Soc Psychiatry Psychiatr Epidemiol
DOI 10.1007/s00127-014-0873-5

ORIGINAL PAPER

The influence of different types of war experiences on depression and anxiety in a Ugandan cohort of war-affected youth: the WAYS study

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Received: 15 July 2013 / Accepted: 18 March 2014

Abstract
Background War experiences (WE) are frequently associated with mental health problems. Whether different types of WE vary in predicting which problem, or how severe, in former child soldiers (FCS) remains unknown.
Methods Using data from the first wave of an on-going longitudinal cohort study (the WAYS study), we investigated relations between types of WE and symptoms of depression/anxiety among FCS in Northern Uganda ($N = 539$, baseline age = 22.39; SD = 2.03, range 18–25). Using robust Maximum Likelihood estimation in SEM, regression analyses were performed to relate binary indicators of types of WE to a single latent factor capturing symptoms of depression/anxiety.
Results SEM results showed that "direct personal harm", "witnessing violence", "deaths", "threat to loved ones", "involvement in hostilities", and "sexual abuse" indicators were related to reported symptoms of depression/anxiety irrespective of gender and age. Multivariable models revealed independent associations of "witnessing violence" ($\beta = 0.29$, SE = 0.09, $p < 0.001$) and "deaths" ($\beta = 0.14$, SE = 0.05, $p < 0.001$) with symptoms of depression/anxiety in both sexes. "Sexual abuse" ($\beta = 0.32$, SE = 0.16, $p < 0.001$) independently predicted symptoms of depression/anxiety for female but not male youths whilst "threat to loved ones" ($\beta = 0.13$, SE = 0.07, $p < 0.05$) independently predicted symptoms of depression/anxiety in male but not female youths.
Conclusions Dimensions of WE predicted symptoms of depression/anxiety differently, but it is hard to establish their causal status. Our findings suggest that it might be fruitful to consider such exposure variations of WE when designing interventions to mitigate the symptoms of depression/anxiety on male and female FCS.

Keywords War experiences · War-affected youths · Gender · Depression/anxiety

Introduction

For two decades (1986–2006), northern Uganda experienced a protracted violent civil conflict in which about 25,000 children (now youths) were forcefully abducted and taken into rebel captivity to work as porters, cooks, messengers, sex slaves, human shields, and fighters [1]. As a result, more than 90 % of the population in the affected districts were displaced and social services such as education and health were disrupted [2–4]. In captivity, the abductees were tortured, sexually abused, involved in hostilities, and injured in combat [5–7]. Exposure to war is a known risk factor for long-term mental health problems such as posttraumatic stress disorder (PTSD), conduct problems, psychosis, depression, and anxiety [8–11]. Many studies conducted in Northern Uganda have reported high

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Published online: 10 April 2014

levels of mental health problems such as depression, anxiety, aggression, and PTSD [7, 12–14]. Intervention studies have also been carried out with varying outcomes [15–17]. Yet, few studies have considered whether types of WE may vary in their relation to different dimensions of mental health problems and whether these relations depend on gender, age at abduction or duration in captivity.

Previous studies have suggested that some types of WE may relate differently to particular dimensions of mental health problems. For example, killing or wounding others has been suggested to disproportionately relate to hostility and rape to increased anxiety and hostility [18]. Other previous studies have suggested that war events such as abduction, threats of death or physical injury are associated with PTSD and depression [18]. In this study, we examine whether particular types of WE are more highly associated with risks for depression or anxiety.

Although previous studies do not indicate gender difference in the absolute number of WE, female and male survivors might be exposed to different types of WE [19, 20]. For example, sexual abuse and rape are mainly reported by females and participation in combat, killing or injuring others are mainly reported by male survivors [5, 6, 12, 21, 22]. Consequently, previous studies showed that female participants were more likely than male participants to meet criteria for PTSD, although they were less likely to have witnessed death or injury during combat or war [22]. Similarly, female participants report sexual assault and child sexual abuse more than male participants. [22] In northern Uganda, 30 % of formerly abducted girls (commonly referred to as "child mothers") returned from captivity with children fathered by rebel commanders [6]. For these "child mothers", child care becomes an additional burden which may predispose them to further mental health problems. Likewise, gender differences may continue to surface in the aftermath of war as more males than females do not have the same experiences of post-war adjustment, for example they differ in receipt of education with women more unlikely to return to school after war [23]. Compared to their male counterparts, female survivors are disproportionately stigmatised and discriminated against in post-war situations [19]. In addition since women were particularly targeted in the conflict in northern Uganda, [6, 24] it is more prudent to examine outcomes and exposures by gender, to see what empirical differences can be observed and to avoid the assumption that women and men are similarly affected by WE.

The evidence for age differences due to exposure to WE is mixed and varies by context. For example, a large study on mental disorders following war in the Balkans reported that older age and exposure to traumatic WE were related to mood and anxiety disorders [25]. On the other hand, experiencing war at a young age has been associated with fewer post-war PTSD symptoms and exposure to WE at a young age has been related to increased internalising problems and feelings of revenge [26–28]. This raises further questions about age at capture and duration in captivity, since this might influence the relationships between WE and the likelihood of later mental health problems such as depression and anxiety.

The current literature has three major limitations. First, many studies have been conducted on the associations between general WE and mental health outcomes without considering the possibility that different types of WE (for example witnessing violence, involvement in combat or sexual abuse) may vary in their prediction of mental health outcome [29]. Second, FCS have been treated as homogeneous group without considering the possibility of sex differences or other sub-population differences that may predispose to adverse symptoms of specific mental health problems, for example depression [30]. Disregard for sex and age differences may mask potential risks associated with being male or female or young or old yet gender differences and age may have implications for post-war reintegration of FCS. Third, previous studies involved small sample sizes and few studies have considered duration in captivity or age at abduction as covariates [19, 27, 31].

