

Addressing the Needs of Children and Youth in the Context of War and Terrorism: the Technological Frontier

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Abstract This paper reviews recent literature on the mental health needs of youth in the context of war and terrorism. A human rights lens is used to explore issues of accessibility and sustainability in service utilization during times of crisis. The authors present the evolution of services over the last several decades, progressing through individual, school-based, and community-wide interventions by exploring models that focus on symptom reduction and building resilience. This paper highlights the benefits and limitations of traditional intervention methods and proposes a new frontier of intervention development and research. The authors focus on the emerging field of e-mental health services and specifically highlight the utility of virtual reality games in treating trauma-exposed youth. The rapid and easily accessible nature of e-mental health models is presented as one potential solution to barriers in accessibility that can help promote the human rights of youth exposed to war and terrorism.

Keywords Youth · War · Terrorism · E-mental health · Trauma treatment

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Introduction

To date, nearly 250 million youth globally, which is close to 1 in 10 individuals under the age of 18, are living in countries or regions impacted by war or conflict [1]. This number reflects a global increase in the number of youth exposed to war and violent conflicts, with approximately 12.4 million people being displaced as a result of conflict or persecution in 2015 alone [2]. As such, the impact of violence on the development and well-being of youth has become a global concern for policy makers, health and mental health practitioners, as well as national and international agencies focusing on children's rights, child protection, and child welfare.

This review provides a summary of the impact of war and terrorism on the mental health of youth, highlights the recent programs and services designed to address the needs of youth, and offers suggestions to increase accessibility and sustainability in the next wave of youth-focused interventions. We conclude by discussing the role of technological advances and e-mental health initiatives in addressing the mental health concerns that arise during chronic exposure to trauma and violence and suggest these advances as one avenue to better realize the rights of children and youth living in regions characterized by war and terrorism.

We adopt a human rights perspective to explore the needs of children and youth in the context of terrorism and war because these contexts can result in human rights challenges that differentially impact vulnerable groups within society, including children and youth. The Convention on the Rights of the Child highlights the responsibility of States to “take all feasible measures to ensure the protection and care of children who are affected by an armed conflict” [3, p. 11]. Further, the Convention requires that the State “take all appropriate measures to promote physical and psychological recovery and social reintegration for a child victim of ... conflict” [3, p.

11]. To that end, ensuring that children and youth have unrestricted access to appropriate mental health services is a critical component of protecting the human rights of children and youth in the context of conflict.

While a good deal of work has been done to address the needs of youth in the context of war and terrorism, there are still youth who are not reached by existing services, programs, or aid. As a result, there are youth whose human rights are not fully recognized and who, as a result, are not successful in achieving the highest standards of health and mental health. As the field takes a more ecological [4] and youth-centered perspective, we have increasingly recognized the importance of empowering children and youth to navigate and negotiate for resources on their own [5, 6]. To that end, we highlight the importance of accessibility in fully recognizing the rights of youth in the context of war and terrorism, in the hopes of increasing the number of youth who have unrestricted, rapid, and long-term access to mental health services.

The Impact of Violence on Youth

It is well documented that war and terrorism have implications for youth across multiple realms of functioning. These include but are not limited to (1) access to basic needs (food, sanitation, and water) [7]; (2) housing stability and displacement [2]; (3) educational attendance and attainment [8, 9, 10]; and (4) health and mental health (see [11, 12, 13] for review). These challenges are amplified in chaotic environments because access to existing resources is curtailed—either because opportunities to access these resources become severely limited or because the resources no longer exist. Further, new needs emerge as a direct impact of exposure to political violence and trauma [14] and the challenges in addressing these needs increase exponentially and are highly interconnected with each other.

Mental Health

Exposure to war and terrorism has been associated with (1) posttraumatic stress and posttraumatic stress disorder (PTSD) [12]; (2) anxiety disorders [15]; (3) depression and suicidality [16]; (4) grief and bereavement [17]; (5) conduct disorders and aggression [11]; (6) functional impairment [18]; (7) substance use [19]; (8) cognitive symptoms such as reduced attention, executive functioning, and memory impairment [20]; and (9) risk-taking behaviors [21].

