of economic opportunities may shift marriage practices, with families choosing to marry their daughters young, as has been seen among Syrian refugees in Lebanon.<sup>28</sup>

After resettlement, children may exhibit disruptive behavior, disorientation, and cultural bereavement.<sup>26</sup> Refugee children report more functional impairment, physical health, psychosomatic, and peer problems.<sup>29</sup> Parenting can also be challenging as many caregivers struggle with their own trauma and emotion dysregulation while learning the norms and practices of a new country.<sup>30</sup> Adjusting to an unfamiliar and at times unfriendly educational system is an additional challenge for children. Furthermore, the educational progress of some children may be affected by difficulties with concentration and learning.

## Health effects

Despite a broad understanding of the myriad conflict and displacement related stressors experienced by children, the literature capturing the health effects of these stressors on children is limited. A recent Save the Children report on Syria found that 78% of children reported feeling extreme grief and sadness at some time.<sup>13</sup> The report contends that toxic stress coupled with prolonged exposure to war during children's key developmental stages has the potential to become irreversible if appropriate action is not taken quickly.<sup>13</sup> Evidence from Sierra Leone has shown that lower levels of social stigma and higher community and familial acceptance of former child soldiers was associated with a more positive mental health trajectory and adult life outcomes.<sup>31</sup>

Global evidence suggests that toxic stress continues to affect the health of future generations through epigenetic changes long after conflict has subsided.<sup>17 32</sup> A small but growing body of literature has described the intergenerational effects of war, including low birth weight, developmental delays, chronic illness, mental health problems, and intergenerational violence.<sup>33</sup> Children of parents with post-traumatic stress disorder (PTSD) after the 1994 Tutsi genocide in Rwanda showed higher secondary traumatization symptoms and lower resilience than children whose parents did not have PTSD.<sup>34</sup> Additionally, new evidence suggests that our knowledge of the interplay between genetics and psychosocial symptoms is still limited. A recent study on male Syrian refugees who participated in a stress attunement intervention found a relation between MAOA genetic variants, which affect the concentrations of the neurotransmitters dopamine, norepinephrine, and serotonin. The MAOA-L variant was associated with sharper reductions of perceived psychosocial stress over time than the MAOA-H variant.<sup>35</sup>

Research with general populations has established the effect of toxic stress on immunological responses.<sup>36</sup> With infectious diseases such as diarrhea, measles, malaria, and pneumonia and acute malnutrition causing the majority of child deaths in conflict,<sup>15</sup> the role of toxic stress in increasing susceptibility to these diseases requires further investigation. Research on how toxic stress may influence the development of chronic diseases later in life is also needed.

## Mitigating strategies

### Prevention

Removing the stressor of armed conflict and displacement is arguably the best and most effective strategy to mitigate the impact of toxic stress. Getting the necessary cooperation of a range of state and non-state groups will be difficult, but it is important to recognize the importance of peace and stability for the health of children. These rights are affirmed by the World Health Organization's nurturing care framework, which ensures that children's rights are protected and focuses on their healthy development.<sup>37</sup>

Although halting armed conflict is the ultimate goal, additional safeguards can decrease the effect of conflict on children. The UN's monitoring and reporting mechanism has an important role in monitoring the conduct of state and non-state actors to reduce grave violations against children.<sup>18</sup> Similarly, funded community monitoring could help to ensure the safety and rights of conflict affected children. Decreasing additional daily stressors by ensuring the basic human rights of families experiencing conflict and displacement through financial assistance, food, housing, education, employment, and healthcare can also benefit children.<sup>38</sup> As conflict affected settings begin to develop and strengthen health systems, mental health and social services will be critical.<sup>39</sup>

Increasing access to services requires improving refugees' mental health literacy and knowledge of services.<sup>40</sup>

Improving parenting quality and care giver support can encourage children to build resilience and strengthen protective factors that allow children to better manage stressors.<sup>36</sup> Positive interactions with primary care givers have an important protective role in reducing synaptic pruning (the process by which extra neurons and synaptic connections are eliminated to increase the efficiency of neuronal transmissions) during childhood.<sup>37</sup> Furthermore, friendship quality and increased number of friends can protect refugee children from some behavioral and psychological problems.<sup>29</sup> In contexts of conflict, particularly protracted conflict, we must expect to see intergenerational violence and trauma. By improving care givers' capacity to provide a stable, nurturing relationship and highlighting the role of fathers, the intergenerational effects of war can be mitigated.

### Group and community programs

Since few mental health professionals are available in many war affected settings, various studies have explored the use of group mental health treatments to expand access to care. These models often leverage the strengths inherent in collectivist cultures in war affected regions.<sup>41</sup> As epidemics or pandemics such as covid-19 further constrain resources and health worker capacity, task shifting to community health workers can allow access to hard-to-reach populations in countries such as Somalia<sup>42</sup> and Yemen.<sup>43</sup>

Community based interventions are important in the short and long term rehabilitation of children experiencing toxic stress.<sup>36</sup> School based programs can help overcome some of the barriers to access to care and improve educational outcomes.<sup>44</sup> Awareness of trauma also allows teachers to create a safe and stable environment for students to buffer their stress response. The trauma informed approach focuses on nurturing relations and attachments, increasing ability to self-regulate, and cultivating students' developmental competencies.<sup>45</sup> Lay counsellors delivering mental health interventions within schools can also improve psychosocial problems.<sup>46</sup> Furthermore, mentoring schemes and after school clubs have helped refugee children overcome some of their behavioral and psychological difficulties.<sup>29</sup> Additionally, evidence suggests that social protection services such as cash transfers can benefit child development by reducing the financial stress experienced by families.<sup>47</sup>

### Family based therapies

A range of therapies targeting care givers such as carer-child interaction therapy, child and care giver psychotherapy, and stress reduction can help improve stress responses.<sup>36</sup> Research in Kosovo has highlighted the role of the family in improving children's response to adversity.<sup>48 49</sup> One study found that mobilizing families to access community based social support services for people with severe mental health illnesses led to increased family coping and quality of life.<sup>48</sup> Similarly, a study in Rwanda with vulnerable families found that home visits to promote early childhood development improved interactions, reduced violence, and created a more enriched home environment.<sup>50</sup> The intervention also increased equitable decision making and child dietary diversity.<sup>50</sup>

The success of such interventions shows the interconnectedness of stressors and supports the nurturing care framework approach, which focuses on the links between health, nutrition, safety, care giving, and early education for childhood brain development.<sup>37</sup> This multisectoral approach integrates health and nutrition



interventions for children as a way to buffer stress response and decrease the impact of toxic stress.<sup>37</sup>

### Personal therapies

Several approaches aim to build resilience and mitigate the impact of the stress response. Mindfulness based therapies have been shown to decrease psychological distress and anxiety and increase wellbeing.<sup>36</sup> Biofeedback therapies focusing on decreasing heart and respiratory rates have also been shown to reduce toxic stress, as have other breathing techniques and guided imagery.<sup>36</sup> These techniques have been used successfully among children and adolescents in Gaza,<sup>51</sup> Sri Lanka,<sup>52</sup> and Kosovo.<sup>53</sup>

More traditional approaches such as trauma focused psychotherapy and cognitive behavioral therapy can also ameliorate toxic stress and reduce PTSD symptoms.<sup>26</sup> Integrating trauma informed treatment across systems of care is essential to ensure that conflict affected and displaced children receive the care they need.<sup>54</sup> This will require strong collaboration between healthcare providers, development workers, the international community, and governmental and non-governmental organizations. Implementation science can help to develop and test innovative strategies to expand reach and ensure the quality and sustained use of evidence based interventions as conflict affected regions move towards peace and development.<sup>55</sup>

### Next steps

Despite the growing evidence on toxic stress in children affected by conflict and displacement, gaps in our knowledge persist. A recent systematic review on the mental health of women, children, and adolescents affected by conflict highlighted the need for interventions to be described in more detail in research papers.<sup>44</sup> Moreover rigorous evaluation of success, failure, and effectiveness of interventions and strategies for widescale implementation in conflict affected regions should be prioritised.<sup>44</sup> Most research has not included children affected by conflict and displacement, and knowledge of best practices for these contexts is limited (box 2). Existing interventions to reduce toxic stress in regions affected by conflict need to be adapted to take account of cultural context and values, vulnerable subgroups, and resource constraints in their design and delivery.

#### Box 2: Examples of the rehabilitation of children of conflict

##### Bosnia and Herzegovina

The 1992-95 war had severe long term effects on the health and wellbeing of children and adolescents, with high rates of PTSD, anxiety, and depression.<sup>26</sup> A Unicef funded psychosocial program, delivered in over 32 secondary schools across the region, shows how appropriate and comprehensive intervention can reduce the rates of reduced post-traumatic stress, depression, and grief symptoms among children<sup>61</sup> through normalizing, validating, and processing traumatic experiences. The program also enhanced coping, tolerance, social skills, and problem solving abilities.<sup>61</sup>

##### Syria

Syrian refugee children have developed increased mental health problems, including PTSD and emotional dysregulation.<sup>62</sup> An eight week humanitarian intervention program of structured activities for 12-18 year olds was designed based on the profound stress attunement framework. The intervention reduced symptoms of insecurity, distress and perceived stress, depression, and anxiety and improved behavioral outcomes but had no effect on prosocial behavior or symptoms of PTSD.<sup>63</sup>

##### Sierra Leone

Community consultations have been used to adapt common elements of cognitive behavioral therapy and interpersonal therapy to create the youth readiness intervention. The intervention, which focused on

increasing emotion regulation, interpersonal skills, and problem solving, was delivered to youth aged 15-24 years old by trained lay workers.<sup>41</sup> A randomized control trial found that the intervention significantly improved emotion regulation skills, prosocial attitudes and behaviors, and social support, and reduced functional impairment. An eight month follow-up found that participants were more likely to persist in school and had better attendance and academic performance than those who did not receive the intervention.<sup>41</sup>

Appropriate action to reduce toxic stress requires a better understanding of the scope of the problem among children and families affected by conflict. Objective measures of toxic stress are essential, and biomarkers offer one such possibility. A recent study of adolescents affected by conflict showed that hair cortisol concentration can be used to assess response to interventions.<sup>56</sup> Further research on the use of biomarkers to track and measure stress responses is key to ameliorating toxic stress.

A broader understanding of toxic stress in children is particularly important during the current covid-19 pandemic, when measures to limit the spread of this disease may unintentionally increase exposure to multiple adversities through school closures, movement restrictions, and economic disruption. In India, for instance, where national lockdowns resulted in mass cross-country migrations, children risked separation from family members, economic insecurity, and violence.<sup>57</sup> The compounding effect of daily stressors and conflict and displacement related stressors encountered by children increases their vulnerability to toxic stress. As social and economic stressors take hold and families are forced into isolation, there has been a rise in family conflict and violence as well as increasing rates of mental health problems among children and their care givers.<sup>58</sup>

Research has indicated that low socioeconomic status, multiple types of violence, and low parental support aggravate the consequences of traumatic events on the development of mental health problems.<sup>59 60</sup> Multisectoral approaches must engage the child, family, community, and, at times, humanitarian groups to prevent and ameliorate the impact of toxic stress among conflict affected and displaced children and strengthen sustainable systems of prevention and care. As the number of people affected by conflict and displacement continues to grow, action to decrease the long term negative effects of toxic stress must be targeted and swift.

#### Key recommendations

- Research is needed to determine optimal strategies for sustained implementation of proved interventions to reduce toxic stress
- Clinicians and pediatricians must work closely with other sectors to integrate trauma informed treatment across systems of care
- Response agencies and professionals working with conflict affected and displaced children can mitigate the effects of daily stressors by ensuring access to food, housing, education, employment, financial assistance, and healthcare
- Task shifting and training of lay workers to deliver community based programs can increase access to psychosocial support in marginalized and difficult to reach populations

Contributors and sources: ZAB has over three decades of experience conducting research on the health of women, and children in fragile and humanitarian settings. AA has conducted research in several fragile settings including extensive ethnographic experience in rural Khyber Pakhtunkhwa, Pakistan. MS has expertise on developmental psychopathology investigating mental health in children of war and refugees, particularly focusing on PTSD, and the effectiveness of psychological interventions. TSB has extensive experience researching the longitudinal and intergenerational impact of war experiences on child mental health and development as well as interventions aimed at conflict affected children, families and youth. ZAB conceived the content of this article with AA. All authors contributed to the

conceptualization of the article. AA wrote the first draft and all authors critically reviewed and approved the final manuscript. ZAB is the guarantor.

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