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Predictors of Somatic Symptomatology in War-Affected Youth in Northern Uganda: Findings from the WAYS Study

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Abstract War experiences have been shown to have adverse long-term psychological sequelae. Nevertheless, the roles of different types of war events in predicting which mental health outcomes remain unclear. This study investigated the effects of different types of war events and socio-demographic characteristics on somatic symptoms in war-affected youth in Northern Uganda. A sample of 539 youth (mean age = 22.39; ± 2.03) participated in the study. Using maximum likelihood estimation in structural equation modelling, regression analyses were fitted to relate binary indicators of different types of war events to one latent factor capturing somatic symptoms. The results indicated that sex, marital status, and war types of "direct personal harm", "deaths", and "sexual abuse" independently and uniquely predicted somatic symptoms. Types of war events should be considered when planning interventions. Somatic symptoms may be a window into physical health and psychological sequelae. Implications for mental health service delivery are discussed.

Keywords War events · Demographic characteristics · Youths · Somatic symptomatology · Uganda

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Introduction

In war-prone African countries such as eastern Democratic Republic of Congo, Central African Republic, South Sudan, and Northern Uganda, exposure to violent and protracted armed conflicts has been associated with numerous psychological sequelae and health problems. This includes post-traumatic stress disorder (PTSD), depression, anxiety, conduct problems, and psychosis (Amone-P'Olak, Garnefski, & Kraaij, 2007; Amone-P'Olak, 2004). Most studies on the associations between violent and prolonged armed conflicts have focused mainly on post-conflict psychological distress such as PTSD, depression, and anxiety to the detriment of other mental health problems such as somatic symptoms (Amone-P'Olak et al., 2007). Yet, most cases of psychological distress and physical health present with somatic symptoms (Simon, VonKorff, Piccinelli, Fullerton, & Ormel, 1999). Several previous studies have demonstrated that somatic symptomatology is the leading cause of health care visits (Hoge, Terhakopian, Castro, Messer, & Engel, 2007; Kroenke, Spitzer, & Williams, 2002). Although the pathophysiology of somatic symptoms remains largely unexplained (Dyregrov, Gjestad, & Raundalen, 2002), several factors, including traumatic experiences such as physical and sexual abuse, have been associated with it among survivors of war (Hoge et al., 2007; Johnson & Thompson, 2008). Moreover, many people who experience somatic symptoms also suffer from other psychological distress such as anxiety or mood disorders (Gillespie, Kirk, Heath, Martin, & Hickie, 1999; Simon, VonKorff, Piccinelli, Fullerton, & Ormel, 1999). Consequently, somatic symptoms constitute a crucial presenting problem in primary health care because it enables health care workers to gain insight into other psychological and physical health

conditions including survivors' interpretations of their conditions and other objective medical symptoms (Epstein, Quill, & McWhinney, 1999).

Among the youth, somatic symptoms constitute a significant public health issue, are associated with considerable psychological distress, poor functioning, loss of productivity, and linked to reduced quality of life. Studying the effects of prolonged and violent conflicts on somatic symptoms is critical in an attempt to understand the impact of a protracted war and designing interventions to mitigate their adverse effects. Moreover, the psychosocial consequences of violent conflicts such as somatic symptoms and the resultant poor functioning can be devastating and can prevent the youth, the most substantial proportion of the population of most countries in Africa, from reaching their full potential. Furthermore, mental health problems also perpetuate further violence and insecurity in communities already severely affected by war (Hoge et al., 2007; Kirmayer, 1996). To date, no study has reported the differential effects of various types of war events on somatic symptoms in war-affected populations in Africa, especially the war-prone Great Lake's region (Rwanda, Burundi, Democratic Republic of Congo, Uganda, South Sudan, and the Central African Republic).

The data for this study are based on an on-going War-Affected Youth Survey (WAYS) study that aims to chart the long-term mental health consequences of war and the roles of the individual, family, and community contextual risk and protective factors in influencing the course of mental health problems in war-affected youth in Northern Uganda. The cohort profile of the participants in the WAYS study has been described elsewhere (Amone-P'Olak, Jones, Abbott, Meiser-Stedman, Ovuga, & Croudace, 2013).

The current study aimed to investigate the roles of different types of war events on somatic symptoms in war-trauma survivors in Northern Uganda. Specifically, the objectives were: (1) to assess the prevalence of somatic symptoms among the youth who survived the war in Northern Uganda, (2) to assess the effects of demographic variables (sex, age at abduction, current age, duration in captivity, and marital status) on somatic symptoms, (3) to assess the effects of various types of war events on somatic symptoms, and (4) to explore whether sex, age at abduction, current age, duration in captivity, and marital status modify the influence of war events (total number of war events) on somatic symptoms.

Methods

Study design

The WAYS study uses a longitudinal cohort design, but the design for the current study was cross-sectional using data collected at baseline. War events were reported retrospectively, and somatic symptoms were assessed for occurrence in the past year.

Sample

Participants in the WAYS study were formerly abducted children (now youth) who were forcefully conscripted and taken to rebel captivity for long periods in Northern Uganda, Southern Sudan, and Democratic Republic of Congo. Participants in the study were recruited using cluster sampling strategy based on a list of eligible formerly abducted children compiled by UNICEF for the districts of Northern Uganda. Based on the UNICEF list, three conditions must be met to allow for participation in the study: first, the war-affected youth should have a history of abduction by rebels, second, the youth must have lived in rebel captivity for at least 6 months, and finally, the youth must be between 18 and 25 years old. Those who were eligible based on the three conditions were invited through their local council leaders to participate in the study.

In total, 650 formerly abducted children were invited, and information was gathered from 539 of them representing 83% response rate. The profiles of the participants are published elsewhere (Amone-P'Olak et al., 2013). This baseline data were collected between June and September 2011. Non-participation was attributed to illness and farming activities. The mental health outcomes of responders and non-responders are described in a cohort profile elsewhere (Amone-P'Olak et al., 2013). Results of the analyses of the cohort profile indicated minimal differences and may not have affected the outcome of the study in any substantial way (Amone-P'Olak et al., 2013).

Of the 539 formerly abducted children who took part at baseline, the majority were males ($n = 329$, 61%). The average age of the formerly abducted children at baseline was 22.18 years (SD = 4.96; min–max = 18–25), mean age at abduction was 14.14 years (SD = 4.21, min–max = 7–28), average duration in captivity was 3.13 years (SD = 2.99, min–max = 0.5–17.75 years), and 337 (62.5%) were married and the rest were unmarried ($n = 121$, 22.4%), separated ($n = 58$, 10.8%), or divorced ($n = 23$, 4.3%). Overall, most of the youth were abducted between 11 and 15 years of age (see Table 1).

Table 1 Differences in demographic characteristics, somatic symptoms, and types of war experiences stratified by sex

		Total ($N = 539$)			Male ($n = 329$)			Female ($n = 210$)			Sex differences (t test)
		Mean	SD	Min–max	Mean	SD	Min–max	Mean	SD	Min–max	
1	Age at baseline	21.97	02.09	18–25	21.92	02.14	18–25	22.04	02.00	18–25	ns
2	**Age at abduction**	**13.37**	**07.68**	**07–20**	**14.53**	**03.48**	**07–15**	**11.56**	**11.30**	**08–15**	$t = 4.45, df = 537, p < 0.001$
3	**Duration in captivity**	**03.14**	**03.00**	**0.5–17.75**	**02.92**	**02.71**	**0.5–15**	**3.49**	**03.39**	**0.5–17.75**	$t = -2.13, df = 536, p < 0.05$
4	**Somatic symptoms**	**03.91**	**02.21**	**00–09**	**03.54**	**02.17**	**00–09**	**4.48**	**02.16**	**00–09**	$t = -4.92, df = 532, p < 0.001$
5	**Direct personal harm**	**05.02**	**01.20**	**00–06**	**05.17**	**01.10**	**01–06**	**4.79**	**01.31**	**00–06**	$t = 3.61, df = 537, p < 0.001$
6	**Witnessing violence**	**10.39**	**01.00**	**04–11**	**10.50**	**00.75**	**07–11**	**10.22**	**01.28**	**04–11**	$t = 3.25, df = 532, p < 0.001$
7	Physical threat to self	04.73	00.63	01–05	04.75	00.64	01–05	4.71	00.63	01–05	ns
8	Deaths	03.96	01.37	00–07	03.90	01.34	00–07	4.06	01.42	01–07	ns
9	**Harm to loved ones**	**03.82**	**00.54**	**00–04**	**03.88**	**00.39**	**00–04**	**3.73**	**00.71**	**00–04**	$t = 3.01, df = 537, p < 0.01$
10	Material loss	03.91	00.38	00–04	03.93	00.35	01–04	3.89	00.42	00–04	ns
11	Threat to loved ones	02.98	01.02	00–04	03.04	00.96	00–04	2.89	01.11	00–04	ns
12	Separation	01.94	00.29	00–02	01.94	00.30	00–02	1.94	00.28	00–02	ns
13	Displacement	03.75	00.71	00–05	03.80	00.69	00–05	3.68	00.74	01–05	ns
14	**Involvement in hostilities**	**01.69**	**00.62**	**00–02**	**01.84**	**00.45**	**00–02**	**1.46**	**00.76**	**00–02**	$t = 7.12, df = 537, p < 0.001$
15	**Sexual abuse/assault**	**00.32**	**00.47**	**00–01**	**00.10**	**00.31**	**00–01**	**0.64**	**00–01**	**00–01**	$t = -15.59, df = 531, p < 0.001$
16	Total number of war experiences	42.16	08.01	00–52	42.19	08.89	00–52	42.17	00–52	00–52	ns

N/n number of participants, *SD* standard deviation, *min* minimum number of score, *max* the maximum number of score, *ns* not significant, all significant associations are in bold

Procedure

Well-trained university graduates fluent in both the English and the native language of the participants (Luo) were employed to gather data for the WAYS study. Questionnaires were administered to participants from community centres or participants' villages. The questionnaire took 30–45 min to complete. A Clinical Psychiatric Officer was present at all data collection points to handle and make referrals to the Regional Referral Hospital in case of a mental health emergency. Written informed consent was obtained from all participants before data collection following ethical guidelines and approvals.

Measures

The measures used for the current study were back-translated from English to Luo, the native language of the participants, by experts who are fluent in both the English language and Luo.

Demographic Characteristics An inventory specifically made for the current study was used to gather information on participants' sex, age at abduction, age at baseline, and duration in captivity.

Somatic Symptoms Somatic symptoms were assessed using a scale from the African Youth Psychosocial Assessment Instrument (APAI). APAI was developed to assess psychosocial outcomes (depression/anxiety, conduct problems, hostility, and somatic symptoms) in war-affected youth in Northern Uganda (Betancourt, Bass, Borisova, et al., 2009; Betancourt, Speelman, Onyango, & Bolton, 2009). For the current study, only the subscale of somatic symptoms was used in the analyses. Somatic symptoms had three items: "I have pain all over my body", "I get headaches", and "I feel cold". The items were scored on a four-point Likert scale ranging from 0 to 3 scale with 0 = never, 1 = rarely, 2 = sometimes, and 3 = always with a higher score indicating that a participant would have more symptoms of a particular mental health outcome.

War events: Exposure to different types of war events were assessed using items from the War Trauma Screening Scale (WTSS) (UNICEF, 2010). The WTSS was initially developed for use in Bosnia and later adapted for use in Northern Uganda and Sierra Leone. To capture the context of the war in Northern Uganda, the questionnaire was

adapted to include other items specific to the war in Northern Uganda such as sexual violence, abduction, and perpetrating violence. The modified instrument consists of 52 items capturing a diversity of war-related experiences (Amone-P'Olak, Stochl, Ovuga, et al., 2014). Items were dichotomously scored for occurrence (1) versus absence (0) with a higher score indicative of experiencing more war events.