A recent review of the impact of exposure to political violence among Israeli and Palestinian youth also found that self-esteem and low emotional security mediated the relationship between exposure and distress [4]. Interestingly, youth who endorsed values relating to power were more likely to report higher levels of engagement in violent actions [22]. War and terrorism may also result in secondary

traumas that complicate the picture of mental health in these contexts (e.g., bereavement, [23]). As such, mental health interventions should be flexible enough to adapt to various trauma types as well as the cumulative effect of repeated or multiple trauma exposures.

Despite the extensive literature verifying the negative impact of violence on the mental health of youth (see [24, 4] for review), a second body of literature suggests that positive adaptations such as resilience are equally, if not more commonly, experienced (see [25, 26] for review). Resilience, described by Masten [27, 28] as “ordinary magic,” refers to a range of potential outcomes including (1) the absence of pathology (for examples, [29, 30]), (2) a return to pre-trauma functioning [31, 32], or (3) successful achievement of normative developmental milestones (e.g., [33]). A consensus definition of resilience describes the process as a stable trajectory of healthy functioning despite adversities [34•].

The growing recognition that trajectories of posttrauma adaptation are complex and multi-faceted [35, 36] implies that a one-size-fits-all approach to intervention is no longer sufficient. Rather, interventions should use a multi-systemic tiered approach [37, 4] that focuses not only on symptom reduction but also on promoting positive adaptation. In the following section, we offer a review of the recent developments in these services.

Evolution of Services and Programs

As research models continue to support the multi-system impact of large scale trauma, interventions have undergone a corresponding shift, with traditional one-on-one and group therapy modalities expanding to school-based interventions, community-wide interventions, and most recently universal screening and tiered intervention models. This shift, particularly in North America, is most evident since September 11, 2001, when the need for simultaneous psychological screening and interventions hits a new peak. Since then, traditional one-on-one and group therapy techniques have been supplemented with school, familial, and community involvement with success (e.g., [38]). As the exploration into addressing the needs of youth has become more prominent, a corresponding increase has been seen in the number of intervention programs that have been validated for use with youth. Intervention modules have increasingly become sustainable and culturally adaptable, that is, the intervention protocol is flexible and can be used within various cultural groups in multiple languages. While the evolution of treatment population (i.e., individual, family, and community) and modalities was underway, a second shift, namely emphasizing not only symptom reduction but also promoting positive adaptation, was also taking place.

Interventions for Symptom Reduction

Individual and Family Interventions

There are a number of approaches to treating individuals and families exposed to potentially traumatic events. In their recent review of the literature, Racco and Vis highlight several evidence-based treatments for trauma-affected youth, including (1) cognitive behavioral therapy, (2) eye movement desensitization and reprocessing (EMDR), (3) dialectical behavioral therapy (DBT), (4) as well alternative therapies such as yoga and art therapy [39].

Similarly, in their chapter, Saltzman and colleagues describe the impact of trauma on family systems as well as an overview of family oriented therapies (see [40] for review). Parent–child interventions, such as the Child and Family Traumatic Stress Intervention (CFTSI), are designed to emphasize the role of educating parental caregivers regarding the reactions to potentially traumatic events and building stronger communication skills between parents and children [41].

While there are many interventions designed to be used with trauma-affected youth and their families, we highlight the use of Trauma-Focused Cognitive Behavioral Therapy (TF-CBT) as TF-CBT is one of the most widely studied and validated intervention modules (see [42] for review). In their systematic review of the literature, Cary and McMillen evaluate studies that rely on both manualized or “branded” TF-CBT and other cognitive interventions that are *similar* (at the most liberal shared four-out-of-five treatment components) to TF-CBT. While their review presents only three studies that use the “branded” model, there are, to our knowledge, no systematic reviews that focus exclusively on “branded” TF-CBT. As such, Cary and McMillen’s review provides important information about this manualized child/parent intervention protocol that is comprised of eight key components: (1) psychoeducation and parenting skills, (2) relaxation, (3) emotion regulation, (4) cognitive coping, (5) building a trauma narrative, (6) exposure techniques, (7) joint session with parents and youth, and (8) future goals [42]. The emphasis on parental involvement in the treatment protocol reflects the understanding that parents are a central component to improving youth mental health following trauma and is supported by evidence that parental engagement in treatment produces better results [43].

