NEW RESEARCH

Stigma and Acceptance of Sierra Leone's Child Soldiers: A Prospective Longitudinal Study of Adult Mental Health and Social Functioning

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Objective: To investigate the associations of war and postconflict factors with mental health among Sierra Leone's former child soldiers as adults.

Method: In 2002, we recruited former child soldiers from lists of soldiers (aged 10–17 years) served by Disarmament, Demobilization, Reintegration centers and from a random door-to-door sample in 5 districts of Sierra Leone. In 2004, self-reintegrated child soldiers were recruited in an additional district. At 2016/2017, 323 of the sample of 491 former child soldiers were reassessed. Subjects reported on war exposures and postconflict stigma, family support, community support, anxiety/depression, and posttraumatic stress symptoms.

Results: Of the subjects, 72% were male, with a mean age of 28 years. In all, 26% reported killing or injuring others; 67% reported being victims of life-threatening violence; 45% of female subjects and 5% of male subjects reported being raped; and 32% reported death of a parent. In 2016/2017 (wave 4), 47% exceeded the threshold for anxiety/depression, and 28% exceeded the likely posttraumatic stress disorder threshold. Latent class growth analysis yielded 3 trajectory groups based on changes in stigma and family/community acceptance; "Improving Social Integration" (n = 77) fared nearly as well as the "Socially Protected" (n = 213). The "Socially Vulnerable" group (n = 33) had increased risk of anxiety/depression above the clinical threshold and possible PTSD, and were around 3 times more likely to attempt suicide.

Conclusion: Former child soldiers had elevated rates of mental health problems. Postconflict risk and protective factors related to outcomes long after the end of conflict. Targeted social inclusion and family interventions could benefit the long-term mental health of former child soldiers.

Key words: child soldiers, Sierra Leone, conflict, stigma, global mental health

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In some of the world's most violent armed conflicts, the exploitation of children by armed groups has doubled in recent years. Colloquially referred to as "child soldiers," they may face forced family separation, loss of access to school and healthcare, poor access to food and shelter, displacement from homes and communities, death of loved ones, and sexual assault, and witness or participate in killings.[1] Mental health problems, such as depression, anxiety, and posttraumatic stress disorder (PTSD) are common among former child soldiers. Given their association with armed groups, former child soldiers may face stigma and lack of family and community acceptance.[2]

How war experiences operate within the postconflict environment to shape long-term health and social functioning of former child soldiers is not well understood. Despite high rates of mental health problems, such as PTSD and depression among former child soldiers,[3,4] research on the topic is fraught with realities of heterogeneity in timing, severity, and type of exposure.[5] Moreover, limited research on adult life outcomes is available. The limited longitudinal research available from Northern Ireland,[6] Northern Uganda,[3,7] the Democratic Republic of Congo,[8] and Mozambique[9] reveals a range of risk factors that influence the lives of former child soldiers.

In our research, exposure to certain "toxic stressors" (frightening/life-threatening experiences in the absence of support from attachment figures) have been associated with poor outcomes. Being a victim of sexual violence or rape was associated with increased risk of anxiety and depression[4,10,11] and PTSD,[12] and being beaten or threatened to be killed was also associated with increased risk of PTSD.[13,14] Children who perpetrated violence had interpersonal deficits and higher hostility and aggression later in life. Child soldiers involved in armed groups at younger ages had higher levels of anxiety and depression. Overall, the prevalence, type, severity, and timing

of war trauma have been associated with decreased school completion, high rates of mental health problems, and criminal involvement in adulthood. Based on evidence from studies of war-exposed youth and of children exposed to extreme and/or compound adversity, it is expected that war experiences and postconflict risk and protective factors will shape adult mental health and life outcomes.[15]

Research examining the postconflict environment reveals important leverage points that can help to improve social integration among former child soldiers. In Northern Uganda, research described how many of the former child soldiers with poor outcomes had encountered challenges in achieving educational and economic stability.[16] Postconflict stressors facing former child soldiers are associated with anxiety and depression problems in adulthood.[17-19] Perceived stigma, lack of community or family acceptance, or physical abuse or neglect within the family have been associated with poorer mental health over time. Protective factors, such as family and community acceptance, forgiveness, or traditional healing rituals and community sensitization interventions may also have a positive influence on the long-term outcomes of former child soldiers.[9,20] There is evidence that despite horrific trauma, positive developmental outcomes in adulthood may be possible if adequate resources and supports are available.[21,22]

The Longitudinal Study of War-Affected Youth (LSWAY) is a 4-wave (2002–2017), prospective study of a cohort of male and female former child soldiers who participated in Sierra Leone's 11-year civil war (1991–2002), infamous for its involvement of child soldiers. In this study we consider whether postconflict family and community support are associated with mitigated long-term difficulties, and whether stigma is associated with exacerbated difficulties.

METHOD

Participants

LSWAY was launched in collaboration with a nongovernmental organization (NGO) working with the Government of Sierra Leone.[2] Assessments were conducted at 4 time points (T1: 2002, T2: 2004, T3: 2008, and T4: 2016/2017), beginning just after the cessation of hostilities. The sample (N = 529) was drawn from multiple sources to capture the diversity of experiences in study participants. At T1, subjects aged 10 to 17 years who were involved with the Revolutionary United Front (RUF) or other armed groups who had been referred to Disarmament, Demobilization, and Reintegration (DDR) programs or were on lists of self-reintegrated former child soldiers in 5 districts (Bo, Kenema, Kono, Moyamba, and Pujehun) were invited to participate in the study (n = 259). A random door-to-door survey of youths of similar age who were not served by DDR programs (n = 136) was administered in the same 5 regions. Additional self-reintegrated youths were added at T2 from an outreach list identified by an NGO in the Makeni region (n = 127) (see Table S1, available online, for greater detail).

Trained Sierra Leonean research assistants conducted private interviews with subjects lasting 1 to 3 hours (all data in the present study are from participant interviews). Consents/assents and all study protocols were administered orally in Krio, the most widely spoken language. Subjects were given a small gift of foodstuffs and supplies for participation. Referrals were made for risk of harm situations due to suicidality or urgent mental health issues; approximately 1% of participants needed referral at each wave. At baseline, procedures were approved by the Office of Human Research Administration at Boston University and later at the Harvard T. H. Chan School of Public Health.

Measures

Mixed methods were used to establish culturally meaningful and valid assessments of mental health, risk and protective factors, and social functioning.[23,24]All measures were self-report and were selected and adapted in consultation with local staff and community members.[25] Focus group discussions among youths and adults similar to the study population were used to develop items and to determine the face validity and cultural appropriateness of scales. All measures were forward- and back-translated following a standard protocol.[26]

Items from the Child War Trauma Questionnaire[27] were introduced at T2 (and at T3 or T4 for participants not interviewed at T2) to assess individual war experiences. Four war experiences were considered "toxic" exposures: (1) direct experience of life-threatening war- violence; (2) death of a caregiver due to war; (3) being a victim of rape or sexual assault; and (4) injuring or killing others. This measure also included age of abduction and length of time with fighting forces.

Mental health was assessed using the Oxford Measure of Psychosocial Adjustment (OMPA). Subscales for hostility (mean of 11 items, range 1–4, T1–T4 average Cronbach's $\alpha = 0.78$) and prosocial behaviors (mean of 9 items, range 1–4, T1–T4 average Cronbach's $\alpha = 0.74$) were used in this analysis. Beginning at T2, anxiety and depression were measured using the Hopkins Symptom Checklist/SF-25 (HSCL-25)[28] (mean of 25 items, range 1–4, T2–T4 average Cronbach's $\alpha = 0.90$), posttraumatic stress symptoms were assessed using the 9-item version of the Child Posttraumatic Stress Disorder Reaction Index (PTSD-RI)[29] (mean, range 0–4, T2–T4 average Cronbach's $\alpha = 0.86$),

both of which have been used to assess children and adolescents globally.[5,30] Emotion dysregulation was assessed at T4 using the Difficulties in Emotion Regulation Scale (DERS)[31] (mean of 24 items, range 1–5, T4 Cronbach's $\alpha = .95$).

Family and community acceptance measures were developed locally (Table S2, available online). Community Acceptance assessed subjects' perceived acceptance from the community at all waves (mean of 6 items, range 0–2, T1–T4 average Cronbach's $\alpha = 0.86$). Family Acceptance assessed subjects' perceived acceptance from family beginning at T2 (mean of 6 items, range 0–2, T2–T4 average Cronbach's $\alpha = 0.88$). Stigma and perceived discrimination were assessed T2–T4 with an adaptation of the 9-item Everyday Discrimination Scale,[32] capturing negative community interactions; stigma due to being a former child soldier is used in this analysis (sum, range 0–9, T2–T4 average Cronbach's $\alpha = 0.88$).

Participants were asked about current school attendance, highest grade level achieved, employment at wave of assessment, involvement in crime, current use of alcohol and drugs, and whether they had a partner. Intimate partner violence was assessed using the Conflict Tactics Scale (range 0–8, T4 Cronbach's $\alpha = 0.65$).[33] Demographic information such as sex and age were collected at each wave using the UNICEF Multiple Indicator Cluster Survey.[34]

Statistical Analyses

Descriptive statistics were used to summarize sample characteristics, social functioning, and mental health outcomes in adulthood, and to describe community and social factors and mental health indicators over time. We compared our participants to an age- and sex-standardized population of respondents to the nationally representative 2013 (latest available) Sierra Leone Demographic and Health Survey (DHS) using harmonized demographic indicators (Table S3, available online).[35]

Next, to address the study's aim of examining whether postwar family and community supports were associated with the reduced long-term negative consequences of the war exposures, we first used latent class growth analysis to sort subjects into groups based on changes over time in stigma, family acceptance, community acceptance, and related group membership at T4 using a semiparametric mixture model.[36] We estimated the probability that an individual belonged to a trajectory group based on that individual's observed pattern of risk and protective factors, and then assigned group membership using the highest classification probability across trajectories. Age, sex, and previous war experiences were included as time-stable covariates. These trajectories were used to characterize a participant's "social integration." Best fit was based on Bayesian Information Criterion, average posterior probabilities of group membership, and odds of correct classification.[37]

Finally, we conducted logistic regression analyses to evaluate whether war experiences and social integration trajectory membership were associated with anxiety and depression, PTSD, suicide attempts, perpetration of intimate partner violence, substance use, involvement with police, primary school completion, and employment at T4, controlling for sex and age. Unless data are missing completely at random, analysis of only complete cases is likely to result in biased results.[38] Missing data occurred for several reasons. In completing scales, respondents may not have supplied a response to one or more items or may not have responded to one or more indicator variables. At T2, some youths originally interviewed at T1 were not re-interviewed because data collection stopped prematurely because of the death of the director of the collaborating NGO in a United Nations helicopter crash, but many of these individuals were re-contacted at T3. For descriptive statistics and logistic regression analyses, we used multiple imputation methods presented by Plumpton *et al.*[39] that allow combined imputation of item-level and scale/indicator missingness via the STATA plug-in command ice, which implements chained equations.[40] We used all cases (N = 529), including 38 youths who were not involved with the fighting forces, to create 30 imputed data sets. For the latent class growth analysis, full information maximum likelihood estimation was used to address missingness.[41] For the present analysis, we reduced the analytic data set to N=323 former child soldiers interviewed at T4 to have full information on adult life outcomes and mental health. We used inverse probability weighting to account for loss to follow-up.[42]

For tests unrelated to the central aim of the article linking social integration to mental health and social functioning at T4, we provide unadjusted p values and 95% confidence intervals throughout the results. For the logistic regressions relating to the central aim, we provide both estimated and adjusted p values in Table S4 (available online). It is worth noting, however, that lowering the type I error (ie, α) has the effect of increasing type II error, the chance of rejecting a true effect in the population. Finding such effects is more consistent with the goals of the present study.

RESULTS

Characteristics of the T4 Sample

Characteristics of the sample at T4 are displayed in Table 1. The sample was predominantly male (72%, n = 231) and evenly divided between Christian (50%, n = 160) and Muslim (50%, n = 162). Most youths (86%, n = 275) were abducted/forced into armed groups at a mean age of

10.9 years and remained an average of 3.0 years. About a quarter of the sample (26%, n = 84) reported killing or injuring others. About two-thirds (67%, n = 216) reported having been victims of life-threatening violence (ie, shot or stabbed, beaten, or violently injured); 16% (45%, n = 40 of female and 5%, n = 11 of male subjects) reported being raped during the war; and 32% (n = 101) reported having a parent die during the war. On average, subjects reported 1.4 (SD = 0.06) cumulative toxic war exposures, more among female (1.8, SD = 0.12) than among male (1.3, SD = 0.06) subjects.

At T4, the mean age of participants was 28.0 (SD = 0.21) years (range, 21–32 years). Approximately half (54%, n = 171) of the LSWAY sample was married, living with a partner, or engaged at T4 compared to 66% of the DHS sample who were married or partnered. In all, 68% (n = 219) of the youths in our sample reported having biological children, which was similar to that in the DHS sample (72%). Because of NGO efforts, the majority of our sample (80%, n = 258; 85% of male and 68% of female subjects) had completed primary school, more than twice as many as in the DHS reference data (44% overall, 50% of male and 30% of female subjects). The mean number of years of schooling reported by each participant was 8.8 (9.3 years for male and 7.4 years for female subjects). In all, 9% of our sample (n = 31; 8% of male and 13% of female subjects) reported currently being a student. Only 40% (n = 159; 42% of male and 36% of female subjects) of the LSWAY former child soldiers reported being currently employed (including self-employed), compared to 82% (86% of male and 72% of female subjects) in the DHS sample.

At T4, approximately 31% (n = 99) of LSWAY former child soldiers (39% of male and 10% of female subjects) reported using alcohol or drugs in a typical week.[43] Among those with an intimate partner (n = 194), 39% (n = 82; 47% of male and 17% of female subjects) reported having physically assaulted (ie, pushed or shoved, slapped, slammed against a wall, hit with a physical object, used a knife or weapon against, or forced to have sex) their intimate partner in the past year, which is considerably higher than in the DHS sample (13%; 16% of male and 5% of female subjects). At T4, 5% (n = 16) of the sample reported ever having been in trouble with the police (no comparable DHS statistics were available).

Fifteen years after the conflict, nearly half the sample (47%, n = 153; 49% of male subjects, n = 114, and 43% of female subjects, n = 39) reported levels of anxiety and depression symptoms above conventional international cut-offs (mean score >1.75, using the 25-item Hopkins Symptom Checklist/SF-25 [HSCL-25]; range. 1–4). More than a quarter (28%, n = 90; 31% of male subjects, n = 72, and 20% of female subjects, n = 18) reported PTSD symptoms above the threshold for "possible PTSD" on the 9-item version of the Posttraumatic Stress Disorder Reaction Index (PTSD-RI; range, 0–4).[44,45] Of the LSWAY former child soldiers, 11% (n = 34; 11% of male subjects, n=26, and 9% of female subjects, n = 8) reported having attempted suicide.

Mean Levels of Social Factors and Mental Health Indicators Over Time

Mean levels of social factors over time are shown in Figure 1. Overall, perceived stigma due to being a child soldier diminished, from a mean of 2.3 at T2 to a mean of 0.5 at T4 (mean change per year following conflict = −0.14; 95% CI = −0.16 to −0.11). Community and family acceptance diminished slightly over time. Mean community acceptance was 1.8 at T1 and fell to 1.5 at T4 (mean change per year following conflict = −0.01; 95% CI = −0.02 to −0.01). Average family acceptance dropped just slightly from 1.8 at T2 to 1.6 at T4 (mean change per year following conflict = −0.00; 95% CI = −0.01 to 0.01). Female former child soldiers generally reported higher stigma and lower community and family acceptance than male former combatants in earlier waves (T1–T2), but by T4, female subjects' perceptions of community and social factors improved, such that at T4, female subjects reported lower levels of perceived stigma and higher levels of family acceptance compared to male subjects, as seen in Figure 1.

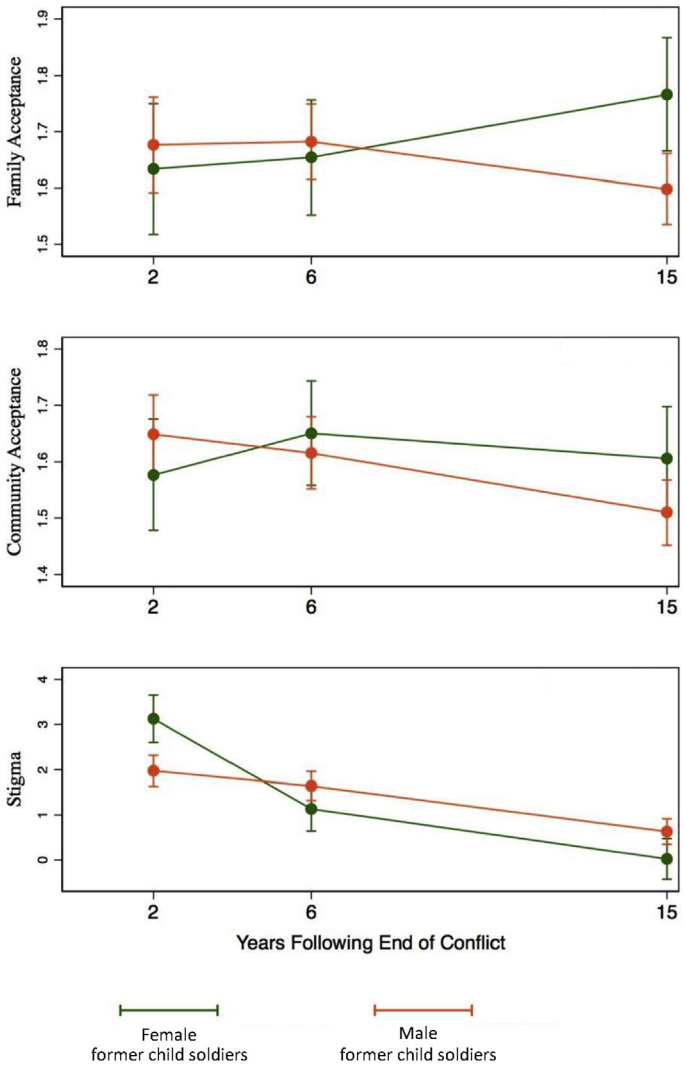
Figure 2 presents average trajectories of depression, anxiety, PTSD symptoms, and prosocial behaviors over time by sex. From T2 to T4, mean anxiety and depression scores decreased from 2.0 to 1.7 (mean change per year following conflict = −0.02; 95% CI = −0.03 to −0.02); the percentage of those above the cut-off decreased from 63% at T2 to 47% at T4. Mean PTSD symptom scores decreased from 1.6 to 1.2 (mean change per year following conflict = −0.01; 95% CI = −0.01 to −0.00), with 28% of the sample above the cut-off at T4, down from 36% at T2. Both male and female former child soldiers showed improvements over time in anxiety and depression to the point where the mean values were just below diagnostic cut-offs at T4. Although female former child soldiers had higher depression, anxiety, and PTSD scores compared to their male counterparts at T2, female former combatants show greater improvement in these indicators. By T4, male and female former child soldiers look similar on depression and anxiety. Externalizing behaviors abate for both sexes. Although PTSD shows steady improvement for female subjects, the pattern for male subjects is less clear, with T4 values looking not much improved over those observed at T2. Male former child soldiers started higher on prosocial

TABLE 1 Estimated Means and Percentages (With Standard Errors) for Characteristics of Male and Female Child Soldiers, Trajectory Groups (N = 323)