Data analytic strategy

The demographic characteristics of the study participants and scores on all types of war events including the total number of war events and somatic symptoms were computed, and the results, stratified by sex and marital status, were tabulated. To assess the prevalence of somatic symptomatology, we dichotomized the total continuous score before inclusion in the analyses. We arbitrarily chose the 85th percentile to demarcate the presence or absence of somatic symptomatology to make the clinical implication of our study of more significant public health relevance. The 85th percentile was used only in the analysis to determine the prevalence of somatic symptomatology. Next, the total score on somatic symptoms (entered as a continuous variable) was regressed on each type of war events including the total number of war events and demographic characteristics, each at a time, in a univariable regression model. Finally, the somatic symptoms were regressed on all types of war events that were significant in the univariable analyses, which in turn were simultaneously entered into a multivariable regression analysis excluding the total number of war events.

Types of war events were standardized to a mean of 0 and standard deviation (SD) of 1 (z scores) before all analyses. To examine the possible modifying effect of sex and marital status, we assessed the interaction between the total number of war events **X** sex and the total number of war events **X** marital status on somatic symptoms as a continuous variable. All analyses were conducted using Mplus version 7 (Muthén & Muthén, 2010) with a p value of 0.05 to indicate the level of significance.

Results

Socio-demographic characteristics study

The prevalence of somatic symptoms (scores $\geq$ 85th percentile) was 28.4% (n = 153). Table 2 presents the mean differences of demographic characteristics, somatic symptoms, and war events stratified by marital status. Married participants had significantly lower scores on somatic symptoms [t (529) = 2.38, p < .05] compared to participants without spouses. There were no sex or marital status differences regarding "total number of war events". Besides, those who reported sexual abuse differed significantly from those who did not [t (518) = − 5.06, p < .001]. Participants who reported sexual abuse scored higher (mean = 4.60, SD = 2.10) on somatic symptoms than those who did not (mean = 3.57, SD = 2.20).

Univariable regression analyses of socio-demographic characteristics and war events

Table 3 presents the results of the univariable regression models of demographic characteristics (sex, age at abduction, current age, and duration in captivity, and marital status) and war events on somatic symptoms. The demographic characteristics of sex and marital status significantly predicted somatic symptoms. Female participants were younger at abduction, lived longer in captivity, reported more sexual abuse, and scored higher on somatic symptoms than their male counterparts. The war events of "direct personal harm", "witnessing violence", "deaths", "physical threat to self", "sexual abuse", "total number of war events", "sex", and "marital status" significantly predicted symptoms of somatic symptoms. Comparative Fit Indices (CFI) ranged from 0.96 to 0.98, and root mean square error of approximation (RMSEA) ranged from 0.04 to 0.06 for the models. CFI values (0.96) and RMSEA values (0.06) indicate excellent model fit (Hu & Bentler, 1995; Kline, 2015).

Multivariate regression analyses of war events and somatic symptoms

Table 4 presents the results of the multivariable regression models aimed at assessing the types of war events that independently and uniquely predict somatic symptoms. The results indicated that "direct personal harm", "deaths", "sexual abuse", "sex", and "marital status" independently predicted somatic symptoms. Similarly, the CFI was 0.96 and RMSEA was 0.05 for the multivariable regression model (Table 4).