In conjunction with the growing evidence base regarding the utility of parental engagement in treatment, the increase in experiences of large-scale violence resulted in an expansion within treatment protocols. An awareness regarding the impact of family structure on adolescent coping following trauma led to a series of studies that focused on understanding the role of families in the process of adaptation, ultimately leading to the development of family oriented interventions. In 2014, Tol and colleagues affirmed that family structure has a vital

impact on adolescents exposed to traumatic experiences [44]. Studies linking parental exposure to trauma, both father’s [45] and mother’s [46], with transfer to the child (e.g., [47]), suggest that intervening with youth exclusively may not be as effective.

In response, whole family interventions such as Families Over Coming Under Stress (FOCUS) [48] and parent–child psychotherapies [49] have been effective for adolescent mental well-being. FOCUS is an intervention originally implemented with families of deployed military service members. The FOCUS intervention provides families with strategies to enhance cohesion and communication, while offering a peer support model [48]. Although this intervention, to our knowledge, has not been implemented with families exposed to other forms of war-based trauma or terrorism, we suggest that this model may be adaptable and may offer benefits in other disaster contexts.

Interventions to Build Resilience

School and Community-Based Interventions

A significant body of literature supports the use of school-based interventions for trauma-exposed youth (see [50, 51] for review). School-based interventions range from school-based group CBT [52] to interventions that focus on reducing PTSD, somatic complaints, functional impairment, and anxiety symptoms in children and youth [53] to reducing stress and promoting resilience (e.g., ERASE Stress) [54, 55] and teacher-based building resilience programs [56, 57, 58, 59]. Professionally delivered therapies are often criticized for being less sustainable and more difficult to implement [60, 61]. This limitation has paved the way for a number of successful teacher-implemented interventions and programs [44, 53, 56, 62].

Brom et al. [60] present a comprehensive school-based intervention model that bridges the gap between symptom reduction and resilience-building foci and addresses some of the challenges associated with professionally delivered therapies. Their Building Resilience Project focuses on teacher/parent training to promote resilience as well as a comprehensive school screening program to identify student who require additional supports [60]. Their school-based program has six primary components that enhance resilience within the school community including (1) preparedness, (2) training mental health professionals, (3) building resilience with teachers (self-awareness and regulation, strengths, and personal resources; support; and finding meaning and hope), (4) parental engagement and involvement, (5) universal screening of students, and (6) when needed, school-based mental health treatment [60].

Similarly, the School Resilience Program proposed by Wolmer and colleagues trained teachers in techniques designed to manage stress and build resilience among students

[63]. This intervention was shown to be effective in communities across Southern Israel impacted by an ongoing threat of missile attacks, highlighting the potential of teachers as effective deliverers of psychosocial interventions among trauma-exposed youth [63].

In 2013, the Communities Advancing Resilience Toolkit (CART) emerged as a toolkit for enhancing community resilience through a program that can respond to community needs by developing a plan of action for successful responses to terrorisms and disasters [64]. Most promising is that multi-layered community-based intervention programs have been shown to be effective even in low resource environments, particularly refugee camps [37] and war-ravaged countries [65]. As indicated by Vogel and Pfefferbaum, interventions that facilitate resilience can target many levels, including (1) the stressor, (2) the available resources or coping strategies, and (3) the family expectations. All of these levels may influence successful adaptation and the cultural variations that may occur over time, particularly following events with long-lasting repercussions [66].