	Full Sample (N = 323)	Female Subjects (n = 91)	Male Subjects (n = 232)	Socially Protected (n = 213)	Improving Social Integration (n = 77)	Socially Vulnerable (n = 33)
Prior War Experiences						
Experienced the death of a parent	32% (0.03)	38% (0.05)	29% (0.03)	27% (0.03)	40% (0.06)	50% (0.09)
Was a victim of rape	16% (0.02)	45% (0.05)	5% (0.01)	12% (0.02)	37% (0.06)	10% (0.05)
Was a victim of life-threatening violence	67% (0.03)	69% (0.05)	66% (0.03)	64% (0.03)	76% (0.05)	75% (0.08)
Killed or injured others during the war	26% (0.02)	23% (0.04)	28% (0.03)	19% (0.03)	32% (0.06)	66% (0.09)
Cumulative war exposures (range 0–4)	1.4 (0.06)	1.8 (0.12)	1.3 (0.06)	1.2 (0.06)	1.9 (0.13)	2 (0.16)
Age of abduction/joined fighting forces (4–18)	10.9 (0.20)	11.0 (0.41)	10.9 (0.22)	11.0 (0.23)	12.0 (0.75)	10.5 (0.62)
Years involved with fighting forces (0.25–11)	3.0 (0.15)	2.3 (0.35)	3.2 (0.17)	3.0 (0.18)	2.6 (0.56)	2.8 (0.33)
Demographics at Time 4						
Age (21–32)	28.0 (0.21)	27.0 (0.39)	28.4 (0.24)	27.8 (0.24)	29.2 (0.92)	27.9 (0.62)
Male	72% (0.03)	-	-	79% (0.03)	53% (0.12)	97% (0.03)
Married, living with partner, or engaged	54% (0.03)	49% (0.05)	56% (0.03)	52% (0.03)	64% (0.10)	51% (0.10)
Has biological children	68% (0.03)	75% (0.05)	66% (0.03)	64% (0.03)	75% (0.08)	78% (0.05)
Adult caregivers not financially responsible for care	70% (0.03)	69% (0.05)	70% (0.03)	67% (0.03)	85% (0.07)	76% (0.05)
Education and Employment						
Completed primary school	80% (0.02)	68% (0.05)	85% (0.02)	79% (0.02)	71% (0.11)	84% (0.04)
Currently working or self-employed	40% (0.03)	36% (0.05)	42% (0.03)	52% (0.03)	41% (0.12)	44% (0.05)
Currently a student	9% (0.02)	13% (0.04)	8% (0.02)	12% (0.02)	7% (0.50)	2% (0.02)
Community and Social Factors						
Stigma due to being a former child soldier (0–9; α = 0.88)	0.5 (0.01)	0.0 (0.03)	0.6 (0.10)	0.3 (0.07)	0.3 (0.29)	1.0 (0.23)
Community acceptance (0–2; α = 0.86)	1.5 (0.02)	1.6 (0.04)	1.5 (0.02)	1.6 (0.03)	1.6 (0.48)	1.3 (0.05)
Family acceptance (0–2; α = 0.88)	1.6 (0.02)	1.8 (0.03)	1.6 (0.01)	1.7 (0.02)	1.6 (0.08)	1.4 (0.06)
Risk Behaviors						
Substance use (alcohol or drug use in typical week)	31% (0.03)	10% (0.03)	39% (0.03)	29% (0.03)	24% (0.11)	39% (0.06)
Trouble with police/law	5% (0.01)	2% (0.02)	6% (0.02)	3% (0.01)	11% (0.06)	11% (0.04)
Perpetrator of IPV (assault, past year, among those with an intimate partner, n = 193)	39% (0.04)	17% (0.05)	47% (0.04)	36% (0.04)	53% (0.12)	42% (0.07)
Mental Health						
Prosocial attitudes (OMPA, 1–4, higher is good; α = 0.74)	3.1 (0.02)	3.1 (0.04)	3.1 (0.03)	3.1 (0.02)	3.2 (0.08)	3.0 (0.05)
Externalizing (OMPA, 1–4; α = 0.78)	1.4 (0.02)	1.4 (0.03)	1.4 (0.02)	1.4 (0.02)	1.4 (0.50)	1.5 (0.03)
Difficulties in Emotion Regulation (DERS, 1–5; α = 0.95)	1.9 (0.04)	1.7 (0.06)	1.9 (0.04)	1.9 (0.04)	1.9 (0.14)	1.9 (0.07)
Anxiety and Depression (HSCL, 1–4; α = 0.90)	1.7 (0.03)	1.7 (0.05)	1.8 (0.03)	1.7 (0.03)	1.8 (0.10)	1.7 (0.05)
Anxiety and Depression (% above clinical threshold, 1.75)	47% (0.03)	43% (0.05)	49% (0.03)	46% (0.03)	43% (0.10)	47% (0.06)
PTSD (PTSD-RI, 0–4; α = 0.86)	1.2 (0.04)	1.0 (0.08)	1.4 (0.06)	0.6 (0.02)	0.7 (0.08)	.6 (0.04)
PTSD (% above clinical threshold)	28% (0.02)	20% (0.04)	31% (0.03)	26% (0.03)	43% (09)	28% (0.05)
Ever attempted suicide (self-report)	11% (0.02)	9% (0.03)	11% (0.02)	9% (0.01)	21% (0.08)	10% (0.04)

Note: Score ranges for nondichotomous measures are provided in parentheses, followed by the average Cronbach's α for all time periods at which the measure was collected. DERS = Difficulties in Emotion Regulation Scale; HSCL = Hopkins Symptoms Checklist; IPV = intimate partner violence; OMPA = Oxford Measure of Psychosocial Adjustment; PTSD-RI = Post Traumatic Stress Disorder–Reaction Index.

FIGURE 1 Estimated Mean Levels of Community and Social Factors Over Time by Sex (N = 323)



Note: Estimated mean levels of family acceptance, community acceptance, and perceived stigma with 95% confidence intervals for female subsample and male subsample, using 30 multiply imputed datasets, are shown. Please note color figures are available online.

attitudes postconflict but dropped sharply over the 3 time points, whereas their female counterparts remained steady, such that by T4, the two sexes appeared to be about equal.

Social Integration Trajectories

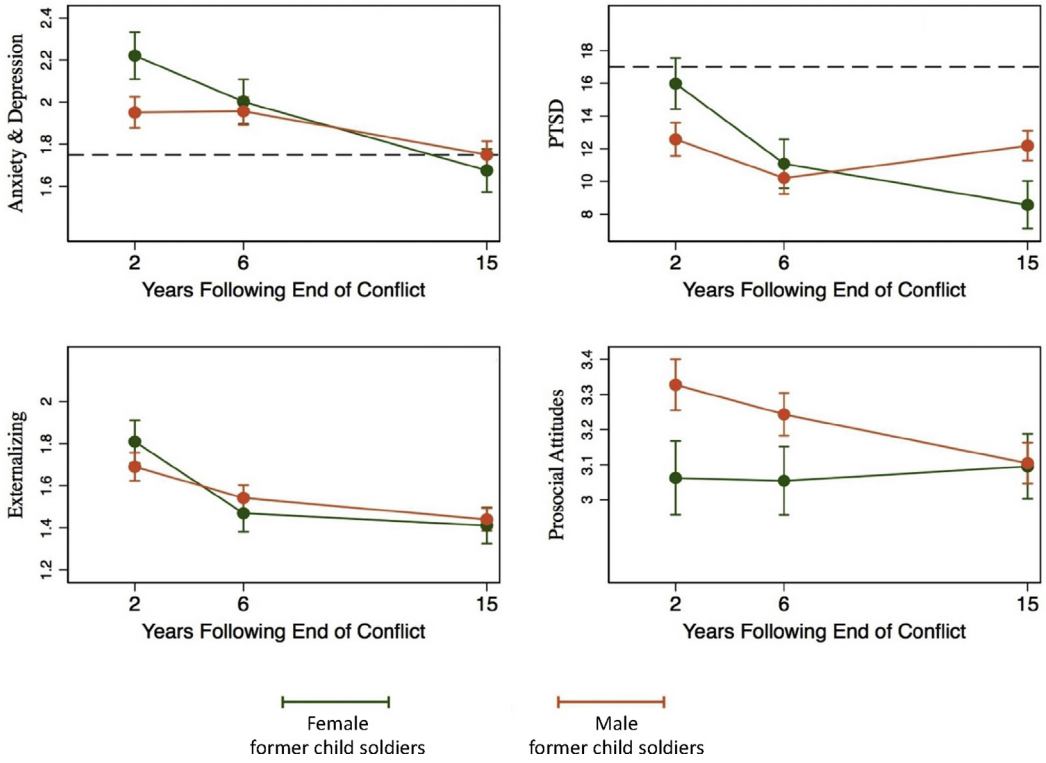
Latent classes of social integration trajectories were identified from latent class growth analyses. Based on the sample-size–adjusted BIC, the 3-group solution (BIC=3802) was optimal. Model fit statistics for two-, three-, four-, and five-class solutions are presented in Supplement 1, available online. The average posterior probability (APP) of assignment for each participant into the 3 social integration trajectory groups ranged from 0.84 to 0.90, well above the recommended threshold of 0.70.[43] The odds of correct classification ranged from 7.35 to 105.09, above the standard threshold of 5.0.

