



Published in final edited form as:

JAMA. 2008 August 13; 300(6): . doi:10.1001/jama.300.6.691.

## Comparison of mental health between former child soldiers and children never conscripted by armed groups in Nepal

Brandon A. Kohrt, M.A.<sup>1,2</sup>, Mark J.D. Jordans, M.A.<sup>2,3,4</sup>, Wietse A. Tol, M.A.<sup>2,3,4</sup>, Rebecca A. Speckman, B.A.<sup>5</sup>, Sujen M. Maharjan, B.A.<sup>2,6</sup>, Carol M. Worthman, Ph.D.<sup>1</sup>, and Ivan H. Komproe, Ph.D.<sup>4</sup>

<sup>1</sup> Emory University, Department of Anthropology, Atlanta, USA <sup>2</sup> Transcultural Psychosocial Organization Nepal, Kathmandu, Nepal <sup>3</sup> VU University Medical Center, Amsterdam, the Netherlands <sup>4</sup> Healthnet TPO, Department of Public Health and Research, Amsterdam, the Netherlands <sup>5</sup> Emory University, Rollins School of Public Health, Atlanta, USA <sup>6</sup> Trichandra College, Department of Psychology, Kathmandu, Nepal

### Abstract

**Context:** Despite child soldiers being considered in need of special mental health interventions, there is a lack of studies investigating the mental health of child soldiers compared with civilian children in armed conflicts.

**Objective:** To compare the mental health status of former child soldiers with children who have never been conscripts of armed groups.

**Design, Setting, and Participants:** A matched-pair cohort study conducted from March through April 2007 in Nepal compared the mental health of 141 former child soldiers to 141 never conscripted children matched on age, sex, education, and ethnicity.

**Outcome Measures:** Depression symptoms were assessed via the Depression Self Rating Scale (DSRS), anxiety symptoms via the Screen for Child Anxiety Related Emotional Disorders (SCARED-5), symptoms of posttraumatic stress disorder (PTSD) via the Child PTSD Symptom Scale (CPSS), general psychological difficulties via the Strength and Difficulties Questionnaire (SDQ), daily functioning via the Function Impairment (FI) tool, and exposure to traumatic events via Kiddie-Schedule of Affective Disorders and Schizophrenia (KIDDIE-SADS) PTSD Traumatic Event Checklist.

**Results:** Participants were a mean of 15.75 years at the time of this study and child soldiers ranged in age from 5 to 16 years at the time of conscription. All participants experienced at least 1 type of trauma. Number (%) of child soldiers meeting cutoff scores were 75 (53.2%) for depression, 65 (46.1%) for anxiety, 78 (55.3%) for PTSD, 55 (39.0%) for psychological difficulties, and 88 (62.4%) for function impairment. Child soldiers had greater odds of meeting cutoff for depression (OR=3.56, 95% CI 2.33—5.43), PTSD (for which we employed stratified analyses because of sex interaction: boys' OR=3.85, 95% CI 1.77—8.39; girls' OR=6.33, 95% CI 2.64—15.17), psychological difficulties (OR=2.91, 95% CI=1.53—5.51), and function impairment (OR=2.04, 95% CI 1.41—2.96), but no difference for anxiety (OR=1.46, 95% CI 0.72—2.68). After adjusting for traumatic exposures, soldier status was no longer associated with

---

**Erratum:** In the Study Instruments section, the Strengths and Difficulties Questionnaire timeframe was incorrectly listed as one week. The SDQ employs a 6-month time frame, while the version used in this study did not specify a timeline. The Nepali translation of the SDQ used in this study was a draft version not authorized for wider use. The validation cut-off score of 16 was based on a validation completed on the Nepali version, not the cut-off score of the English-language version of the instrument.

psychological difficulties or function impairment but remained significantly associated with depression (OR=2.69, 95% CI 1.48—4.89) and PTSD among girls (OR=5.98, 95% CI 1.86—19.27), but not PTSD among boys (OR=2.38, 95% CI 0.87—6.50).

**Conclusions:** In Nepal, former child soldiers display greater severity of mental health problems compared with children never conscripted by armed groups, and this difference remains for depression and PTSD (the latter especially among girls) even after controlling for trauma exposure.

Armed groups throughout the world continue to exploit children to wage war.<sup>1</sup> The dedicated efforts of UNICEF,<sup>2</sup> psychosocial workers,<sup>3</sup> and former child soldiers,<sup>4, 5</sup> have called international attention to this issue. However, in a recent report<sup>6</sup> on the status of child soldiers, Betancourt and colleagues revealed gaps in crucial areas of research to understand the impact of becoming a soldier on child mental health. First, child soldiers are considered in need of special psychosocial intervention. However, there is a lack of published research comparing the severity of mental health problems among child soldiers with children living through war who were not conscripted to armed groups,<sup>6-9</sup> unpublished studies of nongovernmental organizations suggest there may not be a difference between the groups.<sup>6, 10</sup> Second, despite suggestions of increased psychological distress for girl soldiers,<sup>5, 11-13</sup> no studies have explored sex differences in the psychological impact of soldiering. Third, child soldiers are assumed to have greater exposure to trauma.<sup>14</sup> Yet, major studies of child soldiers have not shown an association between trauma and posttraumatic stress disorder (PTSD).<sup>15, 16</sup> Finally, Betancourt<sup>6</sup> calls for studies using validated and cross-culturally appropriate mental health measures, which have been lacking in this field. Researching these issues is crucial to designing the most effective mental health interventions for children in armed conflicts.

In the current study, we worked toward addressing these gaps. Our first objective was to compare the mental health of former child soldiers who have returned home with children growing up in active conflict settings but were not conscripted by armed groups in Nepal, using cross-culturally validated measures of psychosocial wellbeing. We sought to determine (1) if former child soldiers have more mental health problems than never conscripted children, (2) if becoming a soldier has a greater impact on girls versus boys when compared with never conscripted children, and (3) if differential exposure to trauma is associated with mental health differences between child soldiers and never conscripted children. Our second objective was to describe predictors of mental health outcomes within child soldiers: (1) if trauma exposure, combat experience, military roles, and other soldier-related variables are associated with mental health outcomes, and (2) if the associations between key predictors and mental health outcomes were modified by voluntary versus involuntary recruitment, time since leaving military service, or maintained association with an armed group.

## Methods

### Study design and population

We conducted a matched cohort study to assess the association between soldier status and mental health outcomes of children in Nepal. Children with the main exposure (a history of being a child soldier) were matched with unexposed children (children who had never been conscripts of a military group, referred to as “never conscripted children”).

The Communist Party of Nepal-Maoists (CPN-M) fought a 10-year war with the government of Nepal ending with peace accords in November 2006. The CPN-M and the Nepal Army recruited individuals under 18 years of age as soldiers, sentries, spies, cooks,

porters, and messengers.<sup>17, 18</sup> During and after the conflict, many child soldiers returned home. Because of difficulties in accessing this population, we employed expert purposive sampling, rather than a probability sample, to identify former child soldiers who have returned home and compare them with children never conscripted by armed groups. The research was conducted during March and April of 2007.

We followed Cape Town principles<sup>2</sup> in defining *child soldiers*: “any person under eighteen years of age who is part of any kind of regular or irregular armed force in any capacity, including but not limited to cooks, porters, messengers, and those accompanying such groups, other than purely family members.” Additional selection criteria included armed group participation for at least 1 month, being under 18 years of age during study enrollment, and having a consenting caregiver. In Nepal, full adult franchise occurs at the age of 18 years.<sup>19, 20</sup>

Experts, comprising representatives to the 1612 Working Group (a United Nations resolution for children in armed conflict) and the Children Associated with Armed Forces and Armed Groups (CAAFAG) Working Group provided names and locations of child soldiers who had returned home. The lists included all of the known child soldiers at the time of the study. Local civil society groups, teachers, and community leaders validated the veracity (e.g. based on news media documentation, disruption in school attendance, hospital records) of these child soldier cases before providing information to human rights groups and humanitarian agencies. Every child and her/his caregiver on the lists provided by the experts were invited to participate in this study.

Field researchers recorded the ethnicity of children based on the child’s last name, which indicates caste and ethnicity in Nepal. Researchers classified participants into 3 groups: *Brahman/Chhetri* (‘upper’ caste), *Dalit* (‘lower’ caste), and *Janajati* (ethnic minorities) according to Nepal Central Bureau of Statistics categories.<sup>21</sup> We assessed ethnicity because it has been associated with mental health in Nepal.<sup>22, 23</sup>

Researchers contacted 227 potential participants (all the children on the expert lists) and/or their caregivers. Of those 227 children, 169 (74%) met inclusion criteria. Of the 58 children not included, 32 children were over 18 years of age, and 26 participated for under 30 days. Of the 169 children meeting criteria, 27 (16%) did not participate: 10 had moved (according to caregiver reports), and 5 were engaged in school exams, and 12 former Nepal Army conscripts refused for fear of retaliation.