We report on data collected from the first wave of an ongoing longitudinal cohort study of 539 war-affected youths being followed over many years to understand post-war outcomes and mental health variations (6 years later), in Northern Uganda. We use locally adapted and validated measures of types of WE and psychosocial outcomes to make the assessments as relevant and applicable as possible to the setting. We hypothesised that different WE vary in their prediction of levels of psychopathology (depression/anxiety symptoms) and that gender, younger age at abduction, and longer duration in captivity are related to adverse symptoms of depression/anxiety and that this may be different for male and female survivors.

Methods

Sample

The WAYS study utilised a cohort study design recruiting formerly abducted population from five districts in northern Uganda that were most affected by the conflict and resulting atrocities (Gulu, Amuru, Nwoya, Pader, and Kitgum). These districts consist of smaller geographically defined administrative units (referred to in here as sub-counties) where the formerly abducted persons are members of particular groups formed for easy access, social support, and to promote relevant activities. This list was

compiled for the sub-counties by UNICEF and all formerly abducted youths from the villages in the sub-counties are included. Also included in this list are particulars of the former abductees such as age at capture, duration in captivity, village of origin, injuries, and for girls, whether they had any children while in captivity. Also, it is on the basis of this list that all formerly abducted persons would get assistance from Non-governmental organizations (NGOs) including UNICEF. Assistance included essential household items such as mattresses, blankets, cooking utensils, basins, clothes, etc. to help them resettle in their communities after return from captivity. Thus, the list is comprehensive and accurate. From the lists of members of these groups, we randomly selected those who met our inclusion criteria: (1) history of abduction by rebels, (2) lived in rebel captivity for at least 6 months, and (3) aged between 18 and 25 years. Those who met the inclusion criteria were invited through their local council and village leaders to participate in the study. The baseline assessment was conducted from June 2011 to September 2011.

Data collection

The interviewers conducting fieldwork for the WAYS study were all university graduates who had been extensively trained in data collection and interviewing skills, briefed in the study background, and detailed interview content. All the interviewers were fluent in speaking and writing the native language of the participants. The interviewers visited the participants in their homes or nearby trading centres or community halls to conduct semi-structured face-to-face interviews and to administer questionnaires covering a wide range of topics. Information sought in the questionnaire included: demographic characteristics, pre and post-war experiences, individual factors (e.g. temperament), family characteristics (e.g. family functioning), community characteristics or environmental perceptions, and psychosocial outcomes (common symptoms of depression, anxiety, conduct problems, pro-social behaviours, psychotic symptoms and related disorders). A Clinical Psychiatric Officer was available on site to handle mental health emergencies and or make referrals to the Regional Referral Hospital. Prior to participation, informed consent was obtained from the participant in accordance with ethical guidelines and approvals. Where the participants were unable to read or write, the informed consent was read out to them and if they agreed, they inked their thumb print on the informed consent form.

Measures

Assessment of mental health outcomes is a challenge in many non-western settings due to differences in culture and absence of culturally specific standardised measures to convey a discernible meaning. Consequently, we used both standardised and locally derived measures.

War experiences

To assess individual exposures to different WE, we used items from the UNICEF B&H Post-war Screening Survey [32]. The questionnaire was adapted by our research team to better capture the context of the war in northern Uganda; for example, items on knowledge of, witnessing, and being sexually assaulted and/or abused were added. The adapted instrument contained 52 items capturing a diversity of war-related experiences such as direct personal harm (6 items, e.g. serious injuries), witnessing general war violence (11 items, e.g. massacres or raids on villages), sexual abuse (1 item, sexual assault/and or rape), and involvement in hostilities (2 items, e.g. did you fight in the army or warring faction?). Other WE include: Separation (2 items), Deaths (7 items, e.g. parents, siblings, or extended family members), Material loss (4 items), Physical threat to self (5 items), Harm to loved ones (4 items), Physical threat to relatives or loved ones (4 items), Displacement (5 items), and Drug and substance abuse (1 item). WE were simply binary coded for occurrence (1) versus absence (0). We chose these types of WE because we were interested in exploring the particular effect of forms of severe violence common in war-affected youths on psychosocial outcomes. Age at abduction and duration with the fighting forces were self-reported.

Depression/anxiety

Symptoms of depression and anxiety were assessed by a subscale of the Acholi Psychosocial Assessment Instrument (APAI), which is a modified version of African Youth Psychosocial Assessment Instrument. APAI is afield-based measure with very good psychometric properties previously developed and used in Northern Uganda [33, 34]. The measure comprises 40 items (depression/anxiety (19 items), conduct problems (10 items), pro-social behaviours (6 items), and somatic complaints without medical cause (5 items). Four items for Psychotic symptoms were also added. Only the depression/anxiety scale is reported here. Depression/anxiety was represented by questions specific to depression/anxiety such as ‘‘I do not sleep at night’’, “I have a lot of thoughts”, “I think about suicide”, etc. For each question responses were scored on a four-point scale (0–3). In previous studies, the Crobach Alpha for the depression/anxiety subscale was 0.70 [33, 34]. In this study the Cronbach α was 0.82.

Participant demographic characteristics

A demographic inventory collected information on sex, age, at abduction, and duration in captivity.

Statistical analyses

First we tabulated the demographic characteristics of the study participants and correlations among variables in the study. Second, we tabulated all types of war exposures and depression/anxiety by sex and compared continuous variables using *t* tests. Because the *t* test assumes both populations have a normal distribution and yet the scores in the types of war exposure were not normally distributed, we used MLR estimator in MPlus to compute group differences. MLR procedures in Mplus are used to compare differences on continuous variables to provide robustness in the presence of non-normality and non-independence of observations [35–38]. Third, we examined the associations between different types of WE and depression/anxiety for the total group and for both male and female participants in univariable regression models (one at a time). Fourth, to explore to what extent the associations of the different types of WE with depression/anxiety were due to a shared component (co-occurrence) of the domains of WE rather than their independent effect, we entered all the types of WE in one multivariable regression model except the total number of WE. To better understand within-group differences we tested a two-way interaction term stratified by gender. For example, in computing differences based on age at abduction, and duration in captivity, we additionally entered, each at a time, their interaction terms with each types of WE in univariable analyses separately for each sex. For multivariable analyses, we pursued only those types of WE that significantly predicted symptoms of depression/anxiety in the univariable models after adjusting for all other types of WE (except total number of war events) to avoid multiple testing. In all tables the level of significance is indicated through footnotes. Missing data were <1 % (0.79 %). We conducted all analyses using Mplus version 7, [39] and used a Comparative Fit Indices (CFI) of (>0.95) to indicate whether the model was acceptable or not [40].

Results

In total, 650 participants were invited and data were collected from 539 participants representing 83 % of those invited. Those who did not participate were either sick, attending to their sick children or had gone to attend to their farms. The psychosocial outcomes between responders and non-responders at follow-up are discussed in a Cohort profile of this group [41]. In general, the difference between responders and non-responders was minimal and may not have affected the outcome of the study [41].

The demographic characteristics of the participants in the study are presented in Table 1. The sample consisted of 539 war-affected youths (male = 329, 61 %). In general, the mean age at baseline was 26.18 years (SD = 4.96; min–max = 18–35), age at abduction was 14.14 years (SD = 4.21, min–max = 7–28) and duration in captivity was 3.13 years? (SD = 2.99, min–max = 0.5–17.75 - years). Most of the war-affected youths were abducted between 11 and 15 years of age.

Gender differences among variables in the study are presented in Table 1. Male and female participants differed in age at abduction, duration in captivity, witnessing violence, and sexual abuse among others. In general, female participants were younger at abduction, stayed longer in captivity, reported more sexual abuse, and scored higher on depression/anxiety than male participants. There were no gender differences in "total number of war events" and "witnessing violence".

Bivariate correlations between variables in the study are presented in Table 2. Among the types of WE, "witnessing violence" correlated significantly with all other types of WE except "Separation" and "Sexual abuse". Likewise, "Deaths" correlated significantly with all the other types of WE except "Separation" and "Displacement". Among the demographic variables, sex correlation strongly with "Sexual abuse" and "Depression/anxiety".

When types of WE were initially regressed on depression/anxiety each in univariable regression models (Table 3), "direct personal harm", "witnessing violence", "deaths", "threat to loved ones", "sexual abuse", and "total number of war events" significantly predicted symptoms of depression/anxiety. For female youths, "witnessing violence", "deaths", "involvement in hostilities", and "sexual abuse" markedly predicted symptoms of depression/anxiety. For male war-affected youths, "direct personal harm", "witnessing violence", "deaths", and "threat to loved ones" were the most significant predictors of symptoms of depression/anxiety. The fit indices were very good: Comparative Fit Indices (CFI) ranged from 0.95 to 0.98 and root mean square error of approximation (RMSEA) ranged from 0.04 to 0.06 for the models. CFI values >0.95 and RMSEA values <0.06 indicate excellent model fit [35, 36].

In our multivariable regression models "witnessing violence" and "deaths" stood out as types of WE that independently predicted symptoms of depression/anxiety for both male and female participants (Table 4). "Sexual abuse" remained a markedly strong predictor of depression/anxiety for female but not male youths while "threat to loved ones" independently and significantly predicted

Table 1 Differences in baseline age, age at capture, duration in captivity, depression/anxiety, and categories of war experiences stratified by gender

	Variables in the study	Total ($N = 539$)			Male ($n = 329$)		Female ($n = 210$)		Gender differences
		Mean	SD	Min–max	Mean	SD	Mean	SD	(t test)
1	Current age	22.39	2.03	18–25	22.86	2.06	21.92	2.83	ns
2	Age at capture	**14.14**	**4.21**	**07–28**	**14.96**	**4.30**	**12.86**	**3.72**	***t* = 4.80, d*f* = 535, *p* < 0.001***
3	Duration in captivity	**3.13**	**2.99**	**0.5–17**	**2.91**	**2.69**	**3.48**	**3.40**	***t* = −2.16, d*f* = 537, *p* < 0.05***
4	Depression/anxiety	**21.29**	**10.47**	**00–54**	**19.20**	**9.91**	**24.74**	**10.47**	***t* = −6.03, d*f* = 516, *p* < 0.001***
5	Direct personal harm	**5.02**	**1.20**	**00–06**	**5.17**	**1.10**	**4.78**	**1.32**	***t* = 3.75, d*f* = 535, *p* < 0.001***
6	Witnessing violence	10.38	1.00	00–11	10.49	0.76	10.22	1.28	ns
7	Physical threat to self	4.73	0.63	00–05	4.74	0.64	4.71	0.63	ns
8	Deaths	3.96	1.37	00–07	3.90	1.34	4.06	1.42	ns
9	Harm to loved ones	**3.82**	**0.54**	**00–05**	**3.87**	**0.39**	**3.73**	**0.71**	***t* = 3.07, d*f* = 529, *p* < 0.01****
10	Material losses	3.92	0.36	00–05	3.94	0.31	3.89	0.42	ns
11	Threat to loved ones	2.99	1.02	00–04	3.04	0.96	2.90	1.11	ns
12	Separation	1.94	0.29	00–02	1.94	0.29	1.94	0.28	ns
13	Displacement	**3.76**	**0.70**	**00–05**	**3.81**	**0.68**	**3.67**	**0.74**	***t* = 2.07, d*f* = 526, *p* < 0.05***
14	Involvement in hostilities	**1.69**	**0.62**	**00–02**	**1.84**	**0.45**	**1.46**	**0.76**	***t* = 7.19, d*f* = 530, *p* < 0.001***
15	Sexual abuse	**0.32**	**0.47**	**00–01**	**0.10**	**0.31**	**0.65**	**0.48**	***t* = −15.75, d*f* = 522, *p* < 0.001***
16	Total war experiences	42.16	8.01	00–52	42.64	7.31	41.39	8.87	ns

n Number of participants, *SD* standard deviation, *Min* minimum number or score, *Max* maximum number or score, *N/n* number of participants, *ns* not significant

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, all significant associations are in bold

symptoms of depression/anxiety in male but not female youths. Again, the CFI was 0.96 and RMSEA was 0.05 for both total and gender-specific models.

After entering the interaction terms of age at abduction, and duration in captivity with different types of WE, none of the interaction terms were significant indicating that the interaction between age at abduction and duration in captivity with different types of WE did not confer addition risks of depression/anxiety in this sample of war-affected youths for both male and female youths.

Discussion

This is the first study to examine the associations between different types of WE and depression/anxiety while considering age at abduction and duration in captivity and consequent gender differences in FCS in northern Uganda 6 years after the war ended. In particular, we found that "witnessing violence", "deaths", "threat to loved ones", and "sexual abuse" were the most noxious types of WE in predicting symptoms of depression/anxiety even after adjusting for all the other types of WE. In addition, "threat to loved ones" was particularly significant for male and "sexual abuse" for female youths.

This study has a number of strengths. First, the war-affected population from which we drew our sample returned from captivity more than 6 years before baseline study and are currently re-settled in their communities; thus we can examine the long-term impact without the results of our study being contaminated with incidents of on-going war unlike in previous studies conducted during the war [12, 28]. Second, our study had a slightly larger sample compared to other studies conducted in resource-poor non-Western settings [27, 31, 42], thus making our results more credible. Third, our study used measures of WE and mental health outcomes adapted and validated in similar populations before [33]. Last, we used the robust and rigorous structural equation modelling analytical approach that reduced measurement errors, making the results of our study more credible. The Mplus software is known to be robust enough to limit effects of type II errors [35, 36]. In addition, the fit indices such as RMSEA (<0.06) and CFI (>0.95) were within acceptable limits for this study [35, 36].

Nevertheless, to appreciate our findings, some limitations must be discussed. First, the depression/anxiety scale in our study cannot be taken to mean psychiatric disorders defined in terms of clinical diagnosis; they are symptoms of depression/anxiety. Nevertheless, these symptoms of depression/anxiety may be comparable to interviews in studies involving classification of psychiatric disorders that may indicate possible psychiatric disorder. Second, on-going risk factors such as unemployment, daily stressors, and post-war conflicts could influence current depression/anxiety. For instance, FCS are more likely to be

Table 2 Bivariate correlations among demographic variables, depression/anxiety scores, and categories of war experiences

	Variables in the study	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Sex	1																
2	Current age	0.01	1															
3	Age at capture	**−0.24*****	**0.45*****	1														
4	Duration in captivity	0.09	0.05	**−0.27*****	1													
5	Direct personal harm	**−0.16****	0.05	0.08	−0.01	1												
6	Witnessing violence	**−0.14****	**0.14*****	**0.10***	−0.04	**0.37*****	1											
7	Physical threat to self	−0.03	0.07	0.06	0.08	**0.22*****	**0.16*****	1										
8	Deaths	0.06	**0.09***	0.06	−0.05	**0.24*****	**0.28*****	**0.20*****	1									
9	Harm to loved ones	−0.13	0.04	**0.12****	−0.08	**0.31*****	**0.33*****	**0.13****	**0.18*****	1								
10	Material losses	−0.06	0.07	0.04	**0.11***	**0.09***	**0.09***	0.04	**0.11****	**0.17*****	1							
11	Threat to loved ones	−0.07	0.03	**0.10***	−0.05	**0.32*****	**0.36*****	**0.13****	**0.42*****	**0.28*****	0.06	1						
12	Separation	−0.01	0.02	−0.01	−0.07	0.08	**0.12****	**0.13****	0.07	**0.15*****	**0.10***	**0.16*****	1					
13	Displacement	**−0.09***	−0.08	−0.03	−0.06	**0.11***	**0.09***	0.03	0.08	0.08	**0.14****	**0.10***	0.08	1				
14	Involvement in hostilities	**−0.30*****	**0.13****	0.08	0.14	**0.25*****	**0.27*****	**0.15*****	**0.11***	**0.21*****	**0.11***	**0.22*****	**0.11***	−0.01	1			
15	Sexual abuse/assault	**0.57*****	**0.15*****	−0.07	0.08	−0.05	0.04	**0.12****	**0.16*****	−0.03	0.01	0.05	0.05	**−0.13****	−0.05	1		
16	Total war experiences	−0.08	**0.13****	**0.17*****	−0.06	**0.52*****	**0.54*****	**0.29*****	**0.62*****	**0.38*****	**0.19*****	**0.62*****	**0.20*****	**0.26*****	**0.30*****	**0.10***	1	
17	Depression/anxiety	**0.26*****	0.03	−0.01	0.03	**0.12****	**0.16*****	0.07	**0.24*****	0.07	0.07	**0.18*****	0.03	−0.05	0.01	**0.28*****	**0.31*****	1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, all the significant bivariate correlations are in bold