The largest class of the 3 classes (66% of the sample, n = 213) was categorized as "Socially Protected," indicating lower perceived stigma and higher community and family acceptance across all time points, with small but significant decreases in community acceptance (mean change = −0.13, 95% CI = −0.20 to −0.06) and family acceptance (mean change = −0.41, 95% CI = −0.57 to −0.25) over time. The next largest latent class was labeled as "Improving Social Integration" (24%, n = 77) demonstrating high stigma and low community and family acceptance at T2, with a considerable decrease in stigma (mean change = −1.07, 95% CI = −2.63 to 0.51) and increase in family (mean change = 0.21, 95% CI = − 0.08 to 0.51) and community acceptance (mean change = 0.20, 95% CI = 0.04 to 0.36) at T3, which leveled off between T3 and T4 for community acceptance. The smallest latent class (10% of the sample, n = 33) was categorized as "Socially Vulnerable," characterized by high stigma and low community and family acceptance at T2. Trajectories for each of these latent group classifications are displayed in Figure 3. Of the time-stable covariates, male former child soldiers had significantly greater likelihood of belonging to the Socially Vulnerable group [long-odds estimate = 1.82, t(322) = 3.44, $p < .001$].

Table 1 presents demographics and war experiences by social integration trajectory group. The former child soldiers in the Socially Protected group experienced fewer cumulative toxic war exposures than the other 2 trajectory groups ($p < .001$ for both comparisons). Strikingly, the Improving Social Integration group was made up of a much greater proportion of female child soldiers (69%) than the sample as a whole (28%), and consequently had a higher proportion of victims of rape compared with the other 2 groups. In contrast, all but one of the former child soldiers in the smaller Socially Vulnerable group were male and had a high rate of perpetrating injuring or killing as compared to the other two groups.

To pursue the study's aim of examining the relationship of social supports to long-term outcomes, logistic regressions of three latent classes of social integration trajectories on social functioning and mental health outcomes were estimated to evaluate whether group membership was associated with anxiety and depression, PTSD, suicide attempts, perpetration of intimate partner violence, substance use, involvement with police, primary school completion, and employment at T4, adjusting for cumulative toxic war experiences, sex, and age. Odds ratios and 95% confidence

FIGURE 2 Estimated Mean Levels of Mental Health Problems Over Time by Sex (N = 323)