Former child soldiers who agreed to participate identified a matched child who had never been conscripted by an armed group. Matching factors were sex, age, level of education, and ethnicity. Human rights groups and community leaders confirmed ‘never conscripted’ status. Matching was used to increase the feasibility of identifying a comparison (unexposed) group and to control for potential confounding by the matching factors. The matched counterparts comprised 37 siblings, 40 other relatives, and 65 unrelated peers. Of the matched pairs, 125 (88%) were from the same villages.

One child soldier reported affiliation with the Nepal Army. This child and his matched counterpart were excluded from statistical analyses to avoid heterogeneity of the study group.

The institutional review board of Emory University and the UNICEF country office in Nepal approved the study protocol and consent process. Children provided verbal assent; caregivers provided verbal consent. Caregivers did not participate in the interviews. Because of high illiteracy rates, research assistants read consent forms and questionnaires. Children were provided with a snack during the interview and received a notebook and pen in

appreciation of their participation. Caregivers were not offered any incentive for their children to participate. No participants had received psychosocial services prior to enrolling in the study. Participants whose symptoms scores were above the cutoff, who reported suicidal ideation, or who requested services were enrolled subsequently in CAAFAG Working Group programs for psychosocial support.

### Study Instruments

Participants completed 60-90 minute interviews with trained research assistants conducted in private locations away from caregivers and others. Standard instruments were used to assess symptoms of depression, anxiety, and PTSD and general psychological difficulties. For these scales, cut-off scores were used as markers for psychological or psychiatric intervention. Validation of instruments (assessing accuracy and cut-off thresholds) was done with a separate sample of Nepali children ( $n=162$ ) comparing questionnaire scores with a standardized indication for psychosocial intervention determined by a trained Nepali psychosocial counselor using the Global Assessment of Psychosocial Disability<sup>24, 25</sup> as an external criterion.<sup>26</sup> The 18-item *Depression Self Rating Scale (DSRS)*<sup>27, 28</sup> assessed depression symptoms over the past week on a 3-point scale (range=0 to 36), with a clinically significant cut-off score of 14. The 5-item version of the Screen for Child Anxiety Related Emotional Disorders (SCARED-5)<sup>29</sup> assessed anxiety symptoms over the past week on a 3-point scale (range=0 to 10), with a clinically significant cut-off score of 4. The 17-item *Child PTSD Symptom Scale (CPSS)*<sup>30</sup> assessed PTSD symptoms over the past week on a 4-point scale (range=0 to 51), with a clinically significant cut-off score of 20. Non-clinical, general psychological difficulties over the past week were assessed with the 20-item "total difficulties," 3-point scale (range=0 to 40) of the *Strength and Difficulties Questionnaire (SDQ)*, with a clinically significant cut-off score of 16.<sup>31, 32</sup>

Based on adapted methodology of Bolton and Tang,<sup>33</sup> a rating scale was developed to measure children's functioning in a contextually-valid manner.<sup>34</sup> This methodology involved qualitative techniques (participant observation and child focus groups) to identify daily activities in the realms of child, family, peer, and community functioning. The final 10-item child *Function Impairment* tool assessed daily functioning over the past two weeks on a 4-point scale (range=0 to 30), with higher scores indicating more impairment.

Lifetime traumatic events were assessed with the Kiddie-Schedule of Affective Disorders and Schizophrenia (K-SADS) PTSD traumatic event checklist.<sup>35</sup> The K-SADS includes a series of traumatic events (car accident, other accident, fire, witness of a disaster, witness of a violent crime, victim of a violent crime, confronted with traumatic news, witness to domestic violence, physical abuse, sexual abuse, or other) with specific criteria for each item (e.g. for fire – "child close witness to fire that causes significant property damage or moderate to severe physical injuries").

All instruments went through a transcultural translation procedure.<sup>36</sup> Based on focus groups with Nepali children, no items were added to or removed from the mental health instruments. However, items such as bombing, abduction, and torture were added to the traumatic events checklist and "sexual abuse" and "hearing traumatic news" were excluded. Sexual abuse was determined to be cultural inappropriate and unsafe to ask of young girls as it could place them in jeopardy of harm from community and/or family members if they were suspected of discussing sexual behavior with strangers. "Hearing traumatic news" was excluded because it was difficult to frame "news" as "traumatic" for the children, and the experience was seen as ubiquitous during the conflict. The final trauma exposure list included experiencing unintentional injury, fire, natural disaster, beating, bombing, abduction, torture, murder of a family member, domestic violence, and physical abuse, and witnessing a violent death.

Internal consistency of the instruments was measured in the total sample ( $n=282$ ). Test-retest reliability and interrater reliability of the instruments were established in 2 other studies among children in Nepal.<sup>26</sup> Instrument properties were sufficient to excellent: DSRS (Cronbach  $\alpha=.80$ , Spearman-Brown coefficient for test-retest reliability  $r=.80$ , area under the curve (AUC)  $=.82$ , optimal cut off score for psychosocial treatment indication  $=14$ ); SCARED ( $\alpha=.87$ ,  $r=.84$ , AUC $=.64$ , optimal cut-off $=4$ ), CPSS ( $\alpha=.91$ ,  $r=.85$ , AUC $=.77$ , optimal cut-off $=20$ ); SDQ ( $\alpha=.76$ ,  $r=.85$ , AUC $=.72$ , optimal cut-off $=16$ ); and function impairment ( $\alpha=.68$ ,  $r=.70$ , AUC $=.67$ , optimal cut-off $=4$ ). Interrater reliability was excellent for all instruments (average ICC $=.972$ ; average Kappa $=.891$ ).

Additional survey questions were included based on qualitative research with child soldiers, never conscripted children, and adult community members. Child soldiers reported their roles during association with an armed group, such as ‘military regiment’ (received training for combat and given a rank in the People’s Liberation Army), ‘cultural program’ (partaking in cultural performances promoting Maoism), ‘cook’ (traveling with the military preparing meals), ‘porter’ (carrying ammunitions, food, clothing, medicine, and other supplies), ‘messenger’ (carrying information between platoons or between villagers and military personnel), ‘sentry’ (standing guard, typically at night, often armed with grenades), and ‘spy’ (gathering information from the opposite armed group, often by posing as a member of the other group, and gathering information from teachers, community leaders, and others to provide to the Maoists). Participants indicated if they were involved in multiple roles. We also ascertained exposure to combat, process of returning home, and whether joining the armed group was voluntary or forced. Interest in participating in political activities was assessed with a 4-point scale (no interest, minimal interest, moderate interest, intense interest).

### Statistical Analyses

Former child soldiers vs. never conscripted children. To determine the necessary sample size for exposed child soldiers and the matched group of unexposed children, we used a power analysis ( $\alpha=.05$ ,  $\text{power}=.95$ ) relying on treatment effect studies employing the CPSS and DSRS,<sup>37</sup> which suggested a minimum of 35 children per treatment arm when randomizing children individually (Layne et al report an effect size of  $.78$  on depressive symptoms, with  $\alpha=.05$  and  $\beta=.05$ ). To account for the intracluster correlation, this number was multiplied by  $1+(m-1) \rho$ , with  $m=30$  (average cluster size) and  $\rho=.1$  (ICC), resulting in an appropriate sample size of 137 per group for child soldiers and matched counterparts. Our final sample for statistical analyses was 141 child soldiers and 141 matched counterparts.

We used logistic regression to model the association between child soldier status and mental health outcomes, using the validated cutoffs to dichotomize each outcome. There were two non-nested levels of clustering in the data: matched pair and village, and 17 matched pairs were from different villages. We used Miglioretti and Heagerty's generalized estimating equation (GEE)-based strategy to obtain empirical standard error estimates for non-nested clustering structures.<sup>38</sup>

We created a series of models for each mental health outcome. To assess possible effect modification of child soldier status by sex, we evaluated the statistical significance of a first-order cross product term in a regression model that included all potential confounders. To determine the role of the different types of traumatic exposures as possible confounders of an association between child soldier status and mental health outcome, we compared the magnitude of the effect estimate (point estimate of the effect) for child soldier status in an unadjusted model to the magnitude of the effect estimate for child soldier status in a series of models that each included one type of trauma. To determine the role of *aggregate* traumatic exposure as a possible confounder, we compared the unadjusted model for child

soldier status to a model that included all 11 types of trauma. Finally, we used a model that included trauma variables and other potential confounders to obtain a fully adjusted effect estimate for child soldier status. In addition to the trauma variables, other variables included current religion, school enrollment, family type (joint versus nuclear), marital status, house ownership, and interest in politics.

Because some of the information was lost by dichotomizing the outcome variables, we conducted supplementary analyses using linear regression with the outcomes as continuous variables. The series of models evaluated for each outcome had the same explanatory variables as for the logistic regression analyses. Again, we used Miglioretti and Heagerty's GEE-based method to account for the clustering structure.

**Child soldiers**—We used logistic regression to model the association between child soldier characteristics and each mental health outcome, with GEE-based empirical standard error estimates to account for the clustering of the soldiers within villages. In addition to the 11 types of traumatic exposure and the non-trauma covariates described earlier, we examined age at recruitment, military role with the armed group, combat exposure, current association with an armed group, type of recruitment (voluntary or involuntary), duration of military service, and time since returning home. Current association with an armed group was not used in models for depression, anxiety, or psychological difficulties due to low cell counts. Sex, ethnicity, and education (matching factors for the primary study) were also considered as explanatory variables. To determine if trauma exposure, combat exposure, and other aspects of being a child soldier were independent predictors of mental health outcomes, we compared unadjusted models for each covariate to fully adjusted models. As with the soldiers vs. non-soldiers analyses, we conducted a series of parallel, supplementary analyses using linear regression. In particular, this allowed us to better describe the exposure variable “current association with armed group,” for which it was not possible to estimate an odds ratio for some outcomes.

P-values less than 0.05 were considered statistically significant. Statistical analyses were performed with SPSS v.15.0<sup>39</sup> and SAS<sup>40</sup>.

## Results

### Comparison of former child soldiers and never-conscripted children

Sex distribution (see Table 1) did not differ between child soldiers (53% girls) and never conscripted children (51% girls) (McNemar <sup>2</sup> test, (cumulative) binomial distribution used,  $p=.69$ ). Other demographics that did not differ include ethnic distribution (approximately one-third Dalit,  $p=.69$ ; Brahman/Chhetri,  $p=.73$ ; and Janajati,  $p=.99$ ), religion ( $p<.001$ ), family type ( $p=.001$ ), and education level (McNemar-Bowker <sup>2</sup>=10.97,  $p=.28$ ). Child soldiers were older (mean age=15.75 years) than never conscripted children (mean age=14.92 years), (paired t-test=5.77,  $p<.001$ ). School enrollment and marital status differed between groups (McNemar <sup>2</sup> test, (cumulative) binomial distribution used,  $p<.001$  and  $p=.001$ , respectively).

All participants experienced at least 1 type of trauma. Exposure to bombing was more common among child soldiers (79, 56.0%) than never conscripted children (29, 20.6%), (OR=4.92, 95% CI 2.91—8.33), as was torture (child soldiers (41, 29.1%); never conscripted children (15, 10.6%), (OR=3.44, 95% CI 1.80—6.57)) and witnessing a violent death (child soldiers (57, 28.7%); never conscripted children (24, 17.0%), (OR=3.31, 95% CI 1.90—5.75)). In contrast, exposure to beating did not differ between child soldiers (104, 73.8%) and never conscripted children (95, 67.4%), (OR=1.36, 95% CI 0.81—2.28).

More child soldiers were above the cutoff scores for each mental health scale compared with never recruited children (see Table 2): depression (75 (53%) child soldiers vs. 34 (24.1%) never conscripted children), anxiety (65 (46.1%) vs. 53 (37.6%)), PTSD (78 (55.3%) vs. 28 (20.0%)), psychological difficulties (55 (39.0%) vs. 26 (18.4%)), and function impairment (88 (62.4%) vs. 63 (44.7%)).

In the total sample, child soldiers had greater odds of being above cutoff scores for mental health outcomes except anxiety (Table 2). There was a statistically significant interaction between sex and child soldier status for PTSD in the logistic regression analysis and for all outcomes in the linear regression analysis. Therefore, we report the sex-stratified results for these analyses. When controlling for all traumatic exposures (adjusted model 1), the odds ratio point estimate decreased for depression, psychological difficulties, function impairment (all children), and PTSD (in boys and girls), and was no longer statistically significant for psychological difficulties, function impairment, or PTSD (in boys). For depression, psychological difficulties, and function impairment, the odds ratio did not change appreciably with additional covariates (adjusted model 2). Thus, exposures to different types of trauma largely explain the observed unadjusted associations between child soldier status and mental health for psychological difficulties, function impairment, and PTSD (among boys); but traumatic exposure only in part explains the association for depression and PTSD (among girls).

In the supplementary linear regression analyses, the effect of child soldier status on anxiety was not significant for either sex. For the other four outcomes, the effect of child soldier status was always greater among girls, and adjustment for trauma largely explained the effect of child soldier status on mental health outcome among boys but not among girls. For example, in boys, the regression coefficient for child soldier status on PTSD (CPSS questionnaire) was 6.01 (95% CI 3.45–8.58) in the unadjusted model, 1.99 (95% CI –0.41–4.39) when adjusting for trauma, and 2.43 (95% CI –0.22–5.08) in the full model (trauma and other covariates). In contrast, the effect of child soldier status on PTSD in girls was 7.96 (95% CI 4.94–10.97) in the adjusted model, 5.74 (95% CI 1.84–9.65) when adjusting for trauma, and 5.93 (95% CI 1.94–9.91) in the full model. A similar pattern emerged for depression, general psychological difficulties, and function impairment. (Further details from the linear regression analyses are available from the authors on request.)

In models (both logistic and linear) that added 1 type of trauma exposure, the magnitude of the regression coefficient for child soldier status did not change appreciably (not by more than about 5%), indicating that no type of trauma in and of itself played a large confounding role with respect to child soldier status (details available from author on request).

For the fully adjusted logistic regression models (adjusted model 2) shown in Table 2, among the 11 trauma covariates (unintentional injury, fire, natural disaster, violent death, beating, bombing, abduction, torture, murder of family member, domestic violence, physical abuse), exposure to beating was associated with depression (OR=2.21 95% CI 1.01–4.83) and daily functioning (OR=2.58, 95% CI 1.45–4.59). Exposure to bombing was associated with depression (OR=1.93, 95% CI 1.17–3.20) and psychological difficulties (OR=2.54, 95% CI 1.38–4.69). Exposure to torture was associated with anxiety (OR=1.99 95% CI 1.00–3.94), psychological difficulties (OR=2.35 95% CI 1.17–4.71), and daily functioning (OR=2.10 95% CI 1.02–4.30) in all children, and PTSD in both boys (OR=6.96, 95% CI 2.08–23.35) and girls (OR=3.53, 95% CI 1.17–10.70). All other traumatic exposure covariates were not significant (details available from author on request).

### Predictors of mental health outcomes within the child soldier group

Table 3 describes the characteristics of child soldiers. The sample represented relatively equal groups of children who joined voluntarily (65, 45.8%) vs. forced conscription (77, 54.2%). More than half of the children were conscripted before reaching 14 years of age. Half of the child soldiers (50.7%) directly engaged in combat. Thirty-two (22.5%) of the children had been members of armed groups for greater than one year, and 59 (41.5%) had been returned to the community for greater than one year. Girls, compared with boys, were more likely to have been in cultural programs (OR=3.86, 95% CI=1.86—8.05). In contrast, girls, compared with boys, were less likely to have been in military regiments (OR=0.37, 95% CI=0.16—0.86), acting as sentries (OR=0.44, 95% CI 0.22—0.88), or active in the armed group for more than a year (OR=0.41, 95% CI 0.20—0.82). There was no difference between girls and boys in exposure to combat (OR=0.65, 95% CI 0.33—1.26), involuntary association (OR=1.05, 95% CI=0.54—2.04), age of recruitment (OR=0.56, 95% CI=0.28—1.10), time since returning home (OR=1.59, 95% CI 0.82—3.12), or still being associated with the armed group (OR=0.46, 95% CI 0.18—1.18).

Table 4 presents logistic regression models with fully adjusted effect estimates for the covariates considered in the analysis of the subgroup of child soldiers. In the adjusted analyses of child soldiers, female sex was associated with worse symptom scores for depression, anxiety, and general psychological difficulties. Wealth was associated with reduced mental health symptoms on all scales. Among the traumatic events included in this analysis, exposure to beating was associated with worse outcomes for depression; exposure to bombing was associated with depression and general psychological difficulties; and exposure to torture was associated with symptoms of PTSD and general psychological difficulties.