Although school- and community-based interventions—when available and accessible—have been shown to be effective, there is significant variability around the world in the accessibility of these resources during ongoing crises. Significant challenges remain with regard to accessibility, particularly in under-resourced regions impacted by war and terrorism. To that end, we present a new frontier of technological mental health interventions that address the challenges of accessibility and sustainability and thereby enhance the fundamental right of youth to receive appropriate mental health intervention to cope with the impact of war and terrorism.

The Technological Frontier

Two of the most promising changes in our abilities to address the challenge of offering mental health services to children and youth in the context of war are (a) the development of sustainable and accessible technologies for treating PTSD through the Internet and (b) the rapidly growing access that children around the world have to the Internet (see [67] for review). Millions of youth worldwide have access to smartphone technology and more than 3.5 billion individuals around the world have Internet access [68]. Although there are occasions during disasters when Internet access is interrupted, in other cases, as we have seen in recent conflicts such as the civil war in Syria, the Internet remains an effective method of communication that also provides an opportunity for screening and intervention.

One of the main challenges of traditional therapeutic techniques is the lack of accessibility. Inaccessibility may result from (1) displacement—either internally or to foreign countries; (2) inconsistency in placements and frequent relocation; and (3) direct or indirect threats to educators, and school

infrastructures, or students attending school. Even when helpful resources are available to children, the child may feel stigmatized [69], unsure about how to access necessary resources, or hesitant to utilize those resources (e.g., interact with the therapist) because of the social implications of seeking mental health treatment [70]. E-interventions, taking two formats, e-treatment modules and virtual reality (VR) games, can address some of these challenges.

E-Treatment Modules

E-treatment modules do not alter the therapeutic techniques but change the medium in which traditional interventions and training programs are delivered. A wide range of e-delivered therapies, including CBT for children, adolescents, and adults [69, 71], problem-solving therapy for adults [71], and EMDR in adults with PTSD [72], have been shown to be effective modes of treating mental health conditions, including PTSD [72]. Building beyond specific intervention techniques, web platforms have been developed to address a wide range of needs, including training teachers to work with trauma-affected youth. The *Cognitive Behavioral Intervention for Trauma in Schools (CBITS)* is a manualized group intervention protocol developed by the Rand Corporation [73, 74]. The *CBITS* manual is available online and instructs teachers on how to deliver Cognitive Behavioral Interventions in schools or other community contexts following traumatic events such as school shooting, natural disasters, and other tragedies [73, 74].

Websites such as *My Disaster Recovery* [75] and *PTSD Coach Online* [76] differ slightly from *CBITS* in that the intervention is offered in an online format. Both *My Disaster Recovery* and *PTSD Coach* have been shown to decrease negative affect and increase coping self-efficacy in a sample of adult hurricane survivors [75] and to address PTSD symptomology in adult military veterans [76]. These resources, while intended as supplemental to formal counseling, are available to the public without referral from a mental health practitioner. While the online interventions noted above are currently structured to address the mental health concerns of adults, we suggest that with modification these interventions may be beneficial for addressing the needs of children and youth.

Bounce Back Now is yet another interactive web platform, currently in a testing phase that is intended to lead to full public access, developed by Ruggiero and colleagues at the University of Southern California. This platform is intended to serve adolescents living in disaster contexts. *Bounce Back Now* is an interactive website that allows adolescents to choose an intervention module for PTSD, depression, or substance use (cigarettes and alcohol). Parents are encouraged to participate with their child [77]. A unique feature of the *Bounce Back Now* platform is an initial screening to determine clinical levels of symptomology. Using a variety of multimedia platforms (e.g., text, video, audio, and animation),

psychoeducation, behavioral, and cognitive behavioral intervention techniques are transmitted via the website to teens and parents [78]. Teens are exposed to strategies aimed to enhance coping, reduce avoidance of traumatic cues, and manage anxiety [77]. The intervention monitors the adolescent in four ways: (a) reaction (e.g., rating of the web platform and questions regarding barriers to accessing the platform), (b) learning (pre- and post-knowable quizzes), (c) behavior (i.e., changes in symptoms), and (d) results [78]. Although *Bounce Back Now* was designed primarily to address the aftermath of natural disasters, its ability to address a wide range of mental health concerns in adolescents suggests it may be a useful model to adapt for youth exposed to war and terrorism.