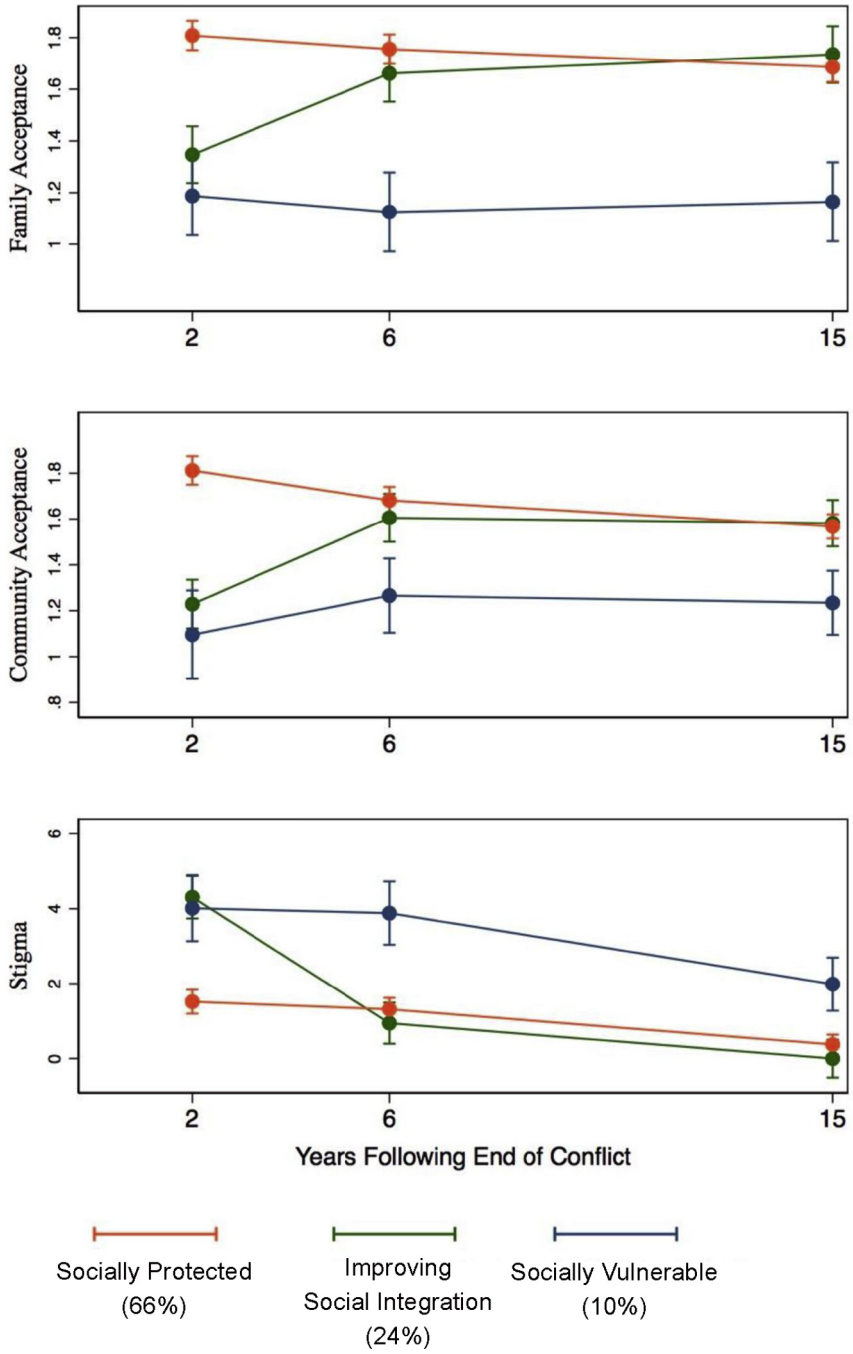
Note: *Estimated mean levels of anxiety and depression, posttraumatic stress disorder (PTSD), externalizing behaviors, and prosocial attitudes with 95% confidence intervals for female subsample (green line) and male subsample (orange line) are shown. Horizontal dashed lines in top graphs indicate conventional international cut-off scores. Please note color figures are available online.*

intervals of experiencing mental health problems, engaging in risk behaviors, and achieving positive social functioning outcomes are reported in Table 2. Former child soldiers in the Socially Vulnerable group, compared with those in the Socially Protected group, were about 2 times more likely to experience levels of anxiety or depression above the conventional clinical threshold (odds ratio [OR] = 2.17, 95% CI = 1.01 to 4.77) and possible PTSD (OR = 2.41, 95% CI = 1.07 to 5.42); around 3 times more likely to have attempted suicide (OR = 2.96, 95% CI = 1.01 to 8.69); and more than 4 times more likely to have been in trouble with the police (OR = 4.53, 95% CI = 1.38 to 14.86). In general, T4 adult life outcomes among the Improving Social Integration group were not significantly different compared to those in the Socially Protected group on the T4 outcomes examined in the present study.

DISCUSSION

This study is unique in following a cohort of former child soldiers prospectively from the end of hostilities to adulthood. Nonetheless, our findings align with other studies of former child soldiers,[2,8] studies of adult war veterans,[46] and studies of adults who faced adversities as children.[22,47,48] Adult mental health and social functioning in Sierra Leone's former child soldiers were related to their war experiences and to postconflict risk and protective factors. The mental health trajectories suggest that although some improvement comes over time, some problems, such as anxiety and depression, are more intractable than others, and that sex has an important role to play, as in the case of shifting risk patterns by sex for PTSD symptoms. Our latent class growth analyses revealed that the Socially Protected group began with fewer toxic war exposures but also had lower levels of perceived stigma, higher levels of community and family acceptance postconflict, as well as lower odds of anxiety or depression, PTSD, attempted suicide, and involvement with police at T4. The group characterized by Improving Social Integration suffered just as harshly during the war as those individuals on the Socially Vulnerable trajectory, yet at adulthood looked comparable to the Socially Protected group on rates of mental health problems and suicidality. The Socially Vulnerable group experienced minimal improvement in stigma and acceptance over time, and,

FIGURE 3 Latent Group Classification of Social Integration Trajectories Estimated by Full Information Maximum Likelihood (N = 323)



Note: *Estimated latent classes of social integration trajectories with 95% confidence intervals are presented by social risk (perceived stigma) and protective (family and community acceptance) factor measures. A three-group solution was optimal, based on the sample-size adjusted BIC, resulting in a "Socially Protected" group (n = 213), an "Improving Social Integration" group (n = 77), and a "Socially Vulnerable" group (n = 33). Please note color figures are available online.*

compared to the socially protected group, demonstrated increased risk of anxiety or depression, PTSD, attempted suicide, and involvement with police.