Still being affiliated with the armed group was associated with better outcome scores on all scales. In the logistic regression, still being associated had a lower point estimate for PTSD symptoms and function impairment compared with no longer associated children. For three of the outcome variables (depression, anxiety, SDQ), we did not calculate odds ratios of “still being associated with an armed group” due to low cell counts. The adjusted effects (linear regression coefficient) of current association on the outcomes DSRs (depression), SCARED (anxiety), CPSS (PTSD), SDQ (psychological difficulties), and FI (daily functioning) were  $-5.26$  (95% CI  $-7.48$ — $-3.04$ ),  $-1.73$  (95% CI  $-2.84$ — $-0.62$ ),  $-6.83$  (95% CI  $-11.37$ — $-2.28$ ),  $-3.74$  (95% CI  $-6.19$ — $-1.30$ ), and  $-2.69$  (95% CI  $-4.03$ — $-1.36$ ), respectively. (Further details from the linear regression analyses are available from the authors on request.)

### Comment

In this study comparing the post-conflict mental health outcomes of child soldiers and matched children who had never been conscripted in Nepal, both groups displayed a substantial burden of mental health and psychosocial problems. The mental health burden among child soldiers ranged from 39 to 62 percent of participants depending upon type of distress, and 18 to 45 percent of children not conscripted by armed groups. Child soldiers had worse mental health outcomes (symptoms of depression, PTSD, general psychological difficulties, and function impairment) than the comparison groups, with the exception of anxiety symptoms. The difference in mental health outcomes between child soldiers and never conscripted children can be explained, in part, by greater exposure to traumatic events among child soldiers, especially for general psychological difficulties and function impairment.



However, even after controlling for exposure to trauma, child soldier status is associated with poorer outcomes for depression and PTSD. Furthermore, for PTSD, the effect of child soldier status was twice as strong for girls compared with boys, even after controlling for trauma exposure and other potential confounders. This suggests that factors other than the traumatic exposures we assessed may contribute to depression and PTSD, the latter especially among girl soldiers. In this study, no single type of traumatic event in isolation explained the relationship between soldier status and mental health; rather it was the aggregate traumatic exposure burden.

The lack of difference in anxiety symptoms suggests that anxiety may be a generalized response of children living through war regardless of their status as soldiers or civilians. The results also suggest that being a soldier exposed children to more traumatic events which increased the rates of depression, PTSD, generalized psychological difficulties, and function impairment. These findings are, in part, congruent with other studies' conclusions, which suggest that the difference between child soldiers and civilians is concentrated among the soldiers with greater trauma exposure, following dose-response tendency.<sup>6, 10</sup> However, our study differs in finding elevated depression and PTSD even after controlling for trauma, especially among girls, indicating that factors other than trauma may contribute to poor mental health outcomes among soldiers.

We are thus left with the question of what other aspects of the child soldier experience, beyond trauma exposures we assessed, contribute to the poorer mental health outcomes among soldiers compared to civilians. One possibility is traumatic exposures that we did not assess such as gender-based violence, a contributor to psychosocial problems among child soldiers in Africa.<sup>11-13</sup> Unfortunately, we were unable to include sexual violence in our analysis as it was deemed culturally inappropriate and potentially unsafe to ask the study participants about such exposures.

Reintegration difficulties when child soldiers return home are another possible contributor. Communities may fear returned former child soldiers and socially ostracize them.<sup>3, 7, 41, 42</sup> In Nepal, association with Maoists may lead to perceived violations of Hindu cultural norms (such as carrying dead bodies, eating in other ethnic groups' homes, and both sexes sleeping in the same areas). This could result in maltreatment (e.g. stigmatization and abuse) by families and communities when soldiers, especially girls, return home. Reintegration difficulties warrant further investigation because "still being associated with an armed group" was a strong protective factor. Furthermore, wealth's protective association with all outcomes raises the possibility that financial resources may buffer against some of the difficulties upon returning home.

This study has several limitations. For feasibility reasons, we used a convenience sample of soldiers, and soldiers identified their own controls, although we used methods appropriate for matched pairs to minimize the effect of the latter limitation. Another limitation of this study is that it represents a subset of child soldiers: those who returned home. We did not assess child soldiers of the Nepal Army, child soldiers who remained within military cantonments of the People's Liberation Army, child soldiers (especially boys) who fled to India, or those who joined the Young Communist League. Ultimately, our study provides insight into the impact of being a child soldier on mental health, but the findings cannot be applied universally to all groups of child soldiers in Nepal nor around the globe.

Because the sample size for the study was chosen with the primary objective in mind, low power is a limitation of the within-soldiers analyses. For example, we did not find a significant effect of combat exposure for any of the mental health outcomes, but the detectable odds ratio<sup>43</sup> for combat based on the observed prevalence ranged from 2.63 to

2.98. Thus, because the study may have been under-powered to detect such differences, the failure to find a relationship with combat exposure, military role, duration of association, and other child soldier variables does not conclude that these factors do not influence mental health status. Finally, we did not have information on drug or alcohol use or exposure to sexual violence. Girls associated with the Maoists may have experienced less sexual violence compared with civilian girls because of the Maoist focus on gender equality;<sup>44</sup> similarly Maoist prohibitions on substance use may have reduced drug and alcohol problems during association.<sup>45</sup> However, sexual violence and substance abuse should be considered during interventions and for further research because the status of these problems among former child soldiers after they return home is unknown.

The study has several clinical and programmatic implications. First, the greater burden of mental health problems among child soldiers supports the need for focused programming, which should include, but not consist solely of, interventions to reduce depression symptoms and the psychological sequelae of trauma, especially bombings and torture, as well as incorporate belongingness and income generation. Second, girl soldiers may require focused attention, possibly for factors not addressed in this study, such as, problems of gender-based violence and reintegration difficulties. Third, the variation in type and severity of mental health problems highlights the importance of screening, including locally developed measures of function impairment, as a base for intervention.<sup>46</sup> Without screening there is a risk of pathologizing child soldiers as a group rather than providing support to those individuals most impaired. Finally, the presence of mental health problems also among never conscripted children illustrates the need for comprehensive post-conflict community-based psychosocial care not restricted only to child soldiers.

## Acknowledgments

This study was funded by UNICEF Nepal. UNICEF Nepal approved the study design and supervised the conduct of the study. UNICEF Nepal was not responsible for collection, management, analysis, or interpretation of the data; nor the preparation, review, or approval of the manuscript. The authors were responsible fully for the design and conduct of the study; collection, management, analysis, and interpretation of the data; and preparation, review, and approval of the manuscript. The first author was supported by an NIMH National Research Service Award F31 MH075584. NIMH NRSA approved the design of the study. NIMH NRSA was not responsible for the conduct of the study; collection, management, analysis, or interpretation of the data; nor preparation, review, or approval of the manuscript. The first and fourth authors had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. We thank Suraj Koirala and the research staff of TPO-Nepal, all of whom were financially compensated, for implementing the study and members of the CAAFAG Working Group for their assistance. Thanks to Ryan Brown, Ph.D. (Northwestern University), Christina Chan, M.R.P. (CARE), Timothy Holtz, M.D., M.P.H. (Centers for Disease Control and Prevention), and Daniel Hruschka, Ph.D., M.P.H. (Santa Fe Institute), none of whom received compensation, for their suggestions on the manuscript. All authors declare that they have no conflicts of interest.

## References

1. Machel, G. Impact of armed conflict on children. United Nations: Aug 26. 1996
2. UNICEF. The Cape Town Principles and best practices on the prevention of recruitment into the armed forces and of demobilization and social reintegration of child soldiers in Africa in 1997. Cape Town, South Africa: 1997.
3. Wessells, MG. Child soldiers: from violence to protection. Harvard University Press; Cambridge, Mass.: 2006.
4. Beah, I. A long way gone: memoirs of a boy soldier. 1st. Farrar, Straus and Giroux; New York: 2007.
5. McDonnell, FJH.; Akallo, G. Girl soldier: a story of hope for northern Uganda's children. Chosen; Grand Rapids, Mich.: 2007.
6. Betancourt, TS.; Borisova, I.; Rubin-Smith, J.; Gingerich, T.; Williams, T.; Agnew-Blais, J. Psychosocial Adjustment and Social Reintegration of Children Associated with Armed Forces and

Armed Groups: the State of the Field and Future Directions. Psychology beyond Borders and the Francois-Xavier Bagnoud Center for Health and Human Rights/Harvard School of Public Health; Cambridge, Massachusetts: May 1. 2008

