Cango Lyec (Healing the Elephant): Probable post-traumatic stress disorder (PTSD) and depression in Northern Uganda five years after a violent conflict

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ARTICLE INFO

ABSTRACT

Background: From 1986 to 2006, Northern Uganda experienced an atrocious civil war between the Lord's Resistance Army (LRA) and the Ugandan government. Acholi people living in the region continue to be impacted by trauma sequelae of the war and a wide range of daily stressors including poverty, hunger, and high rates of HIV infection. To date, there is a dearth of gender-differentiated mental health research in this post-conflict setting. The current study aimed to estimate the prevalence of probable post-traumatic stress disorder (PTSD) and depression in three districts most affected by the Northern Ugandan conflict and examine socio-structural, war-related, and sexual vulnerability factors associated with mental health.
Methods: Cango Lyec (Healing the Elephant) is an open cohort study involving participants from eight randomly selected communities in Amuru, Gulu, and Nwoya districts of Northern Uganda. Between November 2011 and July 2012, the baseline cohort ($N = 2,458$) completed the Harvard Trauma Questionnaire (HTQ) and Hopkins Symptom Checklist-25 (HSCL-25) for screening PTSD and depression, in addition to a detailed questionnaire assessing socio-demographic-behavioral characteristics. Baseline categorical variables were compared between males and females using Fisher's exact test. Multivariate logistic regression was used to model correlates of probable PTSD and depression. All analyses were stratified by gender.
Results: The overall prevalence of probable PTSD and depression was 11.7% and 15.2% respectively. Among former abductees, the prevalence was 23.2% for probable PTSD and 26.6% for probable depression. Women were significantly more likely to experience mental distress than men. Factors associated with mental distress included wartime trauma (adjusted odds ratios ranging from 2.80 to 7.19), experiences of abduction (adjusted odds ratios ranging from 1.97 to 3.03), and lack of housing stability and safety (adjusted odds ratios ranging from 1.95 to 4.59). Additional risk factors for women included HIV infection (AOR=1.90; 95% CI: 1.29–2.80), sexual abuse in the context of war (AOR=1.58; 95% CI: 1.02–2.45), and intimate partner violence (AOR=2.45; 95% CI: 1.07–5.63).
Conclusion: Cango Lyec participants displayed lower than previously reported yet significant levels of probable PTSD and depression. Based on findings from this study, providing trauma-informed care, ensuring food and housing security, eliminating gender-based violence, and reintegrating former abductees remain important tasks to facilitate post-conflict rehabilitation in Northern Uganda.

Background

Psychological impacts of war can be long-lasting for individuals, families, and communities, with unresolved trauma passing from one generation to the next (Abi-Rached, 2009). In resource-limited settings, war serves to magnify preexisting vulnerabilities while generating new hardships, trapping affected populations in cycles of violence, poverty, and marginalization (Amone-P'Olak et al., 2013). A 2018 systematic review of adult civilian war survivors worldwide found an overall prevalence of 26% for post-traumatic stress disorder (PTSD) and 27% for major depression (Morina et al., 2018).

In recent years, more attention has turned to stressful social and material conditions in conflict-affected settings as important mediating factors that shape population mental health (Miller and Rasmussen, 2010; Siriwardhana and Stewart, 2013). Compared to refugees under the protection of international refugee laws, IDPs may experience higher levels of adversity and lower chances of receiving aid and services (Morina et al., 2018; Siriwardhana and Stewart, 2013). At the end of conflict, return migration can be retraumatizing to those who have broken ties with their communities or witnessed horrific events during the initial flight phase (Siriwardhana and Stewart, 2013). Through meta-regression analyses of 161 articles, Steel et al. (2009) identified higher rates of depression among populations who were displaced internally or externally to the source country (38.2%) versus refugees who permanently resettled in another country (24.1%) (Steel et al., 2009).

From 1986 to 2006, the northern region of Uganda experienced a protracted civil war between a rebel guerrilla force, the Lord's Resistance Army (LRA), and the Ugandan government. The war grew into a humanitarian crisis, resulting in innumerable deaths and injuries, cultural disintegration, and socioeconomic breakdown. The LRA abducted thousands of children into their ranks, subjecting them to extreme cruelties including forced labor, indiscriminate killings, and physical mutilation (Finnström, 2008; Annan et al., 2006). Meanwhile, the Ugandan government forced civilians *en masse* to move into internally displaced persons (IDP) camps that were characterized by overcrowding, poverty, disease, and scarcity of essential goods (Patel, 2012; Roberts et al., 2008). Prolonged displacement, coupled with the destruction of agrarian economy and higher HIV infection rates than the national average (Katamba et al., 2020; Malamba et al., 2016; Republic of Uganda Ministry of Health 2011), led to widespread demoralization among Acholi people living in the region. Studies estimated the prevalence of PTSD to be 11.8% to 54% in post-conflict Northern Uganda (Roberts et al., 2008; Mugisha et al., 2015; Murphy et al., 2016; Amone-P'Olak et al., 2018); for major depression, the estimated prevalence was 24.7% to 67% (Roberts et al., 2008; J Mugisha et al., 2015). However, there remains a dearth of research on the long-term psychological impact of internal displacement using gender-differentiated analysis in this setting (Siriwardhana and Stewart, 2013; Klasen et al., 2010).

Among various types of violence that took place during the conflict, sexual violence against women was pervasive and well-documented. The LRA abducted a large number of pre-menstrual girls, who were assigned to rebel "husbands" and forced into involuntary sex and childbearing (Amone-P'Olak et al., 2013; Patel et al., 2013). It is alleged that government troops also adopted rape as a deliberate strategy to intimidate the civilian population (OHCHR, and UHRC 2011). In the post-conflict era, women were confronted with new dangers as they navigated environments outside the bush and IDP camps. Daughters were frequently left behind in large towns or trading centres for schooling where they became vulnerable to sexual predation by strangers (Spittal et al., 2008). In a state of destitution, some young women who never learned agricultural skills were seen working in strip/sex clubs or exchanging sex for goods along the Kampala-Juba highway (Malamba et al., 2016; Amone-P'Olak et al., 2016; Spittal et al., 2018). Many of these women had been raped or sexually abused during the war, thus facing increased risk of sexual exploitation,

infectious diseases including HIV, and compound trauma (Spittal et al., 2018).

The purpose of the current study was two-fold: (1) to estimate the prevalence of probable PTSD and depression in post-conflict Northern Uganda; and (2) to examine socio-structural, war-related, and sexual vulnerability factors associated with mental health to inform community-based preventions and interventions.

Methods

Cango Lyec is an open cohort study involving conflict-affected people from three districts in the Acholi sub-region of Northern Uganda: Amuru, Gulu, and Nwoya. Overall, the study aims to understand the complex relationships between war-related traumatic experiences, HIV, intimate relationships, mental health, and resilience in the context of post-conflict transition. Previous research from Cango Lyec indicates that mental distress was a robust predictor of HIV infection (Katamba et al., 2020; Malamba et al., 2016; Spittal et al., 2018). The current retrospective cross-sectional study was based on baseline Cango Lyec data collected from November 2011 to July 2012.

Sample and data collection

A rigorous two-stage stratified sampling method was applied to produce a representative sample, details of which have been reported in previous Cango Lyec publications (Malamba et al., 2016; Spittal et al., 2018). In summary, all communities in the three districts were listed and categorized as permanent (settlements that had existed prior to the war), transient (settlements created to accommodate IDPs during post-war transition), or displaced (IDP camps created during the war). Three study communities were randomly selected from each district, one from each residential category, except for Nwoya district which did not have a displaced community. The research team mapped out the selected eight communities and conducted house-to-house census ($N = 6375$), inviting all residents who were between 13 and 49 years old and had resided in their household for at least a month to participate in the study ($N = 2954$). Among those, 2458 provided informed consent; unemancipated minors under 18 years old were asked to provide individual assent if written consent was provided by parent/guardian. Minors who did not want to participate were not enrolled.

Measures

The outcomes of interest, probable PTSD and depression, were assessed by the Harvard Trauma Questionnaire (HTQ) and Hopkins Symptom Checklist-25 (HSCL-25) respectively. The term "probable" is used to reflect the non-diagnostic nature of these measures. Probable PTSD was assessed by Part IV of the HTQ comprising 16 post-traumatic symptoms with a one-week recall period measured on a four-point Likert scale (1 = not at all; 2 = a little bit; 3 = quite a bit; 4 = extremely). Probable depression was assessed by Part II of the HSCL-25 comprising 15 cognitive-affective and somatic depressive symptoms, similarly with a one-week recall period on a four-point Likert scale. Per published guidelines (Mollica, 2004), each participant's score for either outcome was calculated by dividing the sum score of all answered items by the number of answered items. A mean score of ≥ 2 was considered positive for probable PTSD, and a mean score of ≥ 1.75 was considered positive for probable depression (Mollica, 2004). Cronbach's alpha was calculated for the HTQ ($\alpha = 0.89$) and the HSCL-25 ($\alpha = 0.88$), both demonstrating high internal consistency in this study. The HTQ and HSCL-25 were developed based on the Diagnostic and Statistical Manual-IV (DSM-IV) and have demonstrated reliability and validity in a number of contexts globally as well as in sub-Saharan Africa (Roberts et al., 2008; Ditlevsen and Elklit, 2012; Tsai et al., 2012; Vinck et al., 2007). Luo (the language spoken by Acholi people) versions of the HTQ and HSCL-25, as developed by Roberts et al. (2008) for use in Gulu

district, Uganda, were adopted. Participants who reported high cumulative scores (≥25 on the HSCL-25 or ≥28 on the HTQ), made any mention of suicidal ideation or feelings of worthlessness or hopelessness were immediately referred to local Trauma Clinics for psychological support.

Other study variables were captured by a detailed questionnaire administered by trained interviewers. The design of the questionnaire was guided and approved by the Cango Lyec Community Advisory Board (CAB), which consists of local multi-lingual research staff and community-based members. All questions were translated from English into Luo through a process of forward and backward translation. Variables included in this study were divided into the following categories. **Socio-demographic characteristics** included gender, age, ethnicity, religion, highest education attained, current marital status, and youth-headed household (≤age 25). **Displacement-related stressors** included community displacement status, felt safety living in current community, the number of camps lived in, frequency of going back home, and hopefulness about returning home permanently. **War-related trauma** was assessed by Part I of the HTQ comprising 15 items. A summary variable "≥10 traumatic events" was created based on the median number of HTQ trauma events reported by participants screening positive for PTSD. Those who self-identified as former child abductees were asked about the number of abductions, age at first abduction, the longest time spent in captivity, and various traumatic events experienced in the bush. **Sexual vulnerability measures** included coerced sexual debut, rape or sexual abuse in the context of war (from HTQ Part I), and physically forced to have sex by partner in the past year.

In addition, nurses on-site drew venous blood for HIV testing with participants' consent. Two specially trained HIV counsellors provided pre/post-test counselling. Participants who tested positive were referred to the health center of their choice and offered guidance on accessing government-supported antiretroviral treatment (ART).

Statistical analyses

R Studio Version 1.1.456 was used to perform all analyses. Age- and time-related variables were dichotomized on the median value, so all variables (other than numeric age) are categorical. Descriptive statistics summarized gender-stratified distributions of study variables. Differences between males and females were assessed using Fisher's exact test. All variables included had less than 6.7% of responses missing, which fell under the 10% threshold that would require missing-data treatment techniques such as maximum likelihood or multiple imputation (Newman, 2014).

Gender-stratified logistic regression models were used to explore associations between explanatory variables of interest and probable PTSD and depression, as separate outcomes. Estimated odds ratios (OR) and their corresponding 95% confidence intervals (CI) were reported after adjusting for the confounding effects of age and district. All *p*-values are two-sided. Variables significant at the *p*<0.10 level in bivariate analyses were included in the final multivariable models, following a process of forward and backward stepwise selection. Statistical significance in the multivariable models was determined at the 5% cut-off.

Ethics

Cango Lyec is funded by the Canadian Institutes of Health Research (CIHR) (grant number 219,124) and has gone through extensive peer review. The local ethical approvals were obtained from Makerere University College of Health Sciences-School of Public Health Science Ethical Committee (Institutional Review Board 00,011,353; approval protocol number HDREC103), and Uganda National Council for Science and Technology (reference SS 2467; approval protocol number (103) 2011–2017). The Uganda National Council for Science and Technology

issued a letter of approval based on non-objection from the Office of the President of Uganda. Subsequently, the Resident District Commissioner in each district provided administrative approval affirming that the study was welcome to be carried out in that district. The present study was approved by the University of British Columbia-Providence Health Care Research Ethics Board (H20–00,413).

Results

The baseline cohort included a total of 2458 participants, with a median age of 25 (IQR: 18–32) and a higher proportion of females (57.6%) than males (42.4%). Most participants were of Acholi ethnicity (90.8%) and Roman Catholic (74.9%) (Table 1). Almost half resided in Gulu district (46.1%), and more than half were living in displaced (14.0%) or transient (39.5%) communities. Less than one third of participants were living at home (29.0%); the vast majority had lived in at least one camp (77.6%). In terms of sexual vulnerabilities, 17.9% of female participants experienced coerced sexual debut and 13.7% were raped or sexually abused in the context of war. A significantly higher proportion of females than males tested positive for HIV (13.9% vs. 7.7%; *p*<0.001).

Frequencies of exposure to traumatic events are given in Table 2. The most frequently reported events were lack of food/water (65.1%), lack of housing/shelter (55.0%), family member/friend's unnatural death (60.2%) or murder (49.0%), and narrowly escaping death (49.0%). In terms of mental health, the overall prevalence was 11.7% for probable PTSD and 15.2% for probable depression. Females were significantly more likely to experience both outcomes than males (probable PTSD: 13.7% vs. 8.8%, *p*<0.001; probable depression: 20.0% vs. 8.5%, *p*<0.001).

Factors associated with mental health among females

For females, bivariate correlates of both probable PTSD and depression, after adjusting for age and district of residence, included: feeling moderately safe or not safe at all in one's community, having lived in ≥2 camps, cumulative exposure to ≥10 traumatic events, ill health without medical care, HIV sero-positivity, coerced sexual debut, having been raped or sexually abused, and being physically forced to have sex by partner in the past year (Table A1 & A2 in Annex).

In final multivariable models for probable PTSD and depression, those who did not feel safe at all in their community had 4.59 times the odds of probable PTSD (AOR=4.59; 95% CI: 2.21–9.53) and 3.79 times the odds of probable depression (AOR=3.79; 95% CI: 1.88–7.63) (Tables 3 & 4). Those who were exposed to ≥10 war-related traumatic events had 4.09 times the odds of probable PTSD (AOR=4.09; 95% CI: 2.62–6.37) and 2.80 times the odds of probable depression (AOR=2.80; 95% CI: 1.87–4.18). Females who experienced ill health without medical care had 82% increased odds of probable PTSD (AOR=1.82; 95% CI: 1.27–2.63) and 92% increased odds of probable depression (AOR=1.92; 95% CI: 1.40–2.64). In addition, females who tested positive for HIV (AOR=1.90; 95% CI: 1.29–2.80), were raped/sexually abused (AOR=1.58; 95% CI: 1.02–2.45), or were physically forced to have sex by partner in the past year (AOR=2.45; 95% CI: 1.07–5.63) had 90%, 58%, and 145% increased odds of probable depression, respectively.

Factors associated with mental health among males

For males, bivariate correlates of probable PTSD, after adjusting for age and district of residence, included: being currently married, living in a transient community, feeling not at all safe in one's community, cumulative exposure to ≥10 traumatic events, and ill health without medical care (Table A1 in Annex). Similarly, bivariate correlates of probable depression, after adjusting for age and district of residence, included: living in a transient community, feeling moderately safe or not safe at all in one's community, having lived in ≥2 camps, cumulative

Table 1

Comparison of baseline characteristics of Cango Lyec participants by gender.

	Male (N = 1043)	Female (N = 1415)	Total (N = 2458)	P-value
District				0.033
Gulu	451 (43.2%)	682 (48.2%)	1133 (46.1%)	
Amuru	349 (33.5%)	413 (29.2%)	762 (31.0%)	
Nwoya	243 (23.3%)	320 (22.6%)	563 (22.9%)	
Age group				<0.001
13–19	363 (34.8%)	382 (27.0%)	745 (30.3%)	
20–24	190 (18.2%)	252 (17.8%)	442 (18.0%)	
25–29	171 (16.4%)	292 (20.6%)	463 (18.8%)	
30–34	121 (11.6%)	199 (14.1%)	320 (13.0%)	
35–39	91 (8.7%)	119 (8.4%)	210 (8.5%)	
40–44	67 (6.4%)	95 (6.7%)	162 (6.6%)	
45–49	39 (3.7%)	76 (5.4%)	115 (4.7%)	
Ethnicity				0.290
Acholi	955 (91.6%)	1276 (90.2%)	2231 (90.8%)	
Other tribes	88 (8.4%)	138 (9.8%)	226 (9.2%)	
Religion				<0.001
Roman Catholic	790 (75.8%)	1050 (74.2%)	1840 (74.9%)	
Anglican	184 (17.7%)	208 (14.7%)	392 (16.0%)	
Others	68 (6.5%)	157 (11.1%)	225 (9.2%)	
Highest education attained				<0.001
No school	9 (0.9%)	215 (15.4%)	224 (9.2%)	
Primary	539 (51.8%)	884 (63.3%)	1423 (58.4%)	
Secondary	376 (36.2%)	241 (17.3%)	617 (25.3%)	
Post-secondary	116 (11.2%)	57 (4.1%)	173 (7.1%)	
Current marital status				<0.001
Not married	503 (48.6%)	574 (41.5%)	1077 (44.6%)	
Married	532 (51.4%)	808 (58.5%)	1340 (55.4%)	
Community displacement status				<0.001
Permanent	433 (41.5%)	710 (50.2%)	1143 (46.5%)	
Transient	455 (43.6%)	515 (36.4%)	970 (39.5%)	
Displaced	155 (14.9%)	190 (13.4%)	345 (14.0%)	
Felt safetyty in community				<0.001
Very safe	763 (73.2%)	894 (63.2%)	1657 (67.4%)	
Moderately safe	241 (23.1%)	461 (32.6%)	702 (28.6%)	
Not safe at all	39 (3.7%)	60 (4.2%)	99 (4.0%)	
Number of camps lived in				0.003
0	202 (19.5%)	346 (24.5%)	548 (22.4%)	
1	510 (49.1%)	691 (49.0%)	1201 (49.0%)	
2+	326 (31.4%)	374 (26.5%)	700 (28.6%)	
Frequency of going back home				<0.001
Living at home	357 (34.3%)	356 (25.2%)	713 (29.0%)	
Once a month or more	451 (43.3%)	474 (33.5%)	925 (37.7%)	

Table 1 (*continued*)

	Male (N = 1043)	Female (N = 1415)	Total (N = 2458)	P-value
Less than once a month	126 (12.1%)	352 (24.9%)	478 (19.5%)	
Never	108 (10.4%)	232 (16.4%)	340 (13.8%)	
≥10 traumatic events				0.148
No	846 (81.1%)	1180 (83.4%)	2026 (82.4%)	
Yes	197 (18.9%)	235 (16.6%)	432 (17.6%)	
HIV				<0.001
Negative	941 (92.3%)	1197 (86.1%)	2138 (88.7%)	
Positive	79 (7.7%)	194 (13.9%)	273 (11.3%)	
Coerced sexual debut				<0.001
No	783 (76.4%)	924 (65.7%)	1707 (70.2%)	
Yes	18 (1.8%)	251 (17.9%)	269 (11.1%)	
Never had sex	224 (21.9%)	231 (16.4%)	455 (18.7%)	
War-related rape or sexual abuse				<0.001
No	995 (98.6%)	1204 (86.3%)	2199 (91.5%)	
Yes	14 (1.4%)	191 (13.7%)	205 (8.5%)	
Physically forced to have sex by partner (past year)				<0.001
No	786 (77.9%)	1117 (81.2%)	1903 (79.8%)	
Yes	4 (0.4%)	37 (2.7%)	41 (1.7%)	
Never had sex	219 (21.7%)	221 (16.1%)	440 (18.5%)	

exposure to ≥10 traumatic events, and ill health without medical care (Table A2 in Annex).

In final multivariable models, males who were exposed to ≥10 war-related traumatic events had 7.19 times the odds of probable PTSD (AOR=7.19; 95% CI: 4.05–12.75) and 5.54 times the odds of probable depression (AOR=5.54; 95% CI: 3.03–10.12) (Tables 3 & 4). Males who experienced ill health without medical care had 3.01 times the odds of probable PTSD (AOR=3.01; 95% CI: 1.80–5.04) and 2.27 times the odds of probable depression (AOR=2.27; 95% CI: 1.33–3.87). Finally, males living in a transient camp had 95% increased odds of probable depression (AOR=1.95; 95% CI: 1.07–3.55).

Subgroup analyses of former abductees

A total of 603 participants self-reported to have been abducted during the war (Table 5), among which 46.9% were males and 53.1% were females. A significantly higher proportion of females than males were abducted under the age of 15 (60.4% vs. 34.4%; *p*<0.001). While in the bush, the vast majority of abductees carried heavy loads (77.6%), and a third were forced into military training (33.7%). Approximately half of abductees were beaten (50.7%), were injured (46.6%), and/or witnessed killing (50.2%). Among female abductees, over a quarter were sexually abused (28.5%) and/or given as a wife (26.6%). Male abductees were more likely to be living at home than their female counterparts (37.5% vs. 25.3%; *p*< 0.001). Among those living away from home, male abductees were more likely to return home at least once a month (46.6% vs. 36.6%; *p*< 0.001) and feel hopeful about eventually settling back home (80.7% vs. 44.4%; *p*< 0.001). In terms of mental health, 23.2% of former abductees screened positive for PTSD and 26.6% for depression – almost double the rates among the general cohort.

Tables 6 and 7 present results of final models among former abductees for probable PTSD and depression, respectively. Adjusting for all other factors, female abductees living in a youth-headed household

Table 2
Comparison of HTQ Part I trauma events and mental health outcomes by gender.

	Male (N = 1043)	Female (N = 1415)	Total (N = 2458)	P-value
Lack of food or water				0.024
No	379 (37.5%)	463 (33.0%)	842 (34.9%)	
Yes	633 (62.5%)	940 (67.0%)	1573 (65.1%)	
Lack of housing or shelter				<0.001
No	504 (49.8%)	581 (41.5%)	1085 (45.0%)	
Yes	508 (50.2%)	819 (58.5%)	1327 (55.0%)	
Unnatural death of family member or friend				<0.001
No	449 (44.4%)	510 (36.4%)	959 (39.8%)	
Yes	562 (55.6%)	890 (63.6%)	1452 (60.2%)	
Murder of family member or friend				<0.001
No	563 (55.7%)	667 (47.6%)	1230 (51.0%)	
Yes	447 (44.3%)	735 (52.4%)	1182 (49.0%)	
Being close to, but escaping, death				0.351
No	504 (49.9%)	724 (51.8%)	1228 (51.0%)	
Yes	506 (50.1%)	673 (48.2%)	1179 (49.0%)	
Ill health without medical care				<0.001
No	762 (75.4%)	900 (64.3%)	1662 (69.0%)	
Yes	248 (24.6%)	499 (35.7%)	747 (31.0%)	
Witnessing the murder of stranger(s)				0.020
No	765 (75.8%)	1117 (79.8%)	1882 (78.1%)	
Yes	244 (24.2%)	283 (20.2%)	527 (21.9%)	
Tortured or beaten				0.350
No	658 (65.1%)	884 (63.2%)	1542 (64.0%)	
Yes	353 (34.9%)	514 (36.8%)	867 (36.0%)	
Forced separation from family				0.002
No	691 (68.3%)	1035 (74.1%)	1726 (71.7%)	
Yes	321 (31.7%)	361 (25.9%)	682 (28.3%)	
Made to accept ideas against your will				<0.001
No	562 (55.5%)	921 (65.9%)	1483 (61.6%)	
Yes	450 (44.5%)	476 (34.1%)	926 (38.4%)	
Serious injury				<0.001
No	612 (60.6%)	979 (69.9%)	1591 (66.0%)	
Yes	398 (39.4%)	421 (30.1%)	819 (34.0%)	
Forced isolation from other people				0.107
No	733 (72.6%)	1053 (75.5%)	1786 (74.3%)	
Yes	277 (27.4%)	342 (24.5%)	619 (25.7%)	
Being in a war fighting situation				0.294
No	779 (77.4%)	1108 (79.1%)	1887 (78.4%)	
Yes	228 (22.6%)	292 (20.9%)	520 (21.6%)	
Imprisonment against your will				<0.001
No	809 (80.3%)	1227 (88.0%)	2036 (84.7%)	
Yes	199 (19.7%)	168 (12.0%)	367 (15.3%)	
War-related rape or sexual abuse				<0.001
No	995 (98.6%)	1204 (86.3%)	2199 (91.5%)	
Yes	14 (1.4%)	191 (13.7%)	205 (8.5%)	
Probable PTSD (HTQ score ≥2)				<0.001
No	923 (91.2%)	1211 (86.3%)	2134 (88.3%)	
Yes	89 (8.8%)	193 (13.7%)	282 (11.7%)	
Probable depression (HSCL score ≥1.75)				<0.001
No	939 (91.5%)	1125 (80.0%)	2064 (84.8%)	
Yes	87 (8.5%)	282 (20.0%)	369 (15.2%)	

had 2.73 times the odds of probable PTSD (AOR=2.73; 95% CI: 1.16–6.42) and 2.67 times the odds of probable depression (AOR=2.67; 95% CI: 1.17–6.08). Those who experienced ≥2 abductions (AOR=1.97; 95% CI: 1.10–3.53) or were sexually abused in the bush (AOR=3.03; 95% CI: 1.66–5.54) had 1.97 and 3.03 times the odds of probable PTSD, respectively. Additionally, female abductees who returned home less than once a month (AOR=2.49; 95% CI: 1.17–5.28), witnessed killing (AOR=2.88; 95% CI: 1.57–5.28), or were given as a wife (AOR=2.40: 95% CI: 1.25–4.63) had 2.49, 2.88, and 2.40 times the odds of probable depression, respectively. By contrast, male abductees who never returned home (AOR=3.86; 1.10–13.57), were injured in the bush (AOR=2.75; 95% CI: 1.13–6.68), or received forced military training (AOR=2.68; 95% CI: 1.12–6.42) had 3.86, 2.75, and 2.68 times the odds of probable PTSD, respectively. Male abductees who never returned home (AOR=6.40; 95% CI: 1.95–20.98) had 6.40 times the odds of probable depression.

Discussion

The prevalence of probable PTSD (11.7%) and depression (15.2%) among Cango Lyec participants was lower than previously reported in Northern Uganda (Roberts et al., 2008; J Mugisha et al., 2015; Murphy et al., 2016; Amone-P'Olak et al., 2018; J Mugisha et al., 2015), as well as in a recent systematic review of adult civilian war survivors worldwide (Morina et al., 2018). As residents moved back to ancestral villages and reconnected with their kin, many might have experienced spontaneous remission of war-induced symptoms such as hypervigilance, intense fear/anxiety, and nightmares (J Mugisha et al., 2015; Nuttman-Shwartz et al., 2011). Previous research suggests that returning home in the aftermath of natural or man-made disasters can bring a sense of belonging, hopefulness, and renewed economic opportunities that facilitate healing (Siriwardhana and Stewart, 2013; Nuttman-Shwartz et al., 2011). That said, the fact that more than one in ten participants met symptom criteria for PTSD and depression is cause for concern. There are ongoing appeals for funding to reduce the mental health service gap in Northern Uganda (Mugisha et al., 2016; Kigozi et al., 2010). Meanwhile, stigma, traditional beliefs, and normalization of everyday stress are suggested to prevent individuals from accessing

Table 3
Final multivariable models for probable PTSD obtained via stepwise variable selection.

Variable	Units	Females			Males		
		AOR	CI.95%	*P*-value	AOR	CI.95%	*P*-value
District	Gulu	Ref			Ref		
	Amuru	1.06	[0.69;1.63]	0.796	1.92	[1.13;3.26]	0.016
	Nwoya	0.33	[0.19;0.58]	<0.001	0.91	[0.46;1.79]	0.774
Age (years)		1.03	[1.01;1.05]	0.002	0.96	[0.92;0.99]	0.021
Ethnicity	Acholi	Ref					
	Other tribes	0.46	[0.21;1.00]	0.051			
Current marital status	Not married				Ref		
	Married				1.75	[0.89;3.45]	0.104
Community displacement status	Permanent						
	Transient						
	Displaced						
Felt safety in community	Very safe	Ref					
	Moderately safe	1.22	[0.84;1.78]	0.302			
	Not safe at all	4.59	[2.21;9.53]	<0.001			
Number of camps lived in	0	Ref					
	1	0.76	[0.47;1.23]	0.261			
	2+	1.29	[0.76;2.18]	0.343			
≥10 traumatic events	No	Ref			Ref		
	Yes	4.09	[2.62;6.37]	<0.001	7.19	[4.05;12.75]	<0.001
Ill health without medical care	No	Ref			Ref		
	Yes	1.82	[1.27;2.63]	0.001	3.01	[1.80;5.04]	<0.001
HIV	Negative						
	Positive						
Coerced sexual debut[1]	No						
	Yes						
	Never had sex						
War-related rape or sexual abuse[1]	No	Ref					
	Yes	1.51	[0.94;2.44]	0.091			
Physically forced to have sex by partner (past year)[1]	No	Ref					
	Yes	2.07	[0.83;5.19]	0.118			
	Never had sex	0.49	[0.21;1.14]	0.098			

[1] Analyzed for females only due to small cell counts among males.

available resources (Amone-P'Olak et al., 2013; J Mugisha et al., 2015; Odokonyero et al., 2015).

In this study, cumulative exposure to ten or more traumatic events emerged as the most robust predictor of probable PTSD and depression overall. This concurs with other studies from Uganda showing a dose-response relationship between war-related trauma and psychiatric symptomology (Roberts et al., 2008; Vinck et al., 2007; Ainamani et al., 2020; Pfeiffer and Elbert, 2011). The most common trauma event reported was lack of food and water, with women substantially more affected than men. This corroborates emerging evidence that food insecurity poses major stress for women in sub-Saharan Africa who traditionally assume the role of food collectors (Patel, 2012; Tsai et al., 2012). Moreover, ill health without medical care was strongly linked to both outcomes across genders in our study. It is clear that ensuring people's basic needs are met remains a priority in post-conflict Northern Uganda. Unfortunately, the region's redevelopment has been hindered by poverty, destruction of infrastructure during the war, political corruption and inefficiency, and shortage of personnel (Blair, 2017; EU joins national donors in freezing aid to Uganda over graft 2012).

The fact that former LRA abductees were disproportionately affected by mental distress is in congruence with mounting evidence on the psychosocial detriments of child abduction in war-affected settings (Amone-P'Olak et al., 2013; Pfeiffer and Elbert, 2011; Pham et al., 2009; Blattman and Annan, 2008; Moscardino et al., 2012). Globally more than 93,000 children are recruited by armed forces or groups and exploited extensively as soldiers, cooks, porters, and forced wives (Klasen et al., 2010; UNICEF 2021). A longitudinal study of 39 former child soldiers in Mozambique revealed that the majority of them, despite having reintegrated into society as productive members, continued to suffer from intrusion of troubling memories 16 years later (Boothby et al., 2006). Similarly, amid prevailing peace in Northern Uganda, male abductees in our sample who were injured or forced into military training during abduction had greater likelihood of probable PTSD. Among female abductees, risk of probable PTSD/depression was elevated if they had experienced two or more abductions, witnessed killing, been sexually abused, or given as a wife in the bush. It has been suggested that LRA returnees carry the dual identity of being victims and perpetrators of war crimes and, as a result, may suffer from complex trauma (Klasen et al., 2015). Many reportedly became targets of domestic and interpersonal violence and thus alienated from their home communities (Klasen et al., 2010; Ovuga et al., 2008). This could explain why never or seldom visiting home displayed independent associations with mental distress among abductees enrolled in our study. At the same time, it is important to acknowledge that the majority of former abductees in our study did not develop chronic mental health symptoms, having lower rates of probable PTSD and depression compared to surveys of abducted children in Northern Uganda during and shortly after the war (Moscardino et al., 2012; Ovuga et al., 2008; Derluyn et al., 2004). Support of caregivers and peers, a shared sense of values within the community, and the ability to find meaning in suffering have been found to promote resilience in war-affected children (Boothby et al., 2006; Werner, 2012).

Our findings underscore the adverse impact of prolonged internal displacement on wellbeing. War-related forced displacement creates a deep sense of insecurity and uncertainty about the future, accompanied by substantial material and emotional losses (Patel, 2012;

Table 4
Final multivariable models for probable depression obtained via stepwise variable selection.

Variable	Level	Females			Males		
		AOR	CI.95%	*P*-value	AOR	CI.95%	*P*-value
District	Gulu	Ref			Ref		
	Amuru	1.10	[0.75;1.62]	0.617	0.85	[0.45;1.57]	0.597
	Nwoya	0.48	[0.31;0.74]	<0.001	1.04	[0.54;2.02]	0.904
Age (years)		1.04	[1.02;1.06]	<0.001	0.98	[0.95;1.01]	0.229
Ethnicity	Acholi	Ref					
	Other tribes	0.54	[0.29;1.01]	0.052			
Current marital status	Not married						
	Married						
Community displacement status	Permanent				Ref		
	Transient				1.95	[1.07;3.55]	0.029
	Displaced				2.12	[0.95;4.71]	0.067
Felt safety in community	Very safe	Ref					
	Moderately safe	1.32	[0.96;1.83]	0.092			
	Not safe at all	3.79	[1.88;7.63]	<0.001			
Number of camps lived in	0	Ref			Ref		
	1	0.87	[0.58;1.32]	0.526	0.50	[0.23;1.10]	0.086
	2+	1.46	[0.92;2.31]	0.108	0.88	[0.39;1.99]	0.764
≥10 traumatic events	No	Ref			Ref		
	Yes	2.80	[1.87;4.18]	<0.001	5.54	[3.03;10.12]	<0.001
Ill health without medical care	No	Ref			Ref		
	Yes	1.92	[1.40;2.64]	<0.001	2.27	[1.33;3.87]	0.003
HIV	Negative	Ref					
	Positive	1.90	[1.29;2.80]	0.001			
Coerced sexual debut[1]	No						
	Yes						
	Never had sex						
War-related rape or sexual abuse[1]	No	Ref					
	Yes	1.58	[1.02;2.45]	0.040			
Physically forced to have sex by partner (past year)[1]	No	Ref					
	Yes	2.45	[1.07;5.63]	0.034			
	Never had sex	0.55	[0.28;1.09]	0.087			

[1] Analyzed for females only due to small cell counts among males.

Nuttman-Shwartz et al., 2011). In the context of Northern Uganda, the lack of access to ancestral land during the war had kept people from engaging in agricultural production, contributing to dysfunctional behaviours (e.g. drinking, gambling, involvement in promiscuous relationships) and a gradual breakdown of Acholi culture (McElroy et al., 2012). As resettling began after the war, elders and persons with disabilities were frequently left behind in IDP camps with no homesteads to return to (Patel, 2012). Many families had no choice but to move back and forth between transit camps and home villages (Patel, 2012). It is notable that female abductees in our study experienced greater housing-related vulnerabilities than male abductