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Research Review: Psychosocial adjustment and mental health in former child soldiers – a systematic review of the literature and recommendations for future research

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Abstract

Aims and scope—This article reviews the available quantitative research on psychosocial adjustment and mental health among children (age <18 years) associated with armed forces and armed groups (CAAFAG) – commonly referred to as child soldiers.

Methods—PRISMA standards for systematic reviews were used to search PubMed, PsycInfo, JSTOR, and Sociological Abstracts in February 2012 for all articles on former child soldiers and CAAFAG. Twenty-one quantitative studies from 10 countries were analyzed for author, year of publication, journal, objectives, design, selection population, setting, instruments, prevalence estimates, and associations with war experiences. Opinion pieces, editorials, and qualitative studies were deemed beyond the scope of this study. Quality of evidence was rated according to the Systematic Assessment of Quality in Observational Research (SAQOR).

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Findings—According to SAQOR criteria, among the available published studies, eight studies were of high quality, four were of moderate quality, and the remaining nine were of low quality. Common limitations were lack of validated mental health measures, unclear methodology including undefined sampling approaches, and failure to report missing data. Only five studies included a comparison group of youth not involved with armed forces/armed groups, and only five studies assessed mental health at more than one point in time. Across studies, a number of risk and protective factors were associated with postconflict psychosocial adjustment and social reintegration in CAAFAG. Abduction, age of conscription, exposure to violence, gender, and community stigma were associated with increased internalizing and externalizing mental health problems. Family acceptance, social support, and educational/economic opportunities were associated with improved psychosocial adjustment.

Conclusions—Research on the social reintegration and psychosocial adjustment of former child soldiers is nascent. A number of gaps in the available literature warrant future study. Recommendations to bolster the evidence base on psychosocial adjustment in former child soldiers and other war-affected youth include more studies comprising longitudinal study designs, and validated cross-cultural instruments for assessing mental health, as well as more integrated community-based approaches to study design and research monitoring.

Keywords

Violence; resilience; risk factors; child soldiers; war

Introduction

In the last decade, conflicts have killed 2 million children, disabled 6 million, and displaced an estimated 20 million people (UNICEF, 2007b). At any given moment, an estimated 300,000 children under 18 years of age are involved in armed forces or armed groups in more than 87 countries (Coalition to Stop the Use of Child Soldiers, 2008).

The reality of children associated with armed forces and armed groups (referred to in this review using the colloquial term ‘child soldiers’ for ease of communication) is that they are often both victims and perpetrators of violence. Children involved with armed groups assume myriad roles as soldiers, porters, cooks, servants, human shields, mine sweepers, and guards (Coalition to Stop the Use of Child Soldiers, 2008). Many are forced to perpetrate violence, even participating in village raids and mass atrocities (Coalition to Stop the Use of Child Soldiers, 2008; Wessells & Jonah, 2006). Child soldiers often face years of violence exposure and physical and sexual abuse themselves, resulting in serious health and mental health risks as well as social stigma upon return (Betancourt, Agnew-Blais, Gilman, Williams, & Ellis, 2010; Coalition to Stop the Use of Child Soldiers, 2008; Gingerich & Leaning, 2004; Johnson et al., 2008; Kohrt, Tol, Pettigrew, & Karki, 2010; Ward & Marsh, 2006), and for girls, unwanted pregnancies.

Without question, the involvement of children in armed forces and armed groups is detrimental to their mental health and development (Machel, 2001; Wessells, Fitzduff, & Stout, 2006). However, research on the topic is nascent, and to date there has not been a

concerted effort to summarize the peer-reviewed literature using a systematic review process.

This systematic review has three aims: (1) To discuss evidence from quantitative studies of psychosocial adjustment and mental health in child soldiers (a defined by the Paris Principles (UNICEF, 2007a) as ‘any person below 18 years of age who is or who has been recruited or used by an armed force or armed group in any capacity’); (2) To present recommendations for further research that will inform policy and practice; and (3) To emphasize clinical needs, ethical issues, and implications to consider when planning research and interventions with child soldiers.

Methods of systematic review

Our literature review was guided by the PRISMA standards for systematic reviews (Moher, Liberati, Tetzlaff, & Altman, 2009). (PRISMA stands for Preferred Reporting Items for Systematic Reviews and Meta-Analyses. It is an evidence-based minimum set of standards for reporting in systematic reviews and meta-analyses.) Although the term ‘child soldiers’ appears frequently in the literature, humanitarian practitioners often employ the term ‘children associated with armed forces and armed groups’ (CAAFAG) given the diverse roles conscripted children may assume. Thus, we used the following combination of key words and subject headings to guide our search: (1) ‘child soldiers,’ ‘child combatants,’ ‘children associated with armed forces and armed groups,’ or ‘CAAFAG’, and (2) ‘mental health’ or ‘psychosocial.’ For clarity, we will use the term ‘child soldiers’ in this review to encompass all these terms. The final search (February 2012) of the peer-reviewed literature yielded the following results: PubMed ($n = 24$), PsycInfo ($n = 105$), and JSTOR ($n = 136$), with two additional references identified in Google Scholar. References from search results were cross-checked and duplicates were eliminated. Opinion pieces, editorials, reviews, and qualitative studies were also excluded. Although qualitative studies are important in their own right and for contextualizing quantitative findings, a systematic review of all qualitative literature was beyond the scope of this article. After the final screening process, 29 articles presenting findings from 21 unique quantitative studies were included.

Various approaches have been proposed for improving the quality of reporting and evaluation of observational studies (Sanderson, Tatt, & Higgins, 2007; Stroup et al., 2000; Vandembroucke et al., 2007). For this review, we elected to use the Systematic Assessment of Quality in Observational Research (SAQOR) system, which has been recently developed specifically for assessing quality in psychiatry research (Ross et al., 2011). SAQOR evaluates studies in six domains: Sample, Control/Comparison Group, Quality of Exposure/Outcome Measurements, Follow-Up, Distorting Influences, and Reporting Data. During evaluation, the SAQOR rater assesses a range of criteria in each domain by evaluating the occurrence and nonoccurrence of each criterion. For example, the ‘Sample’ domain criteria include representativeness of the population, clearly stated source of sample, clearly stated method of sampling (convenience, consecutive, clinical, community), sample size/power calculation, and inclusion/exclusion criteria. Each criterion is rated as ‘yes’ (satisfied), ‘no’ (not satisfied), ‘unclear,’ or ‘not applicable.’ Domains are then graded ‘Adequate,’ ‘Inadequate,’ ‘Unclear,’ or ‘Not Applicable’ depending on the number of positive (or not-

applicable) responses to criteria (e.g., if 3 of 5 Sample criteria are met, the domain is deemed 'adequate'). A grade of overall quality – High, Moderate, Low – is then determined based on adequacy in the six domains (*see* Table 2 for details).

As the research questions for intervention and longitudinal studies are different from those pertaining to observational studies, we recalibrated SAQOR in this review to allow more sensitivity to the level of evidence produced by different types of studies. Specifically, we revised the overall scoring rubric, such that 'Control/Comparison Group' and 'Follow-Up' domains were *required* only for intervention and longitudinal studies (those observational studies that *did* include a control/comparison group were duly assessed in this domain). In addition, we revised the standard SAQOR criteria for Sample 'representativeness': for this review, 'representativeness' was met if the study made an effort to determine a base sample across multiple sources (i.e., rehabilitation centers or school programs) and used randomization to arrive at the final sample. This change was implemented given that community sampling of child soldiers can be logistically and ethically fraught.

Following our adapted SAQOR guidelines, the quality of intervention/longitudinal studies was rated 'High' if five or more domains were adequate; for observational studies, a 'High' rating was bestowed if three or more of the applicable domains were adequate, intervention/longitudinal studies of 'Moderate' quality exhibited adequacy in 3–4 domains; observational studies of 'Moderate' quality achieved adequacy in two of the required domains. Any intervention/longitudinal study found to be inadequate in four or more domains was rated 'Low;' observational studies found to be inadequate in three or more required domains were also rated 'Low.' Two of the authors completed the ratings, with 95% interrater agreement. All discrepancies were resolved through discussion between authors. See Table 2 for additional details and overall grading rubric.

Results

Overview

The 14 observational studies, five intervention studies, and two prospective studies reviewed included a total of 3,984 child soldiers (30% girls) from 10 countries: Uganda, Sierra Leone, Liberia, Côte d'Ivoire, the Democratic Republic of Congo (DRC), Mozambique, Nepal, Sri Lanka, El Salvador, and Germany (*see* Table 1). Participants were involved in armed conflicts from the 1940s to present day. Most were evaluated within 1–3 years of conflict's end (with the exception of the study from Germany and follow-up assessments in longitudinal studies from Mozambique and Sierra Leone).

Eight studies (five cross-sectional, two intervention, one longitudinal) met SAQOR criteria for high quality. Four studies (three cross-sectional, one intervention) met criteria for moderate quality. The remaining nine studies (six cross-sectional, two intervention, one longitudinal) met criteria for low quality. See Table 2 and Supplemental Tables S1–S4 for details.

Studies investigated a range of risk factors that may predispose child soldiers to negative psychosocial outcomes. In addition, some studies also considered protective factors that may

contribute to resilient outcomes. The policy implications of available evidence, as well as gaps in the literature (related to both study design and evidence), are highlighted in the Discussion section. A series of recommendations to inform the practice of future research are also provided.

Sampling—Former child soldiers are a hidden group and difficult to sample while ensuring ethical research conduct and human subjects protections. Perhaps as a consequence, the majority of investigators in the studies reviewed worked with service agencies to sample from beneficiary registries (Betancourt, Brennan, Rubin-Smith, Fitzmaurice, & Gilman, 2010; Kohrt et al., 2008). Others conducted outreach via radio (Derluyn, Broekaert, Schuyten, & De Temmerman, 2004) and newspaper (Forstmeier, Kuwert, Spitzer, Freyberger, & Maercker, 2009). Only two studies included power calculations in relation to sample size (Blattman & Annan, 2010; Kohrt et al., 2008).

Gender

Girls were sampled in 17 of the 21 studies reviewed, and female participants comprised 30% of the total research participants. Thirteen of the studies examined gender in analyses.

Studies with non-CAAFAG comparison groups

Five of the studies incorporated a comparison group of children not associated with an armed group (Betancourt, Borisova, de la Soudière, & Williamson, 2011; Blattman & Annan, 2010; Kohrt et al., 2008; MacMullin & Loughry, 2004; Okello, Onen, & Musisi, 2007). Okello et al. (2007) identified a comparison group from a local mixed boarding and day college, whereas Betancourt and colleagues (2010) included a random door-to-door sample of war-affected youth from the same villages of resettlement as a cohort of former child soldiers. Only two studies used a matching procedure for establishing a comparison group (Blattman & Annan, 2010; Kohrt et al., 2008).

Longitudinal studies

Although much of the research on child soldiers is cross-sectional or oriented toward intervention evaluation, two of the reviewed studies did employ longitudinal designs. In a study from Mozambique, 39 boys were assessed while in reintegration centers, then reassessed 16 years later after returning to their community (Boothby, 2006). In a study conducted in Sierra Leone, a cohort of 259 child soldiers was interviewed at three time points over 6 years along with a comparison group of 136 youth from the same communities and an additional sample of 127 self-reintegrated child soldiers (Betancourt, Agnew-Blais, et al., 2010; Betancourt, Borisova, et al., 2011; Betancourt, Borisova, et al., 2010; Betancourt, Brennan, et al., 2010; Betancourt, McBain, Newnham, & Brennan, 2012). This study is the sole prospective longitudinal study of male and female former child soldiers available in the literature to date.

Mental health in former child soldiers

Measurement—Estimates of psychosocial difficulties and mental health problems among former child soldiers differed widely across studies. Only 10 studies rated 'adequate' in the

measurement SAQOR domain, in large part due to widespread use of assessments and screening measures not validated for the target study population. The range of acceptable assessments included validated measures of PTSD (Forstmeier et al., 2009; Klasen, Oettingen, Daniels, & Adam, 2010; Kohrt et al., 2011; Pfeiffer & Elbert, 2011), locally derived measures of emotional and behavioral problems (Blattman & Annan, 2010; Bolton et al., 2007; Boothby, Crawford, & Halperin, 2006; Karki, Kohrt, & Jordans, 2009; MacMullin & Loughry, 2004; McMullen, O'Callaghan, Shannon, Black, & Eakin, under review), psychiatrist-led interviews using a structured instrument (Okello et al., 2007), and locally developed assessment of internalizing and externalizing problems (Betancourt, Brennan, et al., 2010; MacMullin & Loughry, 2004). Steps taken to validate the mental health measures used were frequently not reported.

Prevalence—Variations in prevalence of mental health problems are consistent with irregularity in methodology, sampling, and instrumentation. Even within similarly designed studies, there was notable heterogeneity in PTSD rates. For example, in studies of formerly abducted youth conducted in rehabilitation centers in northern Uganda, documented PTSD rates ranged from 99% in a study of $N = 339$ youth that used a standard measure and applied clinical thresholds derived from Western populations (Amony P'Olak, Garnefski, & Kraaij, 2007; Amony-P'Olak, 2005), compared to 27% in a study of $N = 82$ youth evaluated using a clinical interview (Okello et al., 2007). Also in northern Uganda, one study investigating PTSD symptoms (rather than clinical cut points) among $N = 71$ former child soldiers determined that PTSD symptoms were present in 97% of the sample (Derluyn et al., 2004).

In three of the five studies with comparison groups, PTSD prevalence was greater among former child soldiers compared with never-conscripted children (Kohrt et al., 2008; MacMullin & Loughry, 2004; Okello et al., 2007). In Nepal, this distinction was maintained even after controlling for exposure to violence (Kohrt et al., 2008). By contrast, studies from northern Uganda (Blattman & Annan, 2010) and Sierra Leone (Betancourt, McBain, et al., 2012) found little difference in psychosocial distress levels between former child soldiers and comparison groups. In fact, in their study with $N = 462$ youth, Blattman and Annan (2010) found that psychosocial distress was predicted by the level of violence exposure and not by 'child soldier' status alone.

Variation across different types of samples was observed. In a 2006 Nepal study conducted with $N = 141$ former child soldiers (<18 years) 1 year after war's end, 55% of participants met symptom cutoff scores for PTSD (Kohrt et al., 2008). By contrast, rates of PTSD were documented at only 2% in a German sample ($N = 103$) of geriatric former child combatants interviewed more than 60 years after deployment (Forstmeier et al., 2009). Differences between these distinct samples are notable, particularly as they highlight how little is understood about how cultural, political, or generational differences affect outcomes among former child soldiers.

Among the longitudinal studies that do exist, most of the 39 boys enrolled in the study from Mozambique (Boothby et al., 2006) exhibited intact functioning in social and occupational domains over time, but also struggled with continued intrusive memories related to war experiences. In longitudinal research in Sierra Leone, former child soldiers demonstrated

elevated levels of depression, anxiety, and hostility across three waves of assessment (Betancourt, Brennan, et al., 2010), but rates of PTSD showed a tendency to attenuate over a 4-year interval of follow-up (Betancourt, Newnham, & Brennan, under review). This study documented important variability in subgroups over time; for instance, child soldiers who experienced postconflict family abuse and neglect, more stigma, and increased social disorder within the community, maintained higher levels of internalizing (anxiety and depression) symptoms compared with children who did not experience these hardships.

Risk factors

Abduction—Children become involved in armed groups through abduction, threats, pressure, manipulation, and voluntary association. Across the studies included in the systematic review, abduction was the main mechanism by which children reported becoming involved with an armed group. However, in the Nepal study, nearly half of study participants joined without abduction (Kohrt et al., 2008), as did 18 of 19 former child soldiers in the study from Sri Lanka (De Silva, Hobbs, & Hanks, 2001). In a study from El Salvador with $N = 293$ former child soldiers, 73.7% of study participants reported joining voluntarily and 3.4% reported forced conscription (Santacruz & Arana, 2002). In these studies, ideological reason for joining voluntarily included revenge, martyrdom, and ‘desire to defend the motherland.’ Other subjects reported joining out of fear of abduction.

Age of involvement and conscription duration—Age at conscription and length of involvement also varied across settings. For example, in the study from Uganda by Blattman and Annan, the average age at abduction was 15.3 years and the length of time with fighting forces ranged from 1 day to several years, with an average duration of involvement of 9 months (Annan, Blattman, & Horton, 2006; Blattman & Annan, 2010). In the Sierra Leone longitudinal study, average age at conscription was 10.6 years and average length of time spent with the fighting forces was 2.69 years (Betancourt, Borisova, et al., 2011). Most studies that considered age at abduction did not observe strong associations with postconflict adjustment, with the exception of Betancourt and colleagues (2010), who found that young age of involvement predicted increased depression symptoms over time, adjusting for other factors. In general, duration spent in abduction was not widely found to correlate with postconflict adjustment, with the exception of Pfeiffer and Elbert (2011), who found that conscription duration actually correlated negatively with the sum score of PTSD symptoms among a sample of former child soldiers from northern Uganda. This finding was not corroborated by other sources from northern Uganda.

Exposure to violence—Across all of the published research, studies of child soldiers were consistent in reporting high levels of exposure to violence. Several studies found that over 70% of child soldiers were severely beaten by armed forces, with similar rates reported by boys and girls (Amone P’Olak et al., 2007; Amone-P’Olak, 2005; Bayer, Klasen, & Adam, 2007; Betancourt, Borisova, et al., 2011; Klasen, Oettingen, Daniels, & Adam, 2010; Kohrt et al., 2008). High levels of sexual abuse among girls were observed in samples from Sierra Leone (44%; Betancourt, Borisova, et al., 2011) and Uganda (30%; Klasen, Oettingen, Daniels, & Adam, 2010), as well as a mixed sample from Uganda and the DRC (57%; Bayer et al., 2007). Boys were also victims of sexual abuse in these settings, although

only Amone P'Olak (2005) found higher rates of sexual abuse among boys (81% vs. 72%) as compared with girls.

High rates of violence perpetration were reported in Sri Lanka, Uganda, the DRC, and Sierra Leone. Sixty-four percent of child soldiers studied in the DRC and 45% of those in Sri Lanka reported killing others during the conflict (Bayer et al., 2007; Kanagaratnam, Raundalen, & Asbjornsen, 2005). In Uganda, rates of participation in killing ranged across studies from 7.5% (Okello et al., 2007) to 67.1% (Amone P'Olak et al., 2007; Amone-P'Olak, 2005), and in Sierra Leone, 29% of Interim Care Center-served former child soldiers reported injuring or killing others during war (Betancourt, Borisova, et al., 2011).

Associations between particularly 'toxic' violence exposures (Layne et al., 2010) and mental health/psychosocial problems were identified by some studies (Betancourt, Borisova, et al., 2010; Kohrt et al., 2008; Okello et al., 2007; Santacruz & Arana, 2002). In El Salvador, participants who witnessed the death of a family member or peer exhibited higher psychological distress, as did children who became disabled during conscription (Santacruz & Arana, 2002). In research from Nepal, exposure to torture was associated with increased PTSD risk (Kohrt et al., 2008). One study from Uganda showed associations between deprivation of food and water, being forced to perform rituals, and elevated PTSD (Okello et al., 2007). In research from Sierra Leone, war experiences such as killings and being a victim of sexual violence were stronger predictors of distress over time compared with other exposures such as general witnessing of violence (Betancourt, Borisova, et al., 2010). Furthermore, analyses of gender interactions from this study indicated that male former child soldiers with a history of sexual abuse experienced higher levels of anxiety and hostility compared with girls (Betancourt, Borisova, et al., 2011).

Gender—Regarding gender differences, the majority of studies reported that female former child soldiers reported greater severity of psychosocial problems than boy soldiers did, which is reflective of trends evidenced even in populations not affected by violence. For instance, in Sierra Leone, Betancourt and colleagues found that female gender was significantly associated with lower levels of confidence and prosocial behaviors over time (Betancourt, Borisova, et al., 2010; Betancourt, Borisova, et al., 2011), even after controlling for war experiences.

A few studies, however, did examine whether girls were affected to a greater degree than boys by soldiering experiences, with significant findings. In Nepal, Kohrt et al. (2008) tested interaction models of gender (girls vs. boys) and child soldier status (child civilians vs. child soldiers). They found a significant interaction effect for PTSD: girls were 6.80 times more likely to have PTSD if they were soldiers than if they were civilians, whereas boys were 3.81 times more likely to have PTSD if they were soldiers than if they were civilians. These results suggest that girls in the Nepali context suffer greater distress than boys due to the soldiering experience; although significant interactions were limited to PTSD outcomes and were not significant for other outcomes, such as depression, anxiety, or functional impairment.

Studies have also noted interactions between gender and community acceptance, with results indicating differences in the ways families and communities treat returning boys compared with girls. In Sierra Leone, female former child soldiers experienced lower rates of acceptance as compared with their male counterparts (Betancourt, Borisova, et al., 2010), and were commonly viewed as sexually impure or akin to ‘prostitutes’ (Betancourt et al., 2008). Girls in the Nepal study reported experiencing gender-based community stigma related to local perceptions that their Hindu purity had been violated (Kohrt, Tol, et al., 2010). Girls in one study from Uganda also reported experiencing less community support (Annan, Blattman, Mazurana, & Carlson, 2011).

Gender also exerted some influence on intervention effects. An intervention study in northern Uganda (Betancourt, Newnham, et al., 2012) found that gender and abduction status moderated the effects of group Interpersonal Therapy (IPT-G) in an intervention for war-affected youth including former child soldiers (ages 14–17; see section on interventions). In this research, IPT-G had significant positive effects on depression in both male and female subjects with a history of abduction (effect size = 0.92 and 0.50, respectively); however, effects were greatest among female subjects without an abduction history (effect size = 1.06) and nonsignificant among male subjects without an abduction history (Betancourt, Newnham, et al., 2012). These findings support arguments that gender and abduction history are important considerations in the planning and implementation of interventions.

Stigma—Despite significant qualitative evidence that former child soldiers struggle with community stigma upon return home (Annan, Brier, & Aryemo, 2009; Burman & McKay, 2007; Denov, 2010; Denov & Maclure, 2007; Kohrt, Tol, et al., 2010; Shakya, 2010; Stark, 2006), only a handful of the reviewed studies investigated stigma as a risk factor. In the El Salvador study (Santacruz & Arana, 2002), participants who experienced stigma scored higher on a psychological impact scale, as did youth who experienced feelings of disappointment upon return home. Longitudinal data from Sierra Leone indicated that stigma predicted higher levels of hostility/externalizing problems as well as deficits in prosocial behaviors over time, even after adjusting for war exposures (Betancourt, Agnew-Blais, et al., 2010; Betancourt, Brennan, et al., 2010). In the only study from Uganda to examine stigma, abductees and nonabductees experienced similar levels of family and community rejection, whereas nonabductees were more likely to engage in prosocial behaviors such as participation in politics and community activities (Blattman, 2009).

Protective factors

Family acceptance—Higher levels of family acceptance were associated with better outcomes in a few of the studies reviewed. In El Salvador, four of five former child soldiers indicated that the relationship with their family was the most useful factor that facilitated their process of reintegration (Santacruz & Arana, 2002). In Sierra Leone, higher levels of family acceptance were linked to lower average levels of emotional distress among participants (Betancourt, Agnew-Blais, et al., 2010; Betancourt, Brennan, et al., 2010). Supportive parenting was associated with better psychosocial adjustment in one study of Ugandan child soldiers (Derluyn et al., 2004).

Social support and community acceptance—Findings indicate that social support and community acceptance may also promote successful reintegration and positive psychosocial adjustment. In the Sierra Leone longitudinal research, higher levels of social support were associated with increased adaptive and prosocial behaviors and attitudes (Betancourt, Agnew-Blais, et al., 2010). Among a sample of German former child soldiers interviewed as adults, social acknowledgment (as opposed to criticism or rejection) was associated with healthier posttraumatic growth trajectories (Forstmeier et al., 2009), although the study design precluded making strong inferences about associations observed. In a sample of 39 boy former child soldiers in Mozambique, traditional cleansing rituals were seen as promoting community acceptance (Kohrt, Jordans, Tol, et al., 2010), although the nature of the measures used to assess this outcome was not clear. In research from Nepal, older age, abduction into an armed group, living in a nuclear family, being from a Buddhist minority ethnic group and not living in a Hindu high-caste community were associated with more social support from family and community (Kohrt, Jordans, Tol, et al., 2010). In this sample, total reintegration support from family and community predicted lower levels of PTSD, depression, and functional impairment (Kohrt, Jordans, Tol, et al., 2010), and, among the types of support examined in this study, peer support was the strongest predictor of lower PTSD, lower functional impairment, and improved hope (Morley & Kohrt, 2012).

Opportunities for livelihoods and education—Most studies found that former child soldiers felt ill-equipped to contribute to their family economy upon return to civilian life (Annan et al., 2006; Boothby et al., 2006). Only one study from Sri Lanka observed that former child soldiers felt that they had gained educational opportunities through their association with armed groups (De Silva et al., 2001).

Attending school and training programs is considered critical in helping war-affected youth attain a sense of normalcy and safety in their everyday lives while also increasing their future employment opportunities (Betancourt & Khan, 2008). Returning to and staying in school was associated with higher levels of confidence and prosocial behaviors among youth in the Sierra Leone longitudinal study (Betancourt, Brennan, et al., 2010). In one study from Uganda ($N = 102$), former child soldiers who were given the opportunity to continue their education scored lower on assessments of depression, compared with those who directly entered vocational training (Ovuga, Oyok, & Moro, 2008).

In addition to educational opportunities, entry into the labor force is seen as enabling youth to redefine themselves and to shift their identity from soldier to civilian (Wessells, 1998). In the study from Nepal, boy participants frequently reported going to India to work before returning to their villages. This process was seen as allowing boys to return as migrant laborers and not as former combatants; by contrast, female migration for employment was perceived as associated with sex work, despite qualitative data suggesting that in reality, former girl soldiers were much less inclined to engage in commercial sex work compared with noncombatant girls (Kohrt, Jordans, Morley, 2010; Kohrt, Tol, et al., 2010).

Intervention research: The peer-reviewed literature on former child soldiers includes few studies of interventions to inform major policy decisions, despite the call for such research

(Betancourt, 2011; Betancourt & Williams, 2008; Tol et al., 2011). Five intervention studies were included in this review. Two of the intervention studies were purely descriptive and did not include control groups: in Côte d'Ivoire, $N = 345$ former child soldiers were enrolled in trauma-focused counseling supplemented by therapeutic workshops, literacy workshops, and resocialization exercises (Bissouma, Te Bonle, Yeo-Tenena, Moke, & Kipre-Koiho, 2010); in a pilot study in Liberia, $N = 130$ former child soldiers participated in a brief (2-week) trauma-focused intervention (Gregory & Embrey, 2009). Two intervention trials were conducted in northern Uganda: Bolton and colleagues conducted a randomized controlled trial (RCT) of Group Interpersonal Therapy (IPT-G) with $N = 314$ war-affected youth (47% former child soldiers; Betancourt, Newnham, et al., 2012; Bolton et al., 2007), whereas Ertl, Pfeiffer, Schauer, Elbert, and Neuner (2011) used three arms to compare Narrative Exposure Therapy (NET), an academic catch-up and supportive counseling group, and a waitlist control condition among $N = 85$ former child soldiers. Finally, in the Democratic Republic of Congo (DRC), McMullen et al. (under review) conducted a randomized controlled trial of trauma-focused cognitive behavioral group therapy to treat PTSD and psychosocial difficulties in $N = 50$ war-affected boys (78% former child soldiers).

The available intervention research revealed potential for treating some symptoms of psychosocial distress in former child soldiers. In northern Uganda, the RCT by Ertl et al. (2011) comparing NET to an academic catch-up/supportive counseling group and a waitlist control group found that all groups improved over time, with significantly greater reduction in PTSD symptoms in the NET group. Also in northern Uganda, Bolton et al. (2007) showed a significant reduction in depressive symptoms among adolescents participating in Group Interpersonal Therapy (IPT-G) compared with a waitlist control condition and a recreation group. Additional analyses investigating the role of former child soldier status and gender indicated that both male and female former child soldiers benefited from the intervention; however, the greatest effects were among girls without an abduction history. Boys who had not been involved with an armed group appeared to benefit the least from IPT-G in this setting (Betancourt, Newnham, et al., 2012). In the DRC, McMullen et al. (under review) observed significant reductions in PTSD and psychological distress, and increases in prosocial behaviors as compared with waitlist controls, with between-treatment effect sizes slightly larger among former child soldiers.

Promising results from intervention research in Côte d'Ivoire and Liberia were limited by their lack of randomization and adequate control or comparison groups. In Liberia, PTSD rates fell moderately from 59% preintervention to 42% postintervention (Gregory & Embrey, 2009), and in Côte d'Ivoire, PTSD rates among the $N = 345$ participants in the sample fell from 53% to 3% at a 15-month follow-up, with rates of depression, anxiety, and psychosis also attenuating over time (Bissouma et al., 2010). However, study design limitations make it difficult to determine if rates of change were due to the effects of the studied intervention or due to the passage of time.

Discussion

Overall, research on psychosocial issues and mental health in former child soldiers is growing, but much remains to be done. The majority of studies to date are cross-sectional

and lack strong control/comparison designs (see Table 2). Of the 21 quantitative studies identified in our review, only 15 scored ‘adequate’ in the SAQOR Sample domain. Some studies used very homogeneous groups, such as children referred to a mental health facility, children accused of witchcraft, or schoolchildren with behavioral problems. In addition, very few studies examined how political and community factors – such as government-sanctioned enlistment of child soldiers or widespread community involvement in atrocities – may alter the child soldier experience and moderate outcomes. Previous meta-analyses of studies on political violence have shown that this type of variation in sampling makes it difficult to accurately estimate prevalence of mental health problems and associations with risk and protective factors (Steel et al., 2009). To strengthen the evidence base on mental health and psychosocial adjustment in former child soldiers, more cohesive research designs are clearly needed to improve the generalizability and comparability of results.

The existing evidence base is also limited by weak instrumentation and analytic procedures used to assess mental health and psychosocial adjustment. Of the studies reviewed, only 10 used instruments validated for the local setting or developed instruments specifically for use in a given cultural setting. Only six studies used multivariate approaches (Bayer et al., 2007; Betancourt, Borisova, et al., 2010; Boothby et al., 2006; Derluyn et al., 2004; Klasen, Oettingen, Daniels, & Adam, 2010; Kohrt et al., 2008), with the remaining studies presenting only descriptive statistics or crude associations. Such design limitations make it difficult to isolate influential war exposures and provide a less robust level of evidence for claims about associations between risk and protective factors and outcomes. Finally, most studies in the literature were cross-sectional in nature and focused on associations between violence exposures and psychopathology in individual children at one time point, with very little attention to longitudinal perspectives.

The policy implications of the available evidence are important to note. Given the scant evidence base for promoting healthy adjustment in former child soldiers as well as the limited number of intervention models, which have been subject to rigorous evaluation, a weak evidence base remains a major obstacle to ensuring sound policy to address issues of promoting mental health and psychosocial adjustment in former child soldiers and other war-affected youth. The available evidence does point to the need to develop programs, which are sensitive to potential differences in gender, age/development, and contextual factors, which determine the degree of stigma facing former child soldiers. The evidence also indicates that sustained attention must be given to supporting families who are adjusting to having a child returned after many years of involvement in an armed group as well as sustained community efforts to address stigma and promote coexistence among fractured and war-affected societies. The role of religion and traditional healing practices remains largely unexamined in quantitative research, although several excellent qualitative perspectives are available (e.g., Kohrt, 2012; Stark, 2006).

Finally, many of the most commonly used practices in child soldier reintegration remain unexamined, such as the use of interim care centers and other reintegration packages involving educational support, job skill training, or employment programs in combination with psychosocial support. A good deal of humanitarian aid is invested in these interventions during the immediate aftermath of conflicts; however, few programs are

sustained over the long term (Tol et al., 2011; Williamson, 2005). It seems logical that future opportunities might present themselves to integrate natural experiments or other study designs into the roll-out of programs. Such services research can go a long way toward overcoming some of the ethical quandaries that plague research with such vulnerable groups, particularly if all participants, in the end, can be offered the intervention packages that are proven to be most effective. The use of mixed-methods research, which integrates local perspectives as well as routine monitoring and guidance of study practices by local community advisory boards, can also go a long way in improving the local relevance and ethical practice of research in vulnerable communities (Betancourt, 2011).

Recommendations for future research with children associated with armed groups

Our review of the literature underscores that considerable work remains to develop a strong evidence base on risk and protective factors in the mental health of former child soldiers globally. To help advance future research as well as improve policies and programming, we offer the following recommendations.

Prioritize ethical conduct and safety of children and local research staff—

Ethical conduct in research is particularly critical when working with vulnerable populations and ‘hidden groups’ such as former child soldiers (Allden et al., 2009; Betancourt, 2011; Kohrt, Jordans, Morley, 2010). If not done with great care, research with child soldiers may endanger subjects, their families, and research staff, especially in communities where the research may invoke taboo or legal issues. Research and intervention also runs the risk of exposing youth who have veiled their association with an armed group (Kohrt, Jordans, Morley, 2010). All research on war-affected youth should receive approval from local and international ethical review committees. In addition, community advisory boards have been used with success in some of the research to date (Betancourt, McBain, et al., 2012) and can help ensure ethical implementation and appropriate dissemination of findings (Betancourt, Meyers-Ohki, et al., 2011). In programming, a large part of ethical response is ensuring that all war-affected youth be recognized as potentially in need of additional supports and can access screening/assessment rather than label-driven services, which target singular groups (e.g., only child soldiers, only gender-based violence survivors, etc.). It is important to recognize that given documented risk of stigma directed at former child soldiers (Annan et al., 2011; Betancourt, Agnew-Blais, et al., 2010; Kohrt, Tol, et al., 2010), programs which target them in isolation from other war-affected youth may have the paradoxical effect of deepening stigma and resentment.

Ensure that research and interventions are contextualized developmentally and ecologically—

The mental health of war-affected youth is embedded in their social ecology (Betancourt & Khan, 2008; Kohrt, Jordans, Tol, et al., 2010). In research, attention must be paid to these interrelated settings, including risk and protective factors at the individual, family, peer, community, and societal/cultural levels. In addition, a child's developmental progress and maturation must also be considered, within cultural context (Betancourt, 2011; Kohrt & Maharjan, 2009). Also important to ensuring more contextualized research is attention to postconflict factors. In the small number of studies that evaluate postconflict challenges (e.g., economic insecurity, poor access to school and

services, structural violence), daily stressors are shown to have important mediating effects on child mental health (Betancourt, Brennan, et al., 2010; Kohrt, Perera, et al., 2010; Kohrt, Tol, et al., 2010; Miller & Rasmussen, 2010) and possibly more dominant effects than past war-related exposures (Kohrt, Perera, et al., 2010; Miller & Rasmussen, 2010). Through deeper investigation of postconflict issues from an ecological perspective, researchers can better identify supports and stressors as leverage points for mental health intervention models. In intervention and policy, a shift from solely trauma-focused interventions to programs, which attend to postconflict factors and day-to-day struggles, can assist youth in achieving life goals.

Employ mixed-methods approaches to select and validate measures—In cross-cultural work with child soldiers, researchers often make *assumptions* about what the major mental health problems will be and how they will manifest locally. More specifically, studies are often designed to assess symptoms of mental health problems using scales with symptom expression typical of populations in higher resource settings such as the United States or United Kingdom (PTSD, depression, anxiety). As these scales are rarely validated locally, it is not always known whether standard diagnostic criteria apply to a certain setting. Clinical thresholds used uncritically in diverse cultural settings can be misleading when not validated in a new context (Betancourt, Meyers-Ohki, et al., 2011; Kohrt et al., 2011). By assuming that symptoms have the same meaning and significance across cultures, researchers increase the risk of selecting inappropriate measurement tools or intervention targets (Kleinman, 1988). Qualitative research can be used to investigate local symptom expression and indicators of impairment. In particular, mixed-methods studies can apply qualitative, context-specific findings to the adaptation of study instruments and interventions, investigating their cultural appropriateness, local relevance, and safety (Allden et al., 2009; Betancourt, Meyers-Ohki, et al., 2011; Van Ommeren et al., 1999). If standard measures are employed, it is crucial to validate them locally and establish contextually and culturally appropriate thresholds for likely clinical diagnoses (Kohrt et al., 2011). In terms of programming and policy, greater attention to local terminology and assessment of readily recognizable constructs can help to improve acceptability and engagement of local populations in preventive supports as well as clinical mental health services.

Use strong sampling designs and comparison groups—For prevalence estimates, representative sampling techniques are required, but for hidden groups such as former child soldiers standard community sampling can be ethically and logistically difficult. Alternate sampling methods for hard-to-reach groups such as Respondent Driven Sampling (RDS; Heckathorn, 1997, 2002) have yet to be applied to the challenge of sampling among former child soldiers and have great potential to address some of the shortcomings of the methods used to date. In regions where community samples are ethically possible, approaches such as the representative sampling method used by Blattman and Annan (2010) are also important. Comparison groups, including children not associated with armed forces/armed groups, should also be used where possible (Kurupparachchi & Wijeratne, 2004; Magambo & Lett, 2004; McKay & Wessells, 2004). Without participation of children who experienced the

conflict, but were not soldiers, researchers cannot isolate the specific problems facing former child soldiers nor accurately assess the impact of interventions on specific subgroups.

Employ longitudinal designs—The psychosocial adjustment and mental health of former child soldiers is likely to fluctuate significantly over time because of changes in context, development and maturation, and variations in protective factors such as social support, family and community acceptance, educational access, and opportunities for vocational training and employment. Moreover, many mental health conditions such as PTSD are time- and context-dependent (Kohrt et al., 2012). In the case of PTSD, nearly half of affected individuals recover without treatment within 1 year (Breslau & Davis, 1992). To advance our knowledge base on the impact of armed conflict on children and families, further longitudinal and developmentally informed research is sorely needed (Betancourt, 2011). To date, only one study has employed a prospective longitudinal design in a sample involving boys and girls (Betancourt, Brennan, et al., 2010). In future research, many more cultural groups and settings would benefit from research of this nature to understand psychosocial adjustment in former child soldiers over time with attention to the postconflict environment and transitions to adulthood.

Invest in intervention research—Despite the proliferation of psychosocial, mental health, and other forms of interventions used with former child soldiers, there have been only a handful of studies on the effectiveness and cultural acceptability of interventions for these groups (Betancourt, Newnham, et al., 2012; Ertl et al., 2011; McMullen et al., under review; Neuner et al., 2008). To identify evidence-based practices that can be used and adapted across settings, a concerted effort is required to study intervention effectiveness. Researchers and service providers should also consider how emerging mental health and psychosocial programming can contribute to the development of longer term and sustainable systems of health and mental health care in postconflict settings (Betancourt & Ettien, 2010). Such sustainable systems of care are necessary to provide a safety net for individuals whose exposure to severe trauma and loss as children presents challenges for adult adjustment and functioning as well as risks for the intergenerational transmission of violence.

Encourage participatory approaches, locally defined research priorities, and collateral respondents—Psychosocial interventions should be based on locally identified needs rather than externally imposed services or researchers' assumptions (de Jong, 2002). For example, communities may be less interested in providing individualized clinical services to former child soldiers, and more invested in other interventions that broadly serve all children affected by war. Some NGOs are attempting to use children's views to develop interventions (Karki et al., 2009). Future research should determine intervention priorities through community-based participatory approaches and collaboration with child soldiers and other war-affected youth as well as input from local service providers and community advisory boards (Betancourt, 2011). With few exceptions (Betancourt, Brennan, et al., 2010; Santacruz & Arana, 2002), research on child soldiers has relied on child self-report measures that often have stronger reliability in assessing internalizing problems, but may be less sensitive to externalizing behaviors. In future research, it is

imperative that more efforts be made to understand well-being and functioning of child soldiers from the viewpoint of collateral respondents who can report on externalizing/behavior problems, such as caregivers, teachers, significant others, neighbors, and employers, without adding further stigma.

Conclusion

An emerging body of evidence is beginning to document psychosocial adjustment, mental health, and social reintegration in former child soldiers across a range of settings and cultures. Research to date demonstrates that children often experience mental health problems following their association with fighting forces, especially if they have been exposed to toxic forms of violence and return to limited family and peer supports as well as community stigma and limited educational and economic opportunities. Some mental health problems may plague children for years, particularly if exacerbated by such post-conflict factors.

Given the nascent status of research with child soldiers, we are left with major questions: What social, cultural, political, and economic dynamics produce differences and commonalities across studies? How can lessons learned in one context be useful for other settings? What interventions can be used across settings for child soldiers and other war-affected youth? How should locally relevant interventions be developed while still contributing to a larger and generalizable evidence base? How can emergency humanitarian interventions contribute to the development of high-quality and feasible mental health and social services in war-affected regions that can be sustained after the initial emergency response?

To answer these questions, more scientifically rigorous, ethical, and culturally informed research is needed. In this article, we offered recommendations for improving research with child soldiers across settings. In particular, we advocate mixed-methods studies, longitudinal research, locally adapted and validated instruments, strong sampling designs, comparison groups, intervention studies, and participatory research approaches to ensure ethical procedures. On the policy side, this growing body of evidence must be utilized to inform the development of more sustainable and comprehensive systems of care for former child soldiers as well as other war-affected groups. By strengthening this evidence base, researchers can contribute to improving our knowledge of adjustment outcomes in various contexts, allowing for better comparative analyses between conflict situations and contributing to improved services for war-affected youth globally. In addition, future research should engage diverse disciplines by bringing together academics, policy-makers, and practitioners, as collaboration is critical to advance both research and practice.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Key points

- The psychosocial adjustment and mental health of child soldiers (children associated with armed forces and armed groups, CAAFAG) deserves priority research attention.
- In the quantitative literature on child soldiers from 10 countries, findings on prevalence and persistence of mental health problems vary widely.
- To allow for cross-site comparison, more studies comprising stronger sampling approaches, comparison groups, and longitudinal designs are needed.
- Use of mixed-methods research, community advisory boards, and locally validated mental health assessments may help to deepen findings, ensure ethical research, and allow for more meaningful conclusions to be drawn.
- Coordinated efforts to increase scientific rigor in the study of child soldiers can better inform policy and intervention research globally.

Table 1

Quantitative studies of child soldier psychosocial adjustment and mental health

Region	Country	Reference	Design	Sampling	Child soldier sample size	Psychosocial/mental health measures				Findings		
						Control group	Measure	Locally Adapted	Locally validated		Analysis	Prevalence
Africa	Cote d'Ivoire	Bissouma et al., 2010. <i>Neuropsychiatrie de l'enfance et de l'adolescence</i>	Pre/postintervention	Recruited from NGO registries	208/137/345	No	Local measure	No	No	Descriptive	Pre: PTSD 53%, Depression 20%, Psychosis 13%, Anxiety 12%. Post: PTSD 3%, Depression 1%, Psychosis 4%, Anxiety 1%	N/A
	Liberia	Gregory & Embrey, 2009. <i>Traumatology</i>	Pre/postintervention	Recruited by local community advisory board	67/63/130	No	CAPS	Yes	No	Paired t-test	Pre: PTSD 59% Post: PTSD 42%	N/A
	Mozambique	Boothby, 2006; <i>Intervention</i>	Longitudinal	Purposive sampling by government	39/0/39	No	TSCCL, CBI	Yes	No	Descriptive	Intrusive memories 100% (T1 & T2); Flashbacks 63% (T1), 45% (T2)	Longer duration in military assoc. with more distress
	Sierra Leone	Betancourt, Borisova, et al., 2010. <i>Child Dev</i> ; Betancourt, Brennan, et al., 2010. <i>JAA CAP</i> ; Betancourt, Agnew-Blais, et al., 2010. <i>Soc Sci Med</i> ; Betancourt, Borisova, et al., 2011. <i>JoAH</i> ; Betancourt, McBain, et al., 2012. <i>Child Dev</i>	Longitudinal	Mixed sample: NGO registries and door-to-door sample of non-NGO served	T1: 231/28/259; T2: 199/79/278; T3: 222/78/300 ^d	No	HSCL-25, PTSD-RI, OMPA, EDS, ISSB, Local measure of community acceptance	Yes	No	Multilevel linear growth modeling	<i>Girls</i> vs. <i>Boys</i> (T1 & T2) Depression 60% vs. 55%, Anxiety 60% vs. 52%	Increases in externalizing associated with killing/injuring others and stigma. Internalizing problems associated with rape, young involvement with armed group and social and economic hardships; improved community acceptance had desirable effect across all outcomes
	Uganda	Amone P.Olak et al., 2007. <i>S Afr Psych Review</i> ; Amone-P.Olak, 2005. <i>Intervention</i>	Observational	Recruited from rehabilitation centers	216/123/339	No	IES-R	No	No	Regression	<i>Girls</i> vs. <i>Boys</i> PTSD 99% vs. 98%	Number of war experiences assoc. with more distress

Region	Country	Reference	Design	Sampling	Child soldier sample size		Psychosocial/mental health measures				Findings	
					Boys/girls/total	Control group	Measure	Locally Adapted	Locally validated	Analysis	Prevalence	Associations with war exposures
		Bolton et al., 2007. <i>JAMA</i> ; Betancourt, McBain, et al., 2012. <i>JoAH</i>	RCT	Recruited from two IDP camps	68/59/127 ^b	Yes	APAI	Yes	Yes	Multilevel models	See article for description of intervention effects	Toward
		Blattman & Anman, 2010. <i>Rev Economics and Statistics</i>	Observational	Randomized representative sample of abducted and nonabducted youth	462/0/462 (741 total, with nonabducted youth)	Yes	NUCPAS, HSCL, HTQ, ISSB	Yes	No	Average treatment effect	N/A	Psych distress assoc. with index of violence, not abduction.
		Derluyn et al., 2004. <i>Lancet</i>	Observational	Recruited through press	61/10/71	No	IES-R	No	No	MANOVA	PTSD 97%	No assoc. of war experiences with PTSD
		Ertl et al., 2011. <i>JAMA</i>	RCT	Former soldiers with PTSD recruited from population-based survey	38/47/85	Yes	CAPS, MINI-Kid; Perceived Stigmatization Questionnaire	No	No	Chi-square; Mann-Whitney U; mixed-effects models	PTSD Pre: 100% Post: 32% (NET); 47.8% (academic); 46.4% (waitlist) Depression Pre: 24.1% (NET); 32.1% (academic); 7.1% (waitlist) Post: 20.7% (NET); 21.4% (academic); 14.3% (waitlist)	N/A
		Okello et al., 2007. <i>Afr J Psych</i>	Observational	Recruited from rehabilitation center and local school	28/54/82	Yes	MINI-Kid, SDQ	No	No	Chi-square; regression	CAAFAG vs. Controls PTSD 27% vs. 13%, Depression 19% vs. 4%, Anxiety 13% vs. 4%	PTSD assoc. with food and water deprivation, and with being forced to perform rituals

Region	Country	Reference	Design	Sampling	Child soldier sample size		Psychosocial/mental health measures				Findings		
					Boys/girls/total	Control group	Measure	Locally Adapted	Locally validated	Analysis	Prevalence	Associations with war exposures	
		Ovuga et al., 2008. <i>Af Health Sci</i>	Observational	Convenience	58/44/102	No	No	HSCL, HTQ	No	No	Chi-square	PTSD 56%, Depression 88%	Depression assoc. with war trauma; <i>No PTSD assoc.</i>
		Klasen, Oettingen, Daniels, Post, et al., 2010. <i>Child Dev</i> ; Klasen, Oettingen, Daniels, & Adam, 2010. <i>JTS</i> ; Klasen, Schrage, Post, Adam, 2011. <i>PKK</i>	Observational	Sampled from boarding school for war-affected youth	170/160/330	No	No	MINI-Kid, YSR, CD-RISC, ARS, TRGI, TRIM	Yes	No	Multiple regression	<i>Girls vs. Boys</i> PTSD 33% vs. 34%, Depression 36% (overall)	Perpetrator and victim of trauma assoc. with depression and PTSD; Community and domestic violence assoc. with PTSD, MDD, behavior/emotion problems
		MacMullin & Loughry, 2004. <i>J Ref Studies</i>	Observational	Mixed sample: NGO registries and door-to-door sample of noncombatants	412/155/567	Yes	Yes	NUCPAS	Yes	Yes	Descriptive	N/A	Higher levels of depression, anxiety, and hostility in abducted children; length of captivity assoc. with poor adjustment
		Pfeiffer & Elbert, 2011. <i>Conf & Hlth</i>	Observational	Recruited from past and present beneficiaries of a reception center and IDP camp	31/41/72	No	No	PDS; HSCL	No	Yes	Multiple regression	<i>Girls vs. Boys</i> PTSD 45% vs. 26% <i>Both genders</i> Depression 71% Anxiety 60%	Total number of trauma events and LRA-specific traumas correlate with PTSD sum score; Duration of association <i>negatively</i> correlated with PTSD
	Uganda and DRC	Bayer et al., 2007. <i>JAMA</i>	Observational	Randomly selected from rehabilitation centers	141/28/169	No	No	CPTSD-RI	No	No	Mann-Whitney U	PTSD 35%	<i>No assoc. of PTSD with trauma.</i> PTSD was assoc. with openness to reconciliation and feelings of revenge.
	DRC	McMullen et al., under review	RCT	Recruited by NGOs and local organizations	50/0/50	No	Yes	PTSD-RI; APAI	Yes	Yes	ANCOVA	N/A	Not explored
Asia	Nepal	Kohrt et al., 2008. <i>JAMA</i> ; Kohrt, Jordans, Tol, et al., 2010. <i>Trans Psych</i> ; Morley & Kohrt, 2012. <i>JCAT</i>	Observational	Purposive, matched-pair sampling using names provided by local human rights groups and agencies	67/75/142	Yes	Yes	DSRS, SCARED, CPSS, SDQ, Local measure of functional impairment	Yes	Yes	Generalized estimating equation	<i>CAAFAG vs. Controls</i> PTSD 55% vs. 20%, Depression 53% vs. 24%, Anxiety 46% vs.	PTSD assoc. with beating, abduction, torture

Region	Country	Reference	Design	Sampling	Child soldier sample size	Psychosocial/mental health measures			Findings			
						Boys/girls/total	Control group	Measure	Locally Adapted	Locally validated	Analysis	Prevalence
	Sri Lanka	De Silva et al., 2001. <i>Child Abuse Rev</i>	Observational	Recruited from rehabilitation center	19/0/19	No	Local measure	Yes	No	Descriptive	38%, Function Impairment 62% vs. 45%. 38%, Function Impairment 62% vs. 45%. 38%, Function Impairment 62% vs. 45%. 38%, Function Impairment 62% vs. 45%. 38%, Function Impairment 62% vs. 45%. 38%, Function Impairment 62% vs. 45%. 38%, Function Impairment 62% vs. 45%.	N/A
		Kanagaratnam et al., 2005. <i>Scand J Psych</i>	Observational	Snowball sampling of exiles in Norway	18/2/20	No	IES	No	No	Mann-Whitney U	N/A	Protective effect of ideological commitment most visible at low levels of war experiences
Europe	Germany	Forstmeier et al., 2009. <i>Am J Geriatr Psych</i>	Observational	Recruitment through press	102/1/103 (geriatric sample of former WWII child soldiers)	No	PTGI, PDS, BSI, SAQ	No	No	Bivariate correlations	PTSD 5% after WWII, 2% current	No assoc. between traumatic events and posttraumatic growth
Central America	El Salvador	Santacruz & Arana, 2002. <i>Biomedica</i>	Observational	Sampled from communities known for resettlement of demobilized combatants	196/97/293	No	Local measure	Yes	No	Descriptive	Memories of what happened 58%, Fatigue/depression 39%	Psych. distress assoc. with death of family or friend and with injured/disabled in war
TOTAL					2783/1201/3984							

^a Although some analyses have used subsets of the sample, these numbers reflect the total number of former child soldiers within a larger sample of war-affected youth.

^b Reported for former child soldiers only.

ARS, adolescent resilience scale; APAI, Acholi Psychosocial Assessment Instrument; BSI, brief symptom inventory; CAPS, clinician-administered PTSD scale; CBI, child behavior inventory form; CD-RISC, Connor-Davidson resilience scale; CPSS, child PTSD symptom scale; DRS, depression self rating scale; EDS, everyday discrimination scale; HSCL, Hopkins symptom checklist; HTQ, Harvard trauma questionnaire; ICD-10, international statistical classification of diseases and related health problems international statistical classification of diseases and related health problems; IES, impact of events scale; IES-R, impact of events scale-revised; ISSB, inventory of socially supportive behaviors; MINI-Kid, mini international neuropsychiatric inventory; NUCPAS, northern Ugandan child and youth psychosocial adjustment scale; OMPA, Oxford measure of psychosocial adjustment; PTGI, posttraumatic growth inventory; PDS, PTSD diagnostic scale; PTSD-R, UCLAPTS reaction index revised; SAQ, social acknowledgment questionnaire; SCARED, screen for child anxiety related emotional disorders; SCL, symptom checklist; SDQ, strengths and difficulties questionnaire; SOC, sense of coherence scale; TRGI, traumatic guilt inventory; TRIM, transgression-related interpersonal motivations scale; TSCL, trauma symptoms checklist (adapted Harvard trauma questionnaire); YSR, youth self-report.

Table 2
Systematic assessment of quality in observational research (SAQOR) ratings

SAQOR domain^a

Region	Country	Reference	Design	Sample			Comparison group			Exposure and Outcome Measurement			Follow-Up			Reporting Bias			Quality									
				Representative	Source	Method	Power Calculation	Inclusion Criteria	Summary	Inclusion	Identifiable	Source	Matched or Randomized	Statistical control	Summary	Exposure	Outcome	Summary		Number lost	Reason for loss	Summary	Intervention	Signs	Summary	Missing Data	Clarity Accuracy	Summary
Africa	Cote d'Ivoire	Bissoma et al. (2010)	Pre-postintervention	N	Y	Y	N	Y	A	N	N	N	I	Y	U	I	N	U	N	I	Y	N	A	N	N	N	I	Low
	Liberia	Gregory & Embrey (2009)	Pre-postintervention	N	Y	Y	N	U	I	N	N	N	I	Y	N	I	N	Y	Y	A	U	Y	N	I	Y	Y	A	Low
	Mozambique	Boothby (2006)	Longitudinal	N	Y	N	N	N	I	N	N	N	N	I	Y	A	N	N	N	I	N	Y	Y	A	N	N	I	Low
	Sierra Leone	Betancourt, Adam, Blake, et al., 2008; Betancourt, Bremm, et al., 2009; Betancourt, Bremm, et al., 2010; Betancourt, Bremm, et al., 2011; Betancourt, McBain, et al., 2012	Longitudinal	N	Y	Y	N	Y	A	Y	Y	Y	A	Y	Y	A	Y	Y	Y	A	Y	N	Y	A	Y	Y	A	High
	Uganda	Ahrens (2005); Ahrens (2006); Ahrens, et al., 2007	Observational	Y	Y	Y	N	N	A	A	N/A	N/A	N/A	N/A	Y	N	I	N/A	N/A	N/A	Y	N	N	I	N	Y	I	Low
		Betancourt, McBain, et al., 2012; Bolton et al., 2007	RCT	N	Y	Y	Y	Y	A	A	Y	Y	Y	A	Y	Y	A	Y	Y	A	Y	Y	Y	A	Y	Y	A	High
		Blattman & Annan, 2010	Observational	Y	Y	Y	Y	Y	A	A	Y	Y	Y	A	Y	Y	A	N/A	N/A	N/A	N	Y	Y	A	Y	Y	A	High
		Derhoy et al., 2004	Observational	N	U	Y	N	U	I	N/A	N/A	N/A	N/A	N/A	Y	N	I	N/A	N/A	N/A	Y	N	N	I	N	Y	I	Low
		Erit et al., 2011	RCT	N	Y	Y	Y	Y	A	A	Y	Y	Y	A	Y	Y	A	Y	Y	A	N	Y	N	I	Y	Y	A	Moderate
		Okello et al., 2007	Observational	N	Y	Y	N	Y	A	A	Y	N	Y	A	Y	Y	A	N/A	N/A	N/A	N/A	N	N	I	N	Y	I	High
Asia		Owaga et al., 2008	Observational	N	Y	Y	N	N	I	N/A	N/A	N/A	N/A	Y	N	I	N/A	N/A	N/A	Y	N	N	I	N	N	N	I	Low
		Khan, Osherson, Daniels, & Adams, 2010; Khatun et al., 2011	Observational	N	Y	Y	N	Y	A	N/A	N/A	N/A	N/A	Y	Y	A	N/A	N/A	N/A	Y	Y	Y	Y	A	Y	Y	A	High
		MacMullin & Longley, 2004	Observational	Y	Y	Y	N	N	A	A	Y	Y	U	Y	U	I	N/A	N/A	N/A	Y	N	N	I	N	N	N	I	Moderate
		Pfiffer & Ebert, 2011	Observational	N	Y	Y	N	Y	A	N/A	N/A	N/A	N/A	Y	Y	A	N/A	N/A	N/A	Y	N	N	N	I	N	Y	I	Moderate
	Uganda and DRC	Boyer et al. (2007)	Observational	N	Y	Y	N	Y	A	N/A	N/A	N/A	N/A	Y	Y	A	N/A	N/A	N/A	Y	N	N	Y	A	Y	Y	A	High
	DRC	McMullin et al. (under review)	RCT	N	Y	Y	Y	Y	A	Y	Y	Y	Y	A	Y	Y	A	Y	Y	A	N	Y	N	I	Y	Y	A	High
	Nepal	Kohrt et al., 2008; Kohrt, Jackson, Tolst et al., 2010; Murray & Kohrt, 2012	Observational	N	Y	Y	Y	Y	A	Y	Y	Y	Y	A	Y	Y	A	N/A	N/A	N/A	Y	Y	Y	A	Y	Y	A	High
	Sri Lanka	De Silva et al. (2001)	Observational	N	U	Y	N	N	I	N/A	N/A	N/A	N/A	N/A	Y	N	I	N/A	N/A	N/A	N	N	N	I	N	U	I	Low
		Kanagaratnam et al. (2005)	Observational	Y	Y	Y	N	N	A	N/A	N/A	N/A	N/A	Y	Y	A	N/A	N/A	N/A	N	N	N	N	I	N	U	I	Low
	Europe	Forsmeier et al. (2009)	Observational	N	Y	Y	N	Y	A	N/A	N/A	N/A	N/A	Y	Y	A	N/A	N/A	N/A	N	U	U	U	I	N	Y	I	Moderate
Central America	Sanchez & Adams (2002)	Observational	Y	Y	U	N	Y	A	N/A	N/A	N/A	N/A	Y	U	I	N/A	N/A	N/A	Y	N	N	N	I	N	Y	I	Low	
TOTALS				5	1	1	5	1	1	7	7	5	6	7	2	11	10	5	5	5	1	9	8	9	15	9	8	High
				9	9	9	9	3	5					0				3										-4 Moderate
																												9 Low

^a Guide to SAQOR Scoring:

For Sample, the 'source' criterion was met if the region, population, or other context for study recruitment was described. For 'method', this criterion was met if the method of study recruitment was defined, such as door-to-door visits, NGO lists, or radio-based recruitment. For 'sample size', this criterion was met if a power calculation was provided for sample size determination given a specific study hypothesis. For 'inclusion/exclusion', the criterion was met if the process of determining whether a child was or was not a child soldier was described and if any other exclusion criteria were included. Given that child soldiers are a hidden and often stigmatized group, community sampling is logistically and ethically difficult. Thus, for this review, representativeness was defined as met if the study made an effort to determine a base sample across multiple sources (i.e., rehabilitation centers or school programs) and used random sampling to arrive at the sample. To achieve a score of 'Adequate', studies must have met 3 of 5 Sample criteria.

For Control/Comparison Group, 'inclusion' criterion was met if there were a group of nonconscribed civilian children for comparison. 'Identifiable' indicated that there were clear criteria to distinguish between the child soldiers and civilian children. 'Source' referred to describing from where these children were recruited, for example community, school, and other organization. 'Matched or randomized' referred to a recruitment procedure pairing soldiers and civilians, other techniques to assure representativeness of the comparison children. 'Statistical control' refers to addressing confounds through use of appropriate statistics for pairing, clustering, and excluding any matching criteria from analyses. To achieve a score of 'Adequate', studies must have met 3 of 5 Control/Comparison criteria. Studies without controls/comparisons were rated 'Not Applicable' for this category.

For Exposure and Outcome Measurements, 'exposure' criteria were met if an instrument was developed or employed to assess type of traumatic or conflict-related events. 'Outcome' criteria were met if instruments used were either developed for the local population or went through a validation process, for example Kohrt et al. (2011). Instruments that were simply translated and back-translated were not considered to demonstrate validity. To achieve a score of 'Adequate' in this category, studies must have met both criteria.

Follow-Up criteria were met if the number lost and reason for the loss were described in the text. To achieve a score of 'Adequate' in this category, studies must have met both criteria.

Distorting Influence categories were developed for the study based on criteria associated theoretically and in early studies with differences in mental health outcome. We chose 'gender' because of expectations that the soldiering experience will have differential effects on boys versus girls often because their roles and experiences may differ (Bush, 2008; Fox, 2004; Honwana, 2006; Mazurana & McKay, 2001; West, 2004). 'Intervention' was included because many child soldiers are recruited from NGOs who are providing some type of support. Therefore, 'intervention' criteria were met if a description of services received was included, and if so, what type. Formal experimental designs testing intervention models were reviewed separately. 'Stigma/social factors' was included because of the increasing awareness that the experiences after association with an armed group may be just as important in determining mental health as direct war-related exposures (Betancourt, Agnew-Blais, et al., 2010; Kohrt, Tol, et al., 2010). To achieve a score of 'Adequate' in this category, studies must have met 2 of 3 criteria.

For Data Reporting, 'missing data' criteria was met if the reason for missing data and the statistical technique used for accounting for missing data were discussed. To achieve a score of 'Adequate' in this category, studies must have met both criteria.

Rubric for computing overall quality score: longitudinal and intervention studies: high 5 or more adequate; moderate 3–4 adequate; low 3 or more inadequate; observational studies: high 3 or more adequate in applicable domains; moderate 2 adequate in applicable domains; low 3 or more inadequate in applicable domains.