7. Dowdney, L. Trauma, resilience and cultural healing: how do we move forward?. Coalition to Stop the Use of Child Soldiers Psychosocial Web Page. [[www.child-soldiers.org/resources/psychosocial](http://www.child-soldiers.org/resources/psychosocial)]. Accessed August 1, 2007
8. Magambo C, Lett R. Post-traumatic stress in former Ugandan child soldiers. *Lancet*. May; 2004 363(9421):1647–1648. [PubMed: 15145643]
9. Kurupparachchi K, Wijeratne LT. Post-traumatic stress in former Ugandan child soldiers. *Lancet*. May; 2004 363(9421):1648–1648. [PubMed: 15145644]
10. Blattman, C. The Consequences of Child Soldiering. The Institute of Development Studies at the University of Sussex; Brighton: Nov. 2006
11. McKay S. The effects of armed conflict on girls and women. *Peace and Conflict: Journal of Peace Psychology*. 1998; 1998; 4(4):381–392.
12. Lamberg L. Reclaiming child soldiers' lost lives. *JAMA-Journal of the American Medical Association*. Aug; 2004 292(5):553–554.
13. Honwana, A. Child soldiers in Africa: (2006). University of Pennsylvania Press; Baltimore, MD, US: 2006. Child soldiers in Africa; p. 202
14. Pearn J. Children and war. *Journal of Paediatrics & Child Health*. Apr; 2003 39(3):166–172. [PubMed: 12654137]
15. Derluyn I, Broekaert E, Schuyten G, Temmerman ED. Post-traumatic stress in former Ugandan child soldiers. *Lancet*. 2004; 363(9412):861–863. [PubMed: 15031032]
16. Bayer CP, Klasen F, Adam H. Association of trauma and PTSD symptoms with openness to reconciliation and feelings of revenge among former Ugandan and Congolese child soldiers. *JAMA*. 2007; 298(5):555–559. [PubMed: 17666676]
17. Human Rights Watch. Children in the Ranks: The Maoists' Use of Child Soldiers in Nepal. Human Rights Watch; Kathmandu, Nepal: Feb. 2007
18. United Nations. Report of the Secretary-General on children and armed conflict in Nepal. United Nations Security Council; Dec 20. 2006
19. Government of Nepal. Interim Constitution of 2063. Ministry of Law. 2006:24.
20. His Majesty's Government. Ministry of Law. Law Books Committee; 2003. Civil Code (11th Revision) of 2059; p. 228
21. HMG-CBS. Census Results-2001. His Majesty's Government Central Bureau of Statistics; Kathmandu, Nepal: 2003.
22. Kohrt BA, Kunz RD, Baldwin JL, Koirala NR, Sharma VD, Nepal MK. 'Somatization' and 'comorbidity': A study of jhum-jhum and depression in rural Nepal. *Ethos*. 2005; 33(1):125–147.
23. Thapa SB, Hauff E. Psychological distress among displaced persons during an armed conflict in Nepal. *Social Psychiatry and Psychiatric Epidemiology*. Aug; 2005 40(8):672–679. [PubMed: 16021344]
24. Schorre BEH, Vandvik IH. Global assessment of psychosocial functioning in child and adolescent psychiatry. A review of three unidimensional scales (CGAS, GAF, GAPD). *European Child & Adolescent Psychiatry*. Oct; 2004 13(5):273–286. [PubMed: 15490275]
25. Dyrborg J, Larsen FW, Nielsen S, Byman J, Nielsen BB, Gautre-Delay F. The Children's Global Assessment Scale (CGAS) and Global Assessment of Psychosocial Disability (GAPD) in clinical practice--substance and reliability as judged by intraclass correlations. *European Child & Adolescent Psychiatry*. Sep; 2000 9(3):195–201. [PubMed: 11095042]
26. Jordans, MJD.; Kohrt, BA.; Tol, WA.; Luitel, N. Validation Study: Mental Health and Functioning Assessment Instruments for Children Affected by Armed Conflict in Nepal. Transcultural Psychosocial Organization, Nepal/ Save the Children-United States; Kathmandu, Nepal: 2007.
27. Birlleson P. Depression in Childhood. *Developmental Medicine and Child Neurology*. 1980; 22(4): 518–521. [PubMed: 7409343]
28. Birlleson P. Behavioural pediatrics and mental health programs: A case for integration? *Journal of Paediatrics and Child Health*. Mar; 2007 43(3):101–102. [PubMed: 17316179]

29. Birmaher B, Brent DA, Chiappetta L, Bridge J, Monga S, Baugher M. Psychometric properties of the Screen for Child Anxiety Related Emotional Disorders (SCARED): a replication study. *Journal of the American Academy of Child & Adolescent Psychiatry*. Oct; 1999 38(10):1230–1236. [PubMed: 10517055]
30. Foa EB, Johnson KM, Feeny NC, Treadwell KR. The child PTSD Symptom Scale: a preliminary examination of its psychometric properties. *Journal of Clinical Child Psychology*. Sep; 2001 30(3): 376–384. [PubMed: 11501254]
31. Goodman R, Meltzer H, Bailey V. The Strengths and Difficulties Questionnaire: a pilot study on the validity of the self-report version (Reprinted from *European Child and Adolescent Psychiatry*, Vol 7, pg 125-130, 1998). *International Review of Psychiatry*. 2003; 15(1-2):173–177. [PubMed: 12745329]
32. Goodman R, Ford T, Simmons H, Gatward R, Meltzer H. Using the Strengths and Difficulties Questionnaire (SDQ) to screen for child psychiatric disorders in a community sample (Reprinted from *The British Journal of Psychiatry*, Vol 177, pgs 534-539, 2000). *International Review of Psychiatry*. 2003; 15(1-2):166–172. [PubMed: 12745328]
33. Bolton P, Tang AM. An alternative approach to cross-cultural function assessment. *Social Psychiatry and Psychiatric Epidemiology*. Nov; 2002 37(11):537–543. [PubMed: 12395144]
34. Tol, WA.; Komproe, IH.; De Jong, JTVM. Assessment of children's functioning in areas of political violence: development and psychometric properties of rating scales for Burundi and Indonesia. Under review
35. Kaufman, J.; Chambers, W.; Puig-Antich, J.; Birmaher, B.; Rao, U.; Ryan, ND. *Kiddie-SADS-Present and Lifetime Version*. University of Pittsburgh; Pittsburgh: Oct. 1996
36. Van Ommeren M, Sharma B, Thapa S, et al. Preparing instruments for transcultural research: use of the translation monitoring form with Nepali-speaking Bhutanese. *Transcultural Psychiatry*. 1999; 36(3):285–301.
37. Cohen JA, Deblinger E, Mannarino AP, Steer RA. A multisite, randomized controlled trial for children with sexual abuse-related PTSD symptoms. *Journal of the American Academy of Child & Adolescent Psychiatry*. Apr; 2004 43(4):393–402. [PubMed: 15187799]
38. Miglioretti DL, Heagerty PJ. Marginal modeling of nonnested multilevel data using standard software. *American Journal of Epidemiology*. 2007; 165(4):453–463. [PubMed: 17121864]
39. SPSS Version 15 [computer program]. SPSS Inc.; Chicago: 2006. Version 15.0
40. SAS Institute Inc.. *SAS/STAT 9.1 User's Guide*, Version 8. SAS Institute Inc.; Cary, North Carolina: 2004.
41. Dickson-Gomez J. Growing up in guerrilla camps: The long-term impact of being a child soldier in El Salvador's civil war. *Ethos*. Dec; 2002 30(4):327–356.
42. Specht I, Attree L. The reintegration of teenage girls and young women. *Intervention: International Journal of Mental Health, Psychosocial Work & Counselling in Areas of Armed Conflict*. Nov; 2006 4(3):219–228.
43. Demidenko E. Sample size determination for logistic regression revisited. *Statistics in Medicine*. Aug 15; 2007 26(18):3385–3397. [PubMed: 17149799]
44. Sharma, M.; Prasain, D. Gender dimensions of the People's War: some reflections on the experiences of rural women. In: Hutt, M., editor. *Himalayan people's war: Nepal's Maoist rebellion*. Indiana University Press; Bloomington: 2004. p. 152-165.
45. Lawoti M. The Maoists and minorities: overlap of interests or a case of exploitation. *Studies in Nepalese History and Society*. 2003; 8:67–97.
46. IASC. *Inter-Agency Standing Committee. IASC; Geneva: 2007. IASC Guidance on Mental Health and Psychosocial Support in Emergency Settings*; p. 182

**Table 1**

Demography and Trauma Exposure of Former Child Soldiers and Matched Children Never Conscripted by Armed Groups.