We can only hypothesize about all the ways in which the experiences of the Socially Improving and the Socially Vulnerable group differ. Perhaps there are unmeasured differences in their war experiences, or differences in their own behaviors, such as hostility or negative affect, that may have an impact on how former child soldiers with adverse war experiences differ from one another in how they are perceived

TABLE 2 Estimated Odds Ratios (and 95% Confidence Intervals) for Mental Health and Life Outcomes by Social Integration Trajectory Group (N = 323)

	Mental Health Outcomes			Social Functioning Outcomes				
	Anxiety/ Depression	PTSD	Ever Attempted Suicide	Perpetrator of IPV[a]	Substance Use	Ever in Trouble With Police	Employed	Completed Primary School
Trajectory Group								
Socially protected (n = 213, 66%)	–	–	–	–	–	–	–	–
Improving social integration (n = 77, 24%)	0.75	0.79	0.81	1.36	1.12	3.39	.55	1.89
Socially vulnerable (n = 33, 10%)	2.17	2.41	2.96	2.44	1.72	4.53	1.12	1.39
Sex (male)	1.10 (0.61, 1.97)	1.70 (0.90, 3.23)	1.01 (0.38, 2.70)	5.52 (2.05, 14.83)	5.66 (2.62, 12.23)	5.03 (1.20, 21.05)	.66 (0.37, 1.19)	4.59 (2.20, 9.56)
Age at T4	0.92 (0.87, 0.98)	0.96 (0.89, 1.03)	1.03 (0.92, 1.15)	0.92 (0.84, 1.01)	1.02 (0.95, 1.09)	1.06 (0.91, 1.24)	1.09 (1.02, 1.16)	0.82 (0.75, 0.89)
War experiences (cumulative)	1.02 (0.81, 1.28)	1.27 (0.99, 1.63)	1.19 (0.76, 1.88)	1.20 (0.86, 1.68)	1.06 (0.80, 1.39)	1.53 (0.96, 2.43)	0.94 (0.74, 1.18)	0.93 (0.67, 1.28)

Note: *"Socially Protected" was the omitted (reference) group for logistic regressions, which also controlled for sex (male), age at T4, and cumulative war experiences. Odds ratios and confidence intervals were estimated using 30 imputed datasets. Estimated probability values and Benjamini–Hochberg adjusted probability values for logistic regression predicting mental health and life outcomes by social integration trajectory group are presented in Table S4, available online. Correlation coefficient matrix for mental health and social functioning outcomes is presented in Table S5, available online. PTSD = likely posttraumatic stress disorder per standard cut-points.*

[a]*Logistic regressions predicting intimate partner violence (IPV) were run on a subsample (n = 194) of participants who reported having ever had an intimate partner.*

and accepted by family and community. Although we find no significant differences between these groups in immediate reintegration services postwar, it is unknown what sorts of formal or informal social supports they may have experienced in the postconflict environment. Sex may certainly play a role, but how it interacts with the postconflict social environment requires further investigation.

Study limitations include the use of self-reports of symptoms and functioning, as this analysis has focused on youth self-reports of adult outcomes. Although our measures of mental health were adapted for use in Sierra Leone, and although indicators of validity and psychometric performance were good, the clinical cut-points used have not been validated with reference to diagnoses from local clinicians. We cannot make claims of causality based on these data, given that the war-related experiences were reported retrospectively, and we have included both life outcomes occurring at T4 along with risk and protective factors assessed at all time points, including T4, to best characterize social integration trajectories. For example, we cannot definitively state that the postconflict experiences of stigma and support shaped the mental health and life outcomes. It is possible, for instance, that improvements in mental health led to greater acceptance, which in turn led to improved life outcomes.

Our trajectory analyses are relative to others within the sample, and the small number of in the Socially Vulnerable trajectory group indicates that in general the trajectories in our sample were on trends of slow improvement; however, these findings must be seen in context of the continued high levels of mental health distress in the full sample. Even though just one small group in this study has been identified as experiencing greater difficulty in life outcomes compared to the other two groups at T4, it should not be taken to mean that the other 2 groups are thriving. Comparisons to the DHS statistics, which themselves include former child soldiers and other war-affected youths, demonstrate that this sample of former child soldiers has had more access to education but also lower rates of favorable outcomes such as marriage and employment, which may indicate difficulty integrating into larger society. Although representative national data on mental disorders in this setting are not available, we do see that, using standard clinical cut-points, our sample demonstrates mental health problems at high rates, with 49% of male and 43% of female subjects falling into the range of standard clinical cut-points for likely depression or anxiety, and 31% of male and 20% of female subjects falling into the likely clinical range for PTSD.

Although experiences of war-related violence and loss cannot be undone, three leverageable postconflict factors—namely, family and community acceptance and stigma—appear to be related to adult outcomes and merit further study. Our analyses suggest that campaigns to reduce stigma against former child soldiers and family-based interventions may offer promising targets to improve mental health and life outcomes. Studies have identified the value of targeted interventions, such as group-based programs addressing the mental health needs of war-affected youth in postconflict settings. Such services can be integrated with interventions to advance life opportunities such as school and livelihood programs, which may improve social and family acceptance.[49]

Our findings on sex are informative, considering several campaigns in Sierra Leone to address additional vulnerability in female former child soldiers overlooked in the early phases of Sierra Leone's approaches to reintegration. Several different processes may help to explain the change in sex-related vulnerability over time. For instance, social pressure on male former combatants may increase as they approach the transition to adulthood and are expected to make a living and to provide for their families. Such factors could explain why female former child soldiers saw greater acceptance over time, whereas their male counterparts perceived diminished acceptance. In addition, there might be more peer pressure or social acceptance of self-destructive coping mechanisms in male former child soldiers, such as drinking, drug use, and fighting.

Our results emphasize the importance of monitoring and attending to postconflict community and family relationships as well as underlying mental health conditions.[50] Understanding the combined influence of multiple war-related and postconflict factors is important for identifying leverage points for programs and policies. Through such investments, the resilience and human capital inherent in the lived experience of surviving former child soldiers and other war-affected youth may one day be better realized.

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supervised the study and R.T.B. contributed significantly to the acquisition of data. T.S.B., D.L.T., R.T.B., T.V., and S.E.G. contributed to the analysis and interpretation of data. C.M.A. contributed to the presentation of quantitative results. All authors contributed to the drafting of the manuscript and approved the final version. All tables and figures are original and are not under copyright.

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