Moderating effects of sex, age, and duration in captivity on somatic symptoms

Sex and marital status did not significantly modify the effect of war events on somatic symptoms. After entering the interaction terms of sex with the total number of war events and marital status and the total number of war event, none of the interaction terms was significant, indicating that the interaction terms did not add any risks of somatic symptoms in this sample of war-affected youth. The results of the interaction analyses are not presented but were as

Table 2 Differences in demographic characteristics, somatic symptoms, and types of war experiences stratified by marital status

		Total			Married			Not married			Differences (*t* test)
		Mean	SD	Min–max	Mean	SD	Min–max	Mean	SD	Min–max	
1	**Age at baseline**	**21.97**	**02.09**	**18–25**	**22.31**	**01.92**	**18–25**	**21.40**	**02.23**	**18–25**	*t* = 5.00, *df* = 537, *p* < 0.001
2	**Age at abduction**	**13.37**	**07.68**	**07–20**	**14.23**	**07.11**	**07–15**	**11.94**	**08.39**	**07–15**	*t* = 3.37, *df* = 537, *p* < 0.001
3	Duration in captivity	03.14	03.00	0.5–17.75	3.29	03.18	0.5–15	02.90	02.67	0.5–15	ns
4	**Somatic symptoms**	**03.91**	**02.21**	**00–09**	**3.62**	**02.17**	**00–09**	**04.08**	**02.22**	**00–09**	*t* = − 2.38, *df* = 529, *p* < 0.05
5	Direct personal harm	05.02	01.20	00–06	5.04	01.12	01–06	04.98	01.32	01–06	ns
6	Witnessing violence	10.39	01.00	04–11	10.46	00.92	07–11	10.26	01.10	07–11	ns
7	Physical threat to self	04.73	00. 63	01–05	4.76	00.57	01–05	04.68	00.72	01–05	ns
8	Deaths	03.96	01.37	00–07	3.98	01.39	00–07	03.94	01.34	00–07	ns
9	Harm to loved ones	03.82	00.54	00–04	3.84	00.49	00–04	03.78	00.62	00–04	ns
10	Material loss	03.91	00.38	00–04	3.93	00.35	01–04	03.88	00.43	01–04	ns
11	**Threat to loved ones**	**02.98**	**01.02**	**00–04**	**2.91**	**01.08**	**00–04**	**03.11**	**00.91**	**00–04**	*t* = − 2.23, *df* = 531, *p* < 0.05
12	Separation	01.94	00.29	00–02	1.93	00.31	00–02	01.96	00.25	00–02	ns
13	**Displacement**	**03.75**	**00.71**	**00–05**	**3.65**	**00.71**	**00–05**	**03.92**	**00.69**	**00–05**	*t* = − 4.35, *df* = 525, *p* < 0.001
14	**Involvement in hostilities**	**01.69**	**00.62**	**00–02**	**1.75**	**00.57**	**00–02**	**01.59**	**00.68**	**00–02**	*t* = − 3.00, *df* = 530, *p* < 0.01
15	Sexual abuse/assault	00.32	00.47	00–01	00.30	00.46	00–01	00.36	00.48	00–01	ns
16	Total number of war experiences	42.16	08.01	00–52	42.02	07.94	00–52	42.28	08.14	00–52	ns

N/n number of participants, *SD* standard deviation, *min* minimum number of score, *max* the maximum number of score, *ns* not significant, all significant associations are in bold

Table 3 Univariate regression models of the influence of demographic variables and different types of war experiences on somatic symptoms (as a continuous variable)

	Variables	*β* (SE)	*p* < value	CFI	RMSEA
1	**Sex**	**0.21 (0.04)**	**0.01**	**0.95**	**0.06**
2	**Marital status**	**− 0.12 (0.04)**	**0.01**	**0.95**	**0.06**
3	**Injury**	**0.12 (0.04)**	**0.01**	**0.95**	**0.06**
4	**Witnessing violence**	**0.10 (0.04)**	**0.05**	**0.96**	**0.05**
5	Involvement in hostilities	0.02 (0.04)	ns	0.96	0.06
6	Displacement	0.04 (0.04)	ns	0.95	0.05
7	Separation	0.01 (0.04)	ns	0.95	0.05
8	**Threats to relatives**	**0.12 (0.04)**	**0.01**	**0.97**	**0.05**
9	Material losses	0.04 (0.04)	ns	0.95	0.06
10	Harm to relatives	0.01 (0.04)	ns	0.96	0.05
11	**Deaths**	**0.17 (0.04)**	**0.01**	**0.95**	**0.06**
12	**Physical threats to self**	**0.10 (0.04)**	**0.01**	**0.95**	**0.06**
13	**Sexual abuse**	**0.22 (0.04)**	**0.01**	**0.96**	**0.06**
14	**Total number of war experiences**	**0.31 (0.04)**	**0.01**	**0.97**	**0.06**

β beta, *SE* standard error, *CFI* comparative fit indices, *RMSEA* root mean squared error of approximation, *ns* not significant, significant values are in bold

Table 4 Multivariate regression models of the influence of demographic variables and different types of war experiences on somatic symptoms (as a continuous variable)

	Variables	β (SE)	$p <$ value	CFI	RMSEA
1	Sex	0.18 (0.06)	0.01	0.95	0.05
2	Marital status	− 0.13 (0.06)	0.05		
3	Injury	0.12 (0.05)	0.05		
4	Deaths	0.10 (0.05)	0.05		
5	Sexual abuse	0.12 (0.05)	0.05		

β beta, SE standard error, CFI comparative fit indices, RMSEA root mean squared error of approximation

follows: sex X War events: $\beta = -0.08$, 95% CI (− 0.16, 0.01) and marital status X War events: $\beta = 0.06$, 95% CI (− 0.03, 0.15).

Discussion

Although traumatic experiences have been associated with somatic symptoms (Amone-P'Olak et al. 2013; Amone-P'Olak, Ovuga, & Jones, 2015; Gillespie, Kirk, Heath, Martin, & Hickie, 1999; Roelofs & Spinhoven, 2007), its associations with different types of war events not been studied in low- and middle-income countries. These results suggest that almost a decade after the war ended; about 28% of the participant still scored within clinical range on somatic symptoms indicating that somatic symptomatology is, indeed, a public health concern. It is possible that mental health outcomes of war events such as in PTSD (e.g. intrusive re-experiencing, avoidance, and hyper vigilance) may lead to worry about adverse physical and bodily symptoms (Amone-P'Olak, Garnefski, & Kraaij, 2007). This is consistent with cognitive theories about somatic symptoms (Brown, 2004) which posit that traumatic experiences may lead to changes in the central nervous system (central stress circuitry) and functional dissociation in information processing, which, in turn, are linked to increased attention to bodily cues (Roelofs & Spinhoven, 2007). Similarly, previous neuroendocrine studies indicate that early traumatic experiences can have long-term consequences on the stress sensitivity of the HPA-axis, which, in turn, may exacerbate somatic symptomatology (Roelofs & Spinhoven, 2007), especially in stressful environments such as in post-conflict situations.

Previous studies have demonstrated that people who suffer from somatic symptoms are more sensitive to non-threatening bodily feelings than those without somatic symptoms (Gillespie, Kirk, Heath, Martin, & Hickie, 1999). Moreover, the rate of the severity of somatic symptoms was determined by feelings of psychological rather than physical distress (Kirmayer, 1996; Steptoe &

Noll, 1997). Therefore, these findings support the hypothesis that types of war events such as injuries during combat, sexual violence, or displacement may be associated with heightened bodily sensitivity or awareness that may manifest as somatic symptoms.

Furthermore, the finding that specific types of war events were associated with somatic symptoms is consistent with previous findings which suggested that adverse life events such as war events, indeed, are related to somatic symptoms (Bonvanie, Janssens, Rosmalen, & Oldehinkel, 2017). In this study, it remains unclear why the war types of "direct personal harm", "deaths", and "sexual abuse" or "rape" were independently and uniquely associated with somatic symptoms. However, PTSD, a known correlate of these war events, is suggested to be associated with somatic symptoms among war veterans who experienced similar events to the participants in the current study (Betancourt, Agnew-Blais, Gilman, Williams, & Ellis, 2010; Hoge et al., 2007). Therefore, it is possible that depression, anxiety, and somatic symptoms (internalizing problems) co-occur, are interrelated, and with possibly similar aetiology. Similarly, this internalizing symptomatology has previously been found to be associated with PTSD in war-affected populations as well (Amone-P'Olak, & Elklit, 2018).

Regarding demographic characteristics such as sex, age, duration in rebel captivity, and marital status, previous studies yielded inconsistent results. Only the demographic characteristics of sex and marital status predicted somatic symptoms, but their interaction terms did not confer additional risks on somatic symptoms in war-affected youth. Being female and unmarried predicted somatic symptoms (Nakao et al., 2001). Marital status appears to protect against somatic symptoms. Married or unmarried participants significantly differed [t (263) = 2.38, $p < .05$] on somatic symptoms with married participants scoring lower (mean = 3.62, SD = 2.17) than unmarried participants (mean = 4.08, SD = 2.22) on somatic symptoms. The explanation for this finding could be that women are generally more willing to disclose psychological distress

and seek psychological help than their male counterparts and married participants may have social support from their spouses that may protect them against somatic symptoms. In addition, previous studies in the same population suggest that female participants scored higher on symptoms of depression and anxiety (Amone-P'Olak, et al., 2013).

It is difficult to compare the findings in this study with other studies concurrently assessing the influence of various types of war events on somatic symptoms. No previous research has been conducted to study the unique effects of demographic characteristics and war events on somatic symptoms. Similarly, different studies using different measures of war events hinder comparison. Nonetheless, previous studies with the same population showed that different types of war events vary in predicting mental health outcomes (Amone-P'Olak et al., 2014a; Amone-P'Olak, Otim, Opio, Ovuga, & Meiser-Stedman, 2015). For example, war events such as "witnessing violence", "injuries or direct personal harm", "bereavement or deaths of family members", and "sexual abuse" uniquely and independently predicted symptoms of depression/anxiety and psychosis (Amone-P'Olak et al., 2014a; Amone-P'Olak et al., 2015a).

The level of brutality meted out to the war-affected youth during the war was so severe that survivors bear ugly scars and/or disabilities, which continually remind them of their ordeal. The war-affected youths were used as human shields, participated in numerous battles, killings or mutilations (Amone-P'Olak et al., 2014a; Amone-P'Olak et al., 2015a). These levels of cruelty and brutality might explain the persistently noxious effect of "direct personal harm", "deaths of family members", and "sexual abuse" on mental health outcomes of the war-affected youth. Moreover, participants who reported sexual abuse differed significantly on somatic symptoms with victims of sexual abuse scoring higher on somatic symptoms than non-victims.

Regarding sexual abuse, young girls and women were mostly targeted for abduction by the rebels on the assumption that they were HIV-free (Amone-P'Olak, 2004, 2005, 2009; Leserman, Li, Drossman, & Hu, 1998). In captivity, senior rebel commanders allocated abducted girls who had reached puberty to trustworthy, hardworking, and brave rebel soldiers to be their "wives". Consequently, the girls were sexually abused and raped and many returned from rebel captivity with children fathered by rebel soldiers and commanders (Amone-P'Olak, 2004, 2005, 2009; Leserman, Li, Drossman, & Hu, 1998). This may explain the enduring harmful effects of "sexual abuse" on somatic symptoms. Sexual abuse has been implicated in the aetiology of somatic symptoms in previous studies (Roelofs & Spinhoven, 2007).

The current study has several strengths. First, the study was carried out more than 6 years after the war ended; thus, the study is not contaminated with instances of an ongoing war unlike previous studies conducted during the war. Second, compared to similar studies in resource-poor settings, our study had a somewhat larger sample, hence lending credence to our results. Third, the measures of somatic symptoms and war events were made for or adapted for the context of our setting in Northern Uganda (Betancourt, Speelman, Onyango, & Bolton, 2009). Finally, rigorous structural equation modelling (SEM) analytical approach and the Mplus software, both known to reduce measurement errors and limit effects of type II errors, were employed in this study (Hu & Bentler, 1995; Kline, 2015). Besides, the fit indices such as RMSEA (0.06) and CFI (0.95) were within acceptable limits for this study (Hu & Bentler, 1995; Kline, 2015).

However, conclusions from this study should be interpreted with caution given that the somatic symptoms scale in our study cannot be taken to mean psychiatric disorders defined in terms of clinical diagnosis but merely symptoms. Similarly, enduring post-war risk factors such as daily stressors, stigma, and poor community relations could influence current somatic symptoms. For example, war-affected youth are more likely to be depressed (Amone-P'Olak et al., 2014a) and unemployed and may find it difficult to sustain a relationship with the community. Often, war-affected youth are stigmatized (Amone-P'Olak et al., 2016; Amone-P'Olak, & Omech, 2018), making them more susceptible to somatic symptoms. In addition, the cross-sectional design of our study limits causal inferences; thus, it is not possible to conclude from these findings whether the war events cause somatic symptoms or not.

Finally, findings from the current study may be generalizable to other conflict hotspots outside Northern Uganda such as in Southern Sudan, the Democratic Republic of Congo, South Sudan, and Central African Republic (Amone-P'Olak, Ovuga, Croudace, Jones, & Abbott, 2014). The same rebel group that operated in Northern Uganda now operates in parts of these countries as well. It is possible therefore that the youth in these regions endured the same levels of brutality, violence, and war events such as injuries, death of family members and sexual abuse. For example, the Eastern Democratic Republic of Congo has witnessed widespread sexual abuse of young girls and women (Brown, 2012).

Implications

The findings of this study have implications for both research and policy. The results should herald further research on the causal paths through which different types

of war events relate to somatic symptoms and how the mechanisms can be translated into strategies to prevent adverse mental health outcomes from a public health point of view. Such mediating and/or moderating factors may include post-war environmental stressors, family contextual factors (e.g. family functioning), stigma, social support network, and coping mechanisms. Interventions to reduce somatic symptoms should target war-affected youths with a history of injuries, bereavement, sexual abuse, consider sex differences, and marital status. As highlighted before, somatic symptoms constitute a significant public health issue among the youth. Somatic symptoms are associated with considerable distress, poor functioning, loss of productivity, and reduced quality of life. Health workers should consider somatic symptoms as possible presenting problems and indicators of severe psychological distress including sexual abuse, especially among female survivors of war. Although sex and marital status univariably and independently predicted somatic symptomatology, their interaction effects with war experiences did not confer additional risks on somatic symptomatology.

Conclusion

This study has shown that sex differences, marital status, and particular types of war events such as injuries (direct personal harm), bereavement (deaths of family members), and sexual abuse, are associated with somatic symptomatology. The findings have broad implications for the health care of war-affected youth. The implications of the finding underline the complex aetiology of somatic symptomatology and the need for health workers working with war-affected youth to consider background characteristics and types of war events besides other potential risk factors when designing interventions to mitigate the adverse effects of somatic symptoms. Besides, somatic complaints can inform interventions that target survivors' understanding of their health conditions. Nevertheless, the effect sizes of the associations between different types of war events and somatic symptoms found in the present study were relatively small, suggesting that interventions to diminish their influence on somatic symptomatology may have only modest benefits.

Availability of Data and Materials The dataset supporting the conclusions of this article is available upon reasonable request by contacting the corresponding author.

Compliance with Ethical Standards

Competing interests The authors declare that they have no competing interests.

Ethics Approval and Consent to Participate Ethical approval for this study was obtained from Gulu University's Institutional Review Board, an affiliate of Uganda National Council for Science and Technology which oversees all research activities in Uganda. Written informed consent was obtained from all participants following ethical guidelines and approvals.

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