CATEGORICAL CHARACTERISTICS	No (%)			
	Child Soldiers		Never Conscripted Children	
	Males (N=67)	Females (N=75)	Males (N=69)	Females (N=73)
Education				
Illiterate	1 (1.5)	7 (9.3)	0 (0.0)	7 (9.6)
Primary	14 (20.9)	26 (34.7)	11 (15.9)	16 (21.9)
Lower Secondary	26 (38.8)	18 (24.0)	27 (39.1)	30 (41.1)
Secondary	19 (28.4)	23 (30.7)	28 (40.6)	17 (23.3)
Higher secondary	7 (4.1)	1 (1.3)	3 (4.3)	3 (4.1)
Ethnicity/Caste				
Dalit	14 (20.9)	32 (42.7)	15 (21.7)	29 (39.7)
Brahmin/Chhetri	23 (34.3)	22 (29.3)	24 (34.8)	23 (31.5)
Janajati	30 (44.8)	21 (28.0)	30 (43.5)	21 (28.8)
School Enrollment				
In School	39 (58.2)	44 (58.7)	62 (89.9)	60 (82.2)
Not In School	28 (41.8)	31 (41.3)	7 (10.1)	13 (17.8)
Religion				
Hindu	56 (83.6)	72 (96.0)	58 (84.1)	67 (91.8)
All others	11 (16.4)	3 (4.0)	11 (15.9)	6 (8.2)
Family Type				
Nuclear	40 (59.7)	56 (74.4)	46 (66.7)	47 (64.4)
Joint	27 (40.3)	19 (25.3)	23 (33.3)	26 (35.6)
Marital Status				
Single	57 (85.1)	65 (86.7)	69 (100.0)	69 (94.5)
Ever Married	10 (14.9)	10 (13.3)	0 (0.0)	4 (5.5)
Political Interest				
No Interest	14 (20.9)	21 (28.0)	18 (26.1)	27 (37.0)

CATEGORICAL CHARACTERISTICS	No (%)			
	Child Soldiers		Never Conscripted Children	
	Males (N=67)	Females (N=75)	Males (N=69)	Females (N=73)
Interest	53 (79.1)	54 (72.0)	51 (73.9)	46 (63.0)
Traumatic Events				
Unintentional injury	25 (37.3)	29 (38.7)	17 (24.6)	26 (35.6)
Fire	32 (47.8)	47 (62.7)	36 (52.2)	37 (50.7)
Natural disaster	9 (13.4)	19 (25.3)	10 (14.5)	19 (26.0)
Witnessing violent death	30 (44.8)	27 (36.0)	13 (18.8)	11 (15.1)
Beating	47 (70.1)	57 (76.0)	45 (65.2)	51 (69.9)
Bombing	42 (62.7)	38 (50.7)	15 (21.7)	14 (19.2)
Abduction	38 (56.7)	35 (46.7)	22 (31.9)	15 (20.5)
Torture	22 (32.8)	19 (25.3)	9 (13.0)	6 (8.2)
Murder of a family member	5 (7.5)	1 (1.3)	2 (2.9)	1 (1.4)
Domestic Violence	8 (11.9)	14 (18.7)	17 (24.6)	23 (31.5)
Physical Abuse	3 (4.5)	4 (5.3)	6 (8.7)	6 (8.2)
CONTINUOUS CHARACTERISTICS				
	Mean (95% CI)			
Age (years)	15.96 (15.57—16.34)	15.56 (15.18—15.90)	15.10 (14.68—15.51)	14.77 (14.42—15.13)
Economic status (number of household facilities)	1.88 (1.57—2.19)	1.96 (1.59—2.36)	2.19 (1.81—2.57)	2.03 (1.67—2.41)
Time living in the current residence (months)	13.94 (12.72—15.16)	12.53 (11.21—13.73)	13.35 (12.31—14.39)	13.17 (12.20—14.11)
Number of Family Members	6.19 (5.70—6.69)	5.97 (5.53—6.55)	6.25 (5.67—6.82)	6.22 (5.68—6.74)

Abbreviations: CI, confidence interval.

Table 2

Univariate and Multivariate Analyses of the Effects Child Soldier Status on Mental Health Outcomes Adjusted for Trauma Exposure and Other Covariates.

	Mean Symptom Score (95% CI)	No. (%) above cutoff <sup>A</sup>	Odds Ratios of Scores Above Cutoff for Former Child Soldiers versus Never Conscripted Children					
			Unadjusted model <sup>B</sup>		Model 1 <sup>D</sup> : Adjusted for Exposure to Trauma		Model 2 <sup>E</sup> : Adjusted for Trauma and other Covariates	
			OR (95% CI)	P-value <sup>C</sup>	OR (95% CI)	p-Value	OR (95% CI)	p-Value
<b>Total Sample (N = 282)</b>								
<b>Depression (DSRS)</b>								
Never Conscripted Children	10.75 (10.16—11.33)	34 (24.1)	1.00		1.00		1.00	
Child Soldiers	14.27 (13.31—15.22)	75 (53.2)	3.56 (2.33—5.43)	<0.001	2.69 (1.48—4.89)	0.001	2.41 (1.31—4.44)	0.004
<b>Anxiety (SCARED-5)</b>								
Never Conscripted Children	2.97 (2.71—3.24)	53 (37.6)	1.00		1.00		1.00	
Child Soldiers	3.61 (3.20—4.02)	65 (46.1)	1.46 (0.78—2.72)	0.24	1.39 (0.72—2.68)	0.33	1.63 (0.77—3.45)	0.20
<b>PTSD (CPSS)</b>								
Never Conscripted Children	14.18 (12.81—15.54)	28 (20.0)	1.00		*		*	
Child Soldiers	21.41 (19.73—23.10)	78 (55.3)	4.96 (2.56—9.64)	<0.001				
<b>Psychological Strengths and Difficulties (SDQ Total Difficulties)</b>								
Never Conscripted Children	12.46 (11.80—13.12)	26 (18.4)	1.00		1.00		1.00	
Child Soldiers	15.13 (14.24—16.01)	55 (39.0)	2.91 (1.53—5.51)	0.001	1.77 (0.82—3.84)	0.15	2.08 (0.86—5.02)	0.10
<b>Function Impairment (FI)</b>								
Never Conscripted Children	4.30 (3.49—5.10)	63 (44.7)	1.00		1.00		1.00	
Child Soldiers	7.19 (6.18—8.21)	88 (62.4)	2.04 (1.41—2.96)	<0.001	1.45 (0.92—2.27)	0.11	1.34 (0.84—2.14)	0.22
<b>Boys (N=134)</b>								
<b>PTSD (CPSS)</b>								

	Odds Ratios of Scores Above Cutoff for Former Child Soldiers versus Never Conscripted Children							
	Mean Symptom Score (95% CI)	No. (%) above cutoff <sup>A</sup>	Unadjusted model <sup>B</sup>		Model 1 <sup>D</sup> : Adjusted for Exposure to Trauma		Model 2 <sup>E</sup> : Adjusted for Trauma and other Covariates	
			OR (95% CI)	p-value <sup>C</sup>	OR (95% CI)	p-Value	OR (95% CI)	p-Value
Never Conscripted Children	12.81 (11.02—14.60)	12 (17.4)	1.00		1.00		1.00	
Child Soldiers	18.64 (16.18—21.10)	30 (44.8)	3.85 (1.77—8.39)	<0.001	2.38 (0.87—6.50)	0.09	3.81 (1.06—13.73)	0.04
<b>Girls (N=148)</b>								
<b>PTSD (CPSS)</b>								
Never Conscripted Children	14.90 (12.90—16.80)	16 (21.9)	1.00		1.00		1.00	
Child Soldiers	22.62 (20.44—24.80)	48 (64.0)	6.33 (2.64—15.17)	<0.001	5.98 (1.86—19.27)	0.003	6.80 (2.16—21.58)	<0.001

Abbreviations: OR, Odds Ratio; CI, confidence interval; DSRS, Depression Self Rating Scale; SCARED-5, Screen for Child Anxiety and Related Emotional Disorders-5 item version; Child Posttraumatic Stress Disorder (PTSD) Symptom Scale; SDQ, Strength and Difficulties Questionnaire; FI, Function Impairment.

<sup>A</sup>No. (%) indicated for intervention refers to percentage of sample at or above cut-off score for psychosocial treatment indication: DSRS cut-off score=14, SCARED=4, CPSS=20, SDQ=16, FI=4.

<sup>B</sup>Odds ratios are from logistic regression models with child soldier status as an independent variable, mental health outcome as the dependent variable.

<sup>C</sup>P values are based on empirical standard error estimates from generalized estimating equations.

<sup>D</sup>Covariates in Adjusted Model 1: Trauma-related covariates (unintentional injury, fire, natural disaster, violent death, beating, bombing, abduction, torture, murder of family member, domestic violence, physical abuse).

<sup>E</sup>Covariates in Adjusted Model 2: Trauma-related covariates from Adjusted Model 1 and religion, school enrollment, family type, marital status, house ownership, political interest.

\* Because of sex interaction, the results for PTSD in adjusted models are presented stratified by sex.



**Table 3**

## Characteristics of Child Soldiers.

	No (%)		
	Total (n=142)	Females (n=75)	Males (n=67)
Armed group association			
Communist Party of Nepal-Maoists	141 (99.3)	67 (100)	66 (98.5)
Royal Nepal Army *	1 (0.7)	0 (0)	1 (1.5)
Recruitment process			
Voluntary	65 (45.8)	35 (46.7)	30 (44.8)
Forced	77 (54.2)	40 (53.3)	37 (55.2)
Age at recruitment			
5-10 years old	16 (11.3)	9 (12.2)	7 (10.4)
11-13 years old	62 (44.0)	35 (47.3)	27 (40.3)
14-16 years old	63 (44.7)	30 (40.5)	33 (49.3)
Role during association **			
Cultural program	55 (38.7)	40 (53.3)	15 (22.4)
Military regiment	30 (21.1)	10 (13.3)	20 (29.9)
Porter	50 (35.2)	28 (37.3)	22 (32.8)
Cook	67 (47.2)	41 (54.7)	26 (38.8)
Sentry	77 (54.2)	35 (46.7)	44 (65.7)
Spy	17 (12.0)	5 (6.7)	12 (17.9)
Messenger	39 (27.5)	22 (29.3)	17 (25.4)
Combat Exposure			
Yes	72 (50.7)	34 (45.3)	38 (56.7)
No	70 (49.3)	41 (54.7)	29 (43.3)
Process of leaving armed group			
Escape from armed group	56 (39.4)	32 (42.7)	24 (35.8)
Child negotiated own release	33 (23.2)	18 (24.0)	15 (22.4)
Did not return to group after vacation or sick leave	12 (8.5)	8 (10.7)	4 (6.0)

	No (%)		
	Total (n=142)	Females (n=75)	Males (n=67)
Family member negotiated child's release	10 (7.0)	5 (6.7)	5 (7.5)
Discharged by armed group	4 (2.1)	3 (4.0)	1 (1.5)
Other process of leaving	25 (17.6)	9 (12.0)	16 (23.9)
Duration of association			
Less than 3 months	26 (18.3)	18 (24.0)	8 (11.9)
3-6 months	62 (43.7)	36 (48.0)	26 (38.8)
7-12 months	22 (15.5)	9 (12.0)	13 (19.4)
Greater than 1 year	32 (22.5)	12 (16.0)	20 (29.9)
Time since return to community			
Less than 6 months	62 (43.7)	29 (38.7)	33 (49.3)
6-12 months	21 (14.8)	10 (13.3)	11 (16.4)
1-2 years	33 (23.2)	23 (30.7)	10 (14.9)
Greater than 2 years	26 (18.3)	13 (17.3)	13 (19.4)
Status of association with armed group			
No longer associated with group	120 (84.5)	67 (89.3)	53 (79.1)
Still associated with armed group	22 (15.5)	8 (10.7)	14 (20.9)

\* This child soldier participant and his matched counterpart were excluded from all statistical analyses.

\*\* Children had multiple roles during association with the armed group.

**Table 4**

Predictors of Mental Health among Former Child Soldiers ( $N=141$ ).  
4a. Depression (DRSR) and Anxiety (SCARED)

	No. (%)	Depression (DSRS)				Anxiety (SCARED)			
		Unadjusted <sup>A</sup>		Adjusted <sup>C</sup>		Unadjusted <sup>A</sup>		Adjusted <sup>C</sup>	
		OR (95%CI)	P-Value <sup>B</sup>	OR (95%CI)	P-Value	OR (95%CI)	P-Value	OR (95%CI)	P-Value
<b>Sex</b>									
Male	67 (47.5)	1.00		1.00		1.00		1.00	
Female	74 (52.5)	2.92 (1.35—6.57)	.007	5.57 (1.43-21.71)	.01	2.90 (1.20—7.00)	.02	4.54 (1.34—15.38)	.02
<b>Wealth (household facilities)</b>									
< 2	92 (65.2)	1.00		1.00		1.00		1.00	
2	49 (34.8)	0.60 (0.44—0.84)	.003	0.56 (0.33—0.94)	.03	0.69 (0.51—0.94)	.02	0.66 (0.46—0.94)	.02
<b>Age of Recruitment</b>									
<14-years-old	86 (61.0)	2.51 (1.08—5.85)	.03	2.64 (0.86-8.06)	.09	0.69 (0.33—1.42)	.31	0.45 (0.20—1.02)	.05
14 years-old	55 (39.0)	1.00		1.00		1.00		1.00	
<b>Type of Recruitment</b>									
Voluntary	77 (54.6)	1.00		1.00		1.00		1.00	
Forced	64 (45.4)	3.11 (1.42—6.79)	.004	2.02 (0.79—5.21)	.14	1.73 (0.91—3.28)	.09	1.24 (0.45—3.41)	.67
<b>Duration of Association</b>									
< 1 year	87 (61.7)	1.00		1.00		1.00		1.00	
1 year	54 (38.3)	0.61 (0.38—0.98)	.04	0.51 (0.26—0.99)	.51	0.67 (0.44—1.00)	.05	0.82 (0.45—1.47)	.49
<b>Role – Military</b>									
No	111 (78.7)	1.00		1.00		1.00		1.00	
Yes	30 (21.3)	1.45 (0.61—3.44)	0.40	2.35 (0.53—10.32)	.26	0.85 (0.34—2.13)	.73	0.92 (0.24—3.56)	.90
<b>Combat Exposure</b>									
No	69 (48.9)	1.00		1.00		1.00		1.00	
Yes	72 (51.1)	2.22 (1.24—3.98)	.007	0.83 (0.13—5.34)	.84	1.50 (0.83—2.70)	.18	1.24 (0.19—8.26)	.82
<b>Trauma – Beating</b>									
No	37 (26.2)	1.00		1.00		1.00		1.00	

	Depression (DSRS)					Anxiety (SCARED)				
	No. (%)	Unadjusted <sup>A</sup>		Adjusted <sup>C</sup>		Unadjusted <sup>A</sup>		Adjusted <sup>C</sup>		
		OR (95%CI)	P-Value <sup>B</sup>	OR (95%CI)	P-Value	OR (95%CI)	P-Value	OR (95%CI)	P-Value	
Yes	104 (73.8)	3.33 (1.51—7.35)	.003	4.23 (1.36—13.19)	.02	1.48 (0.75—2.92)	.27	1.23 (0.50—3.00)	.65	
Trauma – Bombing										
No	62 (44.0)	1.00		1.00		1.00		1.00		
Yes	79 (56.0)	3.15 (1.66—5.99)	<.001	6.02 (0.99—36.54)	.05	1.56 (0.74—3.28)	.24	1.58 (0.34—7.32)	.56	
Trauma – Abduction										
No	69 (48.9)	1.00		1.00		1.00		1.00		
Yes	72 (51.1)	2.35 (1.20—4.61)	.01	1.19 (0.35—4.07)	.78	1.59 (0.79—3.19)	.19	1.35 (0.59—3.07)	.47	
Trauma – Torture										
No	100 (70.9)	1.00		1.00		1.00		1.00		
Yes	41 (29.1)	1.38 (0.78—2.47)	.27	0.52 (0.16—1.66)	.59	1.50 (0.74—3.06)	.26	1.30 (0.44—3.82)	.64	
Still Associated										
No	119 (84.4)	**	**	**	**	1.00		**	**	
Yes	22 (15.6)					0.04 (0.09—0.19)	<.001			
Time Since Return										
< 1 year	61 (43.3)	1.00		1.00		1.00		1.00		
1 year	80 (56.7)	1.85 (1.25—2.73)	.002	1.43 (0.87—2.30)	.14	1.38 (1.05—1.81)	.02	1.12 (0.81—1.55)	.50	

#### 4b. PTSD (CPSS) and General Psychological Difficulties (SDQ)

	PTSD (CPSS)					General Psychological Difficulties (SDQ)				
	No. (%)	Unadjusted <sup>A</sup>		Adjusted <sup>C</sup>		Unadjusted <sup>A</sup>		Adjusted <sup>C</sup>		
		OR (95%CI)	P-Value	OR (95%CI)	P-Value	OR (95%CI)	P-Value	OR (95%CI)	P-Value	
Sex										
Male	67 (47.5)	1.00		1.00		1.00		1.00		
Female	74 (52.5)	2.19 (0.99—4.87)	.05	2.47 (0.94—6.51)	.07	1.70 (0.88—3.27)	.11	2.90 (1.17—7.17)	.02	
Wealth (household facilities)										
< 2	92 (65.2)	1.00		1.00		1.00		1.00		