The flexibility of e-treatment modules in addressing a wide range of needs is not the only benefit of e-treatment protocols. In addition, the ability to tailor interventions for particular racial, ethnic, or linguistic groups increases the utility of e-interventions worldwide. For example, Knaevelsrud and colleagues delivered Cognitive Behavioral Therapy two times a week for 5 weeks via the internet to trauma-exposed Arabic-speaking adults [79]. They found that this intervention reduced PTSD symptoms, such that 62% of their sample no longer met criteria for PTSD post-intervention [79]. Wang and Maercker also describe an intervention module for trauma-exposed adults in mainland China. Wang and Maercker found that their online intervention significantly reduced PTSD symptomology in both urban and rural adults and that these effects were maintained at the 3-month follow-up [80]. To our knowledge, these interventions have been offered only in adult samples. Yet given the proclivity of adolescents to using technology in their daily life and the particular importance of culturally sensitive interventions with youth, we suggest that similar interventions would be equally effective in a diverse range of adolescent samples.

Limitations and Challenges of E-Interventions Despite their promise, e-treatment modules require further substantiation and have several limitations. In their 2014 assessment of the limitations associated with e-interventions, Andersson and Titov suggest a number of potential limitations ranging from logistic issues (i.e., access to internet and data security) to the demographic differences in individuals who self-recruit to online interventions versus in-person modalities, to the challenges in diagnosis of clinical mental health concerns, and the limited ability of online interventions to address comorbid mental health conditions [70]. They propose that therapist-guided online interventions may address some of these limitations and report that guided interventions typically yield greater improvement in mental health symptomology than unguided e-interventions [70].

Low retention rates pose yet another challenge to the efficacy of online interventions [81]. Andersson and Titov propose that the motivation to participate may vary among

individual enrolling in e-interventions and suggest again that therapist-guided interventions may maximize retention [70]. Similarly, Ho and colleagues added a peer network system in which youth could interact with each other (e.g., send message of encouragement, quotes, etc.) to an online intervention in order to gauge the influence of peer interaction of adolescent retention in online therapeutic interventions [81]. In a sample of adolescents with non-clinical levels of depression, Ho and colleagues found that on average 66% of all “log-ins” to the intervention occurred within the first 3 weeks of the study, after which use declined [82]. However, exchanges in the peer network were associated with an increase in the number of minutes spent online per session and the number of days during which adolescents logged on to the site [82]. These results suggest that peer online interaction may address the challenge of retention for adolescents in online intervention modalities.

E-treatment interventions are promising because they can be flexible to the needs of the adolescent and caregivers, culturally and situationally adaptable, and accessible to populations that may otherwise not have access to mental health services [70]. However, e-treatment modalities also face significant challenges and limitations (as described above). As the field evolves, new methodologies will emerge to address these limitations. We highlight the importance of a trained mental health professional in supporting online users and monitoring unwanted, potentially deleterious effects. Monitoring by mental health professionals may take several forms, including (1) simultaneously monitor online discussion boards or posts as participants move through the online modules [82], (2) monitoring responses to regularly administered questionnaires to determine changes in symptomology [70], or we suggest (3) that participants are able to request one-on-one conversations with trained mental health professionals as needed [83•].

Virtual Reality Games

In 2011, the US Army funded the development of a virtual reality exposure therapy platform named *BraveMind* [84]. *BraveMind* builds on the lessons learned from previous virtual reality interventions designed to address PTSD symptomology in military personnel [84]. *BraveMind* uses prolonged exposure in a virtual environment, a combination that has been used with success in trauma-affected populations since the late 1990s [85•]. Virtual reality interventions have been shown to reduce PTSD in military samples after as few as six sessions [86]. These results held over 3, 6, and 12-month follow-up providing preliminary evidence that virtual reality interventions may offer a long-lasting effect on PTSD symptoms in adult military samples [86].

Though most often used to simulate military environments, virtual reality has also been used to simulate terrorist attacks such as 9/11 [85•]. In the 9/11 intervention, the simulation replicates downtown Manhattan, and a therapist controls the

rate of exposure using a keyboard to trigger various events of the day (e.g., plane flying overhead) [85•]. The exposure is intensified by adding details of the events, visual elements, and audio cues [85•]. Virtual reality allows the environment to be tailored to each participant's unique experience of a large-scale event and addresses a limitation of traditional prolonged exposure techniques, namely that exposure may be curtailed by avoidance of trauma-related memories and stimuli [85•].

Virtual reality interventions have been tested in a number of trauma and mental health contexts, including military [85•], 9/11 [85•], and adolescents with depression [87]. The variability in samples highlights the ability of virtual reality to be tailored to the unique experiences of a range of trauma-affected populations. Though few virtual reality games focus specifically on reducing PTSD symptomology in adolescents, a number of games have been developed to address secondary outcomes related to trauma exposure (e.g., emotion regulation).

GameTeen is a virtual reality game aimed at improving emotion regulation in youth. In the game, a child interacts with two environments: one that is intended to elicit joy (balloon popping) and a second meant to frustrate them (whack-a-mole) [88]. In the laboratory experiment for *GameTeen*, youth emotional reactions were monitored using questionnaires, electrocardiography and EEG readings, voice analysis, face tracking, and body gestures [88]. When the target emotions (e.g., joy or frustration) exceed a designated threshold, the youth are redirected to a skill-building portion of the game in which they learn emotion regulation techniques [88]. A therapist is able to monitor the game in real time and send positive feedback to reinforce the successful use of emotion regulation techniques [88]. *GameTeen* was also developed in mobile interface that does not have physiological monitoring but rather solely relies on questionnaires and behavioral analysis [88]. In this version, a therapist is able to monitor the child's progress through the game and see results from self-report questionnaires [88].

Finally, *PlayMancer* is a virtual reality game that targets self-control and impulse behaviors in individuals with bulimia nervosa, binge eating disorders, and pathological gambling behaviors [89]. Each player is represented by an avatar located on an island; the avatar is required to complete several mini-games comprised of different tasks (e.g., climbing a mountain, swimming in the ocean with the goal of catching as many fish as possible, and relaxation techniques) [89]. Players are connected to biosensors that monitor (1) galvanic skin response, (2) skin temperature, (3) breathing rate, (4) oxygen saturation, (5) heart rate, (6) facial gestures, and (7) speech patterns [89]. Based on the feedback provided by biosensors, the game adjusts such that negative biological reactions make the game harder. For example, higher heart rate, faster breathing, and speech patterns that reflect frustration while in the climbing task create more obstacles that increase the difficulty of climbing the mountain [89].

There is also a designated relaxation area in the game where players can go to learn relaxation techniques as needed [89].

Conclusion

Accessible and sustainable mental health services are an essential component to ensuring the human rights of youth, particularly given the growing number of children and adolescents who are exposed to terrorism and war. Although face-to-face therapeutic interventions have been acknowledged as the "gold standard" of care, we propose that technology offers a unique and unparalleled tool to increase access globally. While the development of e-mental health interventions is a growing area in the field, there remain barriers to access and sustainability. Firstly, preliminary studies have shown the effectiveness of interventions using e-interventions and virtual reality games, and additional research is necessary to develop efficacious virtual reality interventions specifically for adolescents exposed to war and terrorism. Secondly, the rapid evolution of technology makes sustaining the behind-the-scenes of e-applications difficult. Lastly, maintaining user-ship to develop long-term use of e-interventions poses challenges to intervention programmers. Despite these challenges, technology offers a new frontier for rapid and immediate intervention. By capitalizing on a medium that is comfortable and familiar to youth, e-interventions have the potential to reach youth who otherwise would not have access to mental health care in the wake of terrorism and war.

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Compliance with Ethical Standards

Conflict of Interest Levi Solomyak and Ruth Pat-Horenczyk declare that they have no conflict of interest.

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