unemployed, [42] may find it difficult to sustain a relationship, etc. making them more susceptible to depression. However, current poverty or unemployment may be risk factors associated with previous war experiences, for example when someone cannot get a job because he is disabled as a result of an injury during the war [43]. Third, the cross-sectional design limits causal inferences. Therefore, we cannot conclude from our findings that the WE causes depression/anxiety. Fourth, it is possible that stratification by gender reduced the sample size and testing of multiple risk factors might have led to type II errors. However, the Mplus software is known to be robust enough to limit effects of type II errors [35, 36]. In addition, the fit indices such as RMSEA (<0.06) and CFI (>0.95) were within acceptable limits for this study [35, 36]. Finally, we used retrospective report of WE, which may be prone to recall bias. Specifically, people with mental health problems are known to over-report severity of life stressors [44]. To limit this bias associated with over-reporting severity of life stressors in our study, we used the number (counts) of WE and not their perceived severity in our analyses. In general, we do not believe that these limitations affected the results of our study in any substantial way [43].

Our findings are consistent with previous reports on war-affected populations. For example, previous studies associated "threats of deaths", and "physical injury" to increased anxiety, elevated levels of PTSD and depression, and "rape" to increased symptoms of PTSD [18, 45]. No studies about the wars in Africa have considered "deaths" as types of WE and its likely mental health consequences. Likewise, no studies have considered the effects of different types of WE on mental health in the same cohort like in our study. Contrary to findings from the Balkans which found an association between older age and experience of traumatic events to mood and anxiety disorders, we did not find additional risks as a result of age at capture and duration in captivity in relation to symptoms of depression/anxiety stratified by gender. We could not easily compare our results with other studies simultaneously addressing experience of different types of WE on varying outcome dimensions as no other study tried to examine the independent effects of different types of WE on mental health outcomes. Likewise, the use of different indices of WE hampers comparison with previous studies.

The scale of atrocities and cruelty in the war in northern Uganda was grave. Abductees were tortured, forced to harm one another including their family members and fellow villagers [5, 6, 12, 13]. Many of the survivors were involved in rituals believed to imbue courage in them [12]. These atrocities and cruelty might explain the enduring toxic effect of "witnessing violence" on symptoms of depression/anxiety. While in captivity, abductees,

Table 3 Univariable regression models of the influence of each categories of war events on depression/anxiety

		Male		Female					Total				
		B (SE)	*p* value	B (SE)	*p* value	χ^2	CFI	RMSEA	β (SE)	*p* value	χ^2	CFI	RMSEA
1	Direct personal harm	**0.19 (0.05)**	**$p < 0.001$**	0.09 (0.05)	ns	739.44, df = 395, ***	0.97	0.057	**0.10 (0.04)**	**$p < 0.01$**	535.74, df = 171, ***	0.97	0.063
2	Witnessing violence	**0.36 (0.08)**	**$p < 0.001$**	**0.14 (0.06)**	**$p < 0.05$**	743.30, df = 395, ***	0.96	0.057	**0.17 (0.04)**	**$p < 0.001$**	542.65, df = 171,***	0.97	0.064
3	Physical threat to self	0.14 (0.09)	ns	0.18 (0.116)	ns	722.51, df = 395, ***	0.97	0.056	**0.15 (0.07)**	**$p < 0.05$**	523.38, df = 171,***	0.97	0.062
4	Deaths	**0.20 (0.04)**	**$p < 0.001$**	**0.12 (0.05)**	**$p < 0.05$**	766.37, df = 395, ***	0.96	0.059	**0.17 (0.03)**	**$p < 0.001$**	540.96, df = 171,***	0.96	0.064
5	Harm to loved ones	0.20 (0.15)	ns	−0.01 (0.101)	ns	718.27, df = 395, ***	0.97	0.056	−0.01 (0.08)	ns	527.22, df = 171,***	0.97	0.063
6	Material losses								0.129 (0.13)	ns	523.30, df = 171,***	0.97	0.062
7	Threat to loved ones	**0.28 (0.06)**	**$p < 0.001$**	0.13 (0.06)	ns	759.79, df = 395,***	0.96	0.059	**0.17 (0.04)**	**$p < 0.001$**	543.05, df = 171,***	0.96	0.064
8	Separation	0.04 (0.18)	ns	0.11 (0.23)	ns	679.86, df = 395,***	0.97	0.052	0.05 (0.14)	ns	517.14, df = 171,***	0.97	0.061
9	Displacement	−0.01 (0.09)	ns	−0.07 (0.09)	ns	748.96, df = 395, ***	0.97	0.058	−0.07 (0.06)	ns	383.63, df = 191,***	0.98	0.044
10	Involvement in hostilities	0.12 (0.12)	ns	**0.20 (0.10)**	**$p < 0.05$**	740.67, df = 395, ***	0.97	0.057	0.019 (0.07)	ns	541.30, df = 171,***	0.97	0.064
11	Sexual abuse/assault	0.33 (0.21)	ns	**0.44 (0.15)**	**$p < 0.001$**	819.53, df = 395, ***	0.96	0.064	**0.62 (0.10)**	**$p < 0.001$**	547.67, df = 171,***	0.96	0.064
12	Total war experiences	**0.05 (0.01)**	**$p < 0.001$**	**0.03 (0.01)**	**$p < 0.001$**	724.27, df = 395, ***	0.95	0.062	**0.04 (0.01)**	**$p < 0.001$**	503.75, df = 171,***	0.95	0.067

RMSEA root mean square error of approximation, *CFI* comparative fit indices, *SE* standard error

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, all significant associations are in bold

Table 4 Multivariable regression model of the unique influence of different categories of war events on depression/anxiety in the same analysis

		Male		Female					Total				
		B (SE)	*p* value	B (SE)	*p* value	χ^2	CFI	RMSEA	*β* (SE)	*p* value	χ^2	CFI	RMSEA
1	Direct personal harm	0.35 (0.23)	ns	0.01 (0.07)	ns	1078.95, df = 395, ***	0.96	0.05	0.05 (0.04)	ns	730.83, df = 351, ***	0.96	0.047
2	Witnessing violence	**0.28 (0.09)**	***p* < 0.01**	**0.11 (0.07)**	***p* < 0.001**				**0.11 (0.06)**	***p* < 0.05**			
3	Physical threat to self	0.05 (0.10)	ns	0.04 (0.15)	ns				0.03 (0.08)	ns			
4	Deaths	**0.13 (0.05)**	***p* < 0.01**	**0.06 (0.06)**	***p* < 0.001**				**0.11 (0.04)**	***p* < 0.05**			
5	Harm to loved ones	−0.082 (0.18)	ns	−0.22 (0.13)	ns				−0.20 (0.11)	ns			
6	Threat to loved ones	**0.13 (0.06)**	***p* < 0.05**	0.03 (0.08)	ns				0.08 (0.05)	ns			
7	Separation	0.00 (0.22)	ns	0.15 (0.27)	ns				−0.09 (0.17)	ns			
8	Displacement	−0.04 (0.10)	ns	−0.06 (0.10)	ns				0.06 (0.07)	ns			
9	Involvement in hostilities	−0.08 (0.14)	ns	0.14 (0.12)	ns				0.04 (0.08)	ns			
10	Sexual abuse/assault	0.35 (0.23	ns	**0.32 (0.16)**	***p* < 0.05**				**0.58 (0.11)**	***p* < 0.001**			

RMSEA root mean square error of approximation, *CFI* comparative fit indices, *SE* standard error

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, all significant associations are in bold

especially boys, were threatened with death of their parents and relatives if they tried to escape from rebel captivity. They were told that their villages will be raided and family members killed to avenge their escape from rebel captivity. Indeed this happened to those who tried and succeeded to escape from rebel captivity. This might explain why "threat to loved ones" significantly predicted symptoms of depression/anxiety.

Young girls, especially those assumed not to be sexually active yet, were particularly targeted for abduction by the rebels in the belief that they were free from HIV/AIDS [5, 6]. Very few older women were abducted and taken into captivity. While in captivity, the girls were distributed by senior rebel commanders to loyal, hardworking, and courageous rebel soldiers as "wives". Indeed, the abducted girls were sexually abused and raped and many returned from captivity with children fathered by rebel soldiers and commanders, often significantly older than the abducted girls [5, 6]. This may explain the enduring noxious effect of "sexual abuse" on symptoms of depression/anxiety. We explored within group models and associations between each exposure and outcome. However, our analyses did not yield additional risks for depression/anxiety regarding gender. Indeed, rape and sexual abuse also affect men's mental health. Although male youths were sexually abused, they were not specifically targeted for sexual abuse and the incidence of abuse was lower among male than female participants (around 10 % compared to over 60 % for females). It is possible that sexual abuse does not predict depression in males due to the low numbers.

Regarding the hypothesis that younger age at abduction and longer duration in captivity will be related to adverse outcome, our analyses revealed that gender, age at abduction, and duration in captivity did not confer addition risks of depression/anxiety in this sample of war-affected youths. This may be due to many reasons. First, FCS varied a lot according to the amount of time spent in captivity ranging from 6 months to 15 years in our study. Second, and finally, age at abduction also varied among the participants and since the war was protracted and lasted for a long time, the participants' time for adjustment post-war may also vary.

Results from this sample also showed that although male and female youths experience similar WE, the mental health consequences might be different. For example, "involvement in hostilities" remained significantly associated with symptoms of depression/anxiety in female but not in male youths while "threats to loved ones" was significantly associated with symptoms of depression/anxiety in male but not in female youths. This may be a result of socialisation where male children are brought up to be defend and protect the family, hunt and fight while female are socialised to be homemakers. Involvement in hostilities

is contrary to this upbringing for girls; thus psychological distress may result.

Results from the current study can be generalized to other conflict zones outside Northern Uganda. In the Democratic Republic of Congo, South Sudan, and Central African Republic, the same rebel groups have been operating and similar WE such as abductions, deaths, material loss, threat to loved ones, and sexual abuse have been widespread. For example, the Eastern Democratic Republic of Congo has been described as the "rape capital of the world" [46–48]. In Sierra Leone and South Sudan, rebel groups have been associated with the deaths of many civilians and rape of numerous girls and women [19, 49].