4b. PTSD (CPSS) and General Psychological Difficulties (SDQ)										
	No. (%)	PTSD (CPSS)				General Psychological Difficulties (SDQ)				
		Unadjusted <sup>A</sup>		Adjusted <sup>C</sup>		Unadjusted <sup>A</sup>		Adjusted <sup>C</sup>		
		OR (95%CI)	P-Value	OR (95%CI)	P-Value	OR (95%CI)	P-Value	OR (95%CI)	P-Value	P-Value
2	49 (34.8)	0.59 (0.46—0.75)	<.001	0.58 (0.43—0.80)	<.001	0.57 (0.43—0.75)	<.001	0.54 (0.35—0.84)	<.001	
Age of Recruitment										
<14-years-old	86 (61.0)	1.04 (0.53—2.06)	.90	0.90 (0.33—2.43)	.84	0.96 (0.43—2.15)	.93	1.07 (0.48—2.42)	.87	
14 years-old	55 (39.0)	1.00		1.00		1.00		1.00		
Type of Recruitment										
Voluntary	77 (54.6)	1.00		1.00		1.00		1.00		
Forced	64 (45.4)	1.85 (1.08—3.15)	.02	0.79 (0.35—1.81)	.58	2.42 (1.37—4.27)	.002	1.44 (0.59—3.52)	.42	
Duration of Association										
< 1 year	87 (61.7)	1.00		1.00		1.00		1.00		
1 year	54 (38.3)	0.63 (0.44—0.90)	.01	0.67 (0.42—1.06)	.08	0.67 (0.47—0.96)	.03	0.73 (0.42—1.25)	.72	
Role – Military										
No	111 (78.7)	1.00		1.00		1.00		1.00		
Yes	30 (21.3)	1.30 (0.51—3.43)	.59	1.24 (0.39—3.90)	.71	1.03 (0.47—2.27)	.94	0.64 (0.21—1.97)	.44	
Combat Exposure										
No	69 (48.9)	1.00		1.00		1.00		1.00		
Yes	72 (51.1)	1.66 (0.86—3.23)	.13	2.66 (0.83—8.51)	.10	2.84 (1.69—1.98)	<.001	1.13 (0.15—8.60)	.90	
Trauma – Beating										
No	37 (26.2)	1.00		1.00		1.00		1.00		
Yes	104 (73.8)	3.21 (1.40—7.36)	.006	2.38 (0.80—7.05)	.12	1.59 (0.72—3.52)	.25	0.56 (0.20—1.56)	.27	
Trauma – Bombing										
No	62 (44.0)	1.00		1.00		1.00		1.00		
Yes	79 (56.0)	1.42 (0.70—2.91)	.33	0.52 (0.16—1.68)	.28	4.38 (2.28—8.40)	<.001	7.73 (1.23—48.57)	.03	
Trauma – Abduction										
No	69 (48.9)	1.00		1.00		1.00		1.00		
Yes	72 (51.1)	2.50 (1.36—4.57)	.003	1.23 (0.52—2.91)	.64	2.70 (1.42—5.14)	.002	1.48 (0.66—3.32)	.34	
Trauma – Torture										

4b. PTSD (CPSS) and General Psychological Difficulties (SDQ)									
	No. (%)	PTSD (CPSS)				General Psychological Difficulties (SDQ)			
		Unadjusted <sup>A</sup>		Adjusted <sup>C</sup>		Unadjusted <sup>A</sup>		Adjusted <sup>C</sup>	
		OR (95%CI)	P-Value	OR (95%CI)	P-Value	OR (95%CI)	P-Value	OR (95%CI)	P-Value
No	100 (70.9)	1.00		1.00		1.00		1.00	
Yes	41 (29.1)	3.01 (1.52—5.97)	.002	3.66 (1.41—9.53)	.008	2.63 (1.18—5.86)	.02	3.22 (0.98—10.65)	.05
Still Associated									
No	119 (84.4)	1.00		1.00		**	**	**	**
Yes	22 (15.6)	0.14 (0.06—0.33)	<.001	0.23 (0.06—0.90)	.04				
Time Since Return									
< 1 year	61 (43.3)	1.00		1.00		1.00		1.00	
1 year	80 (56.7)	1.36 (1.02—1.80)	.03	0.84 (0.60—1.18)	.32	1.38 (0.96—1.98)	.08	1.01 (0.65—1.56)	.96

4c. Function Impairment (FI)					
	No. (%)	Function Impairment (FI)			
		Unadjusted <sup>A</sup>		Adjusted <sup>C</sup>	
		OR (95%CI)	P-Value	OR (95%CI)	P-Value
Sex					
Male	67 (47.5)	1.00		1.00	
Female	74 (52.5)	1.35 (0.62—2.99)	.45	1.01 (0.32—3.19)	.98
Wealth (household facilities)					
< 2	92 (65.2)	1.00		1.00	
2	49 (34.8)	0.56 (0.42—0.73)	<.001	0.52 (0.37—0.74)	<.001
Age of Recruitment					
<14-years-old	86 (61.0)	1.39 (0.54—3.56)	.50	1.78 (0.56—5.60)	.32
14 years-old	55 (39.0)	1.00		1.00	
Type of Recruitment					
Voluntary	77 (54.6)	1.00		1.00	
Forced	64 (45.4)	2.02 (0.93—4.37)	.08	0.96 (0.37—2.49)	.94
Duration of Association					

4c. Function Impairment (FI)					
	No. (%)	Function Impairment (FI)			
		Unadjusted <sup>A</sup>		Adjusted <sup>C</sup>	
		OR (95%CI)	P-Value	OR (95%CI)	P-Value
< 1 year	87 (61.7)	1.00		1.00	
1 year	54 (38.3)	0.61 (0.36—1.04)	.07	0.65 (0.38—1.12)	.12
Role – Military					
No	111 (78.7)	1.00		1.00	
Yes	30 (21.3)	0.76 (0.29—1.97)	.56	0.65 (0.19—2.17)	.48
Combat Exposure					
No	69 (48.9)	1.00		1.00	
Yes	72 (51.1)	1.18 (0.56—2.49)	.67	1.11 (0.27—4.65)	.88
Trauma – Beating					
No	37 (26.2)	1.00		1.00	
Yes	104 (73.8)	3.09 (1.31—7.29)	.01	2.62 (0.92—7.49)	.07
Trauma – Bombing					
No	62 (44.0)	1.00		1.00	
Yes	79 (56.0)	1.51 (0.77—2.97)	.23	1.35 (0.44—4.21)	0.60
Trauma – Abduction					
No		1.00		1.00	
Yes		2.57 (1.38—4.82)	.003	0.97 (0.43—2.21)	.94
Trauma – Torture					
No	100 (70.9)	1.00		1.00	
Yes	41 (29.1)	2.39 (1.22—4.71)	.01	2.79 (0.89—8.74)	0.08
Still Associated					
No	119 (84.4)	1.00		1.00	
Yes	22 (15.6)	0.09 (0.04—0.22)	<.001	0.16 (0.04—0.67)	.01
Time Since Return					
< 1 year	61 (43.3)	1.00		1.00	
1 year	80 (56.7)	1.54 (1.04—2.28)	.03	0.88 (0.59—1.31)	0.52

Abbreviations: OR, odds ratio; CI, confidence interval; DSRS, Depression Self Rating Scale; SCARED-5, Screen for Child Anxiety and Related Emotional Disorders-5 item version; Child Posttraumatic Stress Disorder (PTSD) Symptom Scale; SDQ, Strength and Difficulties Questionnaire; FI, Function Impairment.

<sup>A</sup> Regression coefficients are from mixed logistic models with random effects terms to account for clustering of soldiers within villages.

<sup>B</sup> P values are based on empirical standard error estimates.

<sup>C</sup> Adjusted model includes sex, wealth (< 2 household facilities vs. ≥ 2 household facilities, e.g. electricity, water tap, radio, bicycle); age of recruitment (<14 years old vs. ≥ 14 years old), type of recruitment (voluntary vs. forced), duration of association (<1 year vs. ≥ 1 year), role in military, exposure to combat, traumatic exposures (unintentional injury, fire, natural disaster, violent death, beating, bombing, abduction, torture, murder of a family member, domestic violence, and physical abuse), still associated with armed group, and duration of time since returning home (<1 year vs. ≥ 1 year).

\*\* There were no still associated child soldiers who were above cut-off scores for depression and function impairment. For anxiety, in the adjusted model there were some cells only 1 when using all covariates.