Findings of this study have implications for both research and policy. Research efforts should be directed at unravelling mediating factors such as post-war stressors, family functioning, stigma and discrimination, social support network, and coping mechanisms. Mediating factors in the relationship between war trauma and mental illness have been previously investigated by the authors [50]. We propose that the findings in this study should be a precursor to further research on the causal paths through which different types of WE relate to symptoms of depression/anxiety and how the mechanisms can be translated into strategies to prevent adverse outcomes from a public health point of view. For policy makers, the implication of this study is to direct interventions to war-affected youths with a history of witnessing extreme violence, death of family members, and sexual abuse.

Conclusion

The most noxious types of WE for predicting symptoms of depression/anxiety are "witnessing violence", "deaths", "threat to loved ones", and "sexual abuse". "Threats to loved ones" predicted symptoms of depression/anxiety for male and "sexual abuse" for female participants. Interventions to mitigate the effects of WE on mental health in FCS should consider category of WE experienced and gender differences.

Acknowledgments We thank the war-affected youths for accepting to participate in this study and the following research assistants for collecting data: George Opio, Balaam Nyeko Otim, John Bismarck Okumu, Terrence Okot Akidi, Allan Silverman Obwoya, Denis Komakech, Sandra Abalo, Christine Laura Okello, Patrick Opira, Charles Opira, Justin Ongom, Dennis Nyero, Pamela Akumu, Christine Lamwaka, Brenda Akello, Agnes Areta, Kevin Aculu, Irene Faith Alinga, Douglas Too-rach, Sam Ford Komakech, and Mary Fiona Aber. This study was funded by The Welcome Trust (Grant No. 087540/Z/08/Z) as part of the African Institutional Initiative for the project Training Health Researchers in Vocational Excellence (THRiVE) in East Africa. A decision by Wellcome Trust to continue with funding for the next 5 years is due in February 2013. For now, Gulu University is committed to fund the data gathering activities of the research project for the next 5 years.

Conflict of interest All authors declare that they have no competing interests.

References

1. Coalition to stop the use of child soldiers (2008) Child soldiers: global report
2. UNICEF (2004) The state of the world's children. Oxford University Press, Oxford
3. Amone-P'Olak K (2003) The impact of civil strife on adolescent girls' reproductive health. Afr Health 5(3):15–18
4. Angucia M, Amone-P'Olak K (2010) The interface between early school leavers and conflict: the case of Northern Uganda. In: Zeelen J, Vd Lindern J, Nampota D, Ngabirano M (eds) The burden of educational exclusion: understanding and challenging early school leaving in Africa. Sense Publishers, Rotterdam, pp 127–140
5. Amone-P'Olak K (2004) A study of the psychological state of former abducted children at Gulu World Vision Trauma Centre. Torture 14(1):24–34
6. Amone-P'Olak K (2005) Psychological impact of war and sexual abuse among adolescent girls in Northern Uganda. Intervention 3(1):33–45
7. Ehrenreich R (1997) The scars of death: children abducted by the Lord's resistance army in Uganda. New York, Human Rights Watch, p 78
8. Al-krenawi A, Graham JR, Kanat-Maymon Y (2010) Analysis of trauma exposure, symptomatology and functioning in Jewish Isreali and Palestinian adolescents. Br J Psychiatry 195:427–432
9. Wessells M (2009) Supporting the mental health and psychosocial well-being of former child soldiers. J Amer Acad Child Adolescent Psychiatry 48(6):587–590
10. Williams R (2007) The psychosocial consequences for children of mass violence, terrorism and disasters. Intern Rev Psychiatry 19(3):263–277
11. Barenbaum J, Ruchkin V, Schwab-Stone M (2004) The psychosocial aspects of children exposed to war: practice and policy initiatives. J Child Psychol Psychiatry 45(1):41–62
12. Amone-P'Olak K, Garnefski N, Kraaij V (2007) Adolescents caught between fires: cognitive emotion regulation in response to war experiences in Northern Uganda. J Adolescence 30(4):655–669
13. Amone-P'Olak K (2009) Torture against children in rebel captivity in Northern Uganda: physical and psychological effects and implications for clinical practice. Torture 19(2):102–117
14. Ovuga E, Oyok TO, Moro EB (2008) Problems among children displaced by war in Northern Uganda. Afr Health Sci 8(3):136–141
15. Bolton P, Bass J, Neugebauer R et al (2003) Results of a clinical trial of a group intervention for depression in rural Uganda. JAMA 289(23):3117–3124
16. Bolton P, Bass J, Betancourt T, Speelman L, Neugebauer R, Murray L et al (2007) Interventions for depressions symptoms among adolescent survivors of war and displacement in Northern Uganda: a randomized controlled trial. JAMA 298(5):519–527
17. Ertl V, Pfeiffer A, Schauer E, Elbert T, Neuner F (2011) Community-implemented trauma therapy for former child soldiers in Northern Uganda a randomized controlled trial. JAMA 306(5):503–512
18. Betancourt TS, Agnew-Blais J, Gilman SE, Williams DR, Ellis BH (2010) Past horrors, present struggles: the role of stigma in

the association between war experiences and psychosocial adjustment among former child soldiers in Sierra Leone. Soc Sci Med 70:17–26
19. Betancourt TS, Borisova I, Soudiere M, Williamson J (2011) Sierra Leone's child soldiers: war exposures and mental health problems by gender. J Adolesc Health 49:21–28
20. Freedman SA, Gluck N, Tuval-Mashiach R et al (2002) Gender differences in respect to traumatic events: a prospective study. J Trauma Stress 15(5):407–413
21. Betancourt TS, Khan KT (2008) The mental health of children affected by armed conflict: protective processes and pathways to resilience. Intern Rev Psychiatry 20(3):317–328
22. Tolin FD, Foa EB (2006) Sex differences in trauma and post-traumatic stress disorder: a qualitative review of 25 years of research. Psychol Bull 132(6):959–992
23. Betancourt TS (2008) Child soldiers: reintegration, pathways to recovery, and reflection from the field. J Devel Behav Paediatrics 29(2):138–141
24. Wessells M (2008) Trauma, peace building and development: an Africa region perspective. In: A paper presented at the Trauma, Development and Peace building Conference, New Delhi, India
25. Priebe S, Bogic M, Ajdukovic D et al (2010) Mental disorders following war in the Balkans: a study in five countries. Arch Gen Psychiatry 67(5):518–528
26. Green BL, Korol M, Grace MC et al (1991) Children and disaster: age, gender, and parental effects on PTSD symptoms. J Am Acad Child Adolesc Psychiatry 30(6):945–951
27. Betancourt TS, Brennan RT, Rubin-Smith J et al (2010) Sierra Leone's former child soldiers: a longitudinal study of risk, protective factors, and mental health. J Am Acad Child Adolesc Psychiatry 49(6):606–615
28. Bayer CP, Klasen F, Adam H (2007) Association of trauma and PTSD symptoms with openness to reconciliation and feelings of revenge among former Ugandan and Congolese child soldiers. JAMA 298:555–559
29. Betancourt TS (2011) Attending to the mental health of war-affected children: the need for longitudinal and developmental research perspective. J Am Acad Child Adolesc Psychiatry 50(4):323–325
30. Singh AR, Singh AN (2010) The mental health consequences of being a child soldier: an international perspective. Intern Psychiatry 7(3):55–57
31. Shanahan F (2008) Cultural responses to the reintegration of formerly abducted girl soldiers in Northern-Uganda. Psychol Soc 1(1):14–28
32. UNICEF (2010) UNICEF B&H post-war screening survey
33. Betancourt TS, Speelman L, Onyango G, Bolton P (2009) A qualitative study of mental health problems among children displaced by war in Northern Uganda. Transcult Psychiatry 46:238–256
34. Betancourt TS, Bass J, Borisova I et al (2009) Measuring local instrument validity and reliability: a field-based example from northern Uganda. Soc Psychiatry Psychiatr Epidemiol 44(80):685–692
35. Kline RB (2011) Principles and practices of structural equation modeling, 3rd edn. Guildford Press, New York
36. Hu L, Bentler PM (1995) Evaluating model fit. In: Hoyle RH (ed) Structural equation modelling: concepts, issues, and applications. Sage, Thousand Oaks, pp 76–99
37. Yuan K, Marshall LL, Bentler PM (2003) Assessing the effect of model misspecifications on parameter estimates in structural equation models. Sociol Methodol 33(1):241–265
38. Yuan K, Bentler PM (2000) Three likelihood-based methods for mean and covariance structure analysis with nonnormal missing data. Sociol Methodol 30(2000):165–200
39. Muthen LK, Muthen BO (2012) Mplus user's guide, 6th edn. Muthen & Muthen, Los Angeles
40. Bentler PM (1990) Comparative fit indices in structural models. Psychol Bull 107(2):238–246
41. Amone-P'Olak K, Jones PB, Abbott R, Meiser-Stedman R, Ovuga E, Croudace TJ (2013) Cohort profile: mental health following extreme trauma in a northern Ugandan cohort of war-affected youth study (the WAYS study). SpringerPlus 2:300. doi:10.1186/2193-1801-2-300
42. Annan J, Blattman C, Horton R (2006) The state of youth and youth protection in Northern Uganda findings from the survey for war affected youth. UNICEF, India
43. Amone-P'Olak K, Stochl J, Ovuga E et al (2014) Postwar environment and long-term mental health problems in former child soldiers in Northern Uganda: the WAYS study. J Epidemiol Commun Health. doi:10.1136/jech-2013-203042
44. Grant KE, Compas BE, Thurm AE et al (2006) Stressors and child and adolescent psychopathology: evidence of moderating and mediating effects. Clin Psychol Rev 26:257–283
45. Johnson K, Asher J, Rosborough S et al (2008) Association of combatant status and sexual violence with health and mental health outcomes in post conflict Liberia. JAMA 300:676–690
46. Brown C (2012) Rape as a weapon of war in the democratic republic of the Congo. Torture 22(1):24–37
47. Kalisya LM, Justin PL, Kimona C et al (2011) Sexual violence toward children and youth in war-torn Eastern democratic republic of Congo. PLoS One 6(1):e15911
48. Mukwege DM, Nangini C (2009) Rape with extreme violence: the new pathology in South Kivu, democratic republic of Congo. PLoS Med 6:e1000204
49. Roberts B, Damundu EY, Lomoro O, Sondorp E (2010) The influence of demographic characteristics, living conditions, and trauma exposure on the overall health of a conflict-affected population in Southern Sudan. BMC Public Health 10:518
50. Amone-P'Olak K, Jones PB, Meiser-Stedman R, Abbott RA, Ayella-Ataro PS, Amone J, Ovuga E (2014) War experiences, general functioning and barriers to care among former child soldiers in Northern Uganda: the WAYS study. J Public Health. doi:10.1093/pubmed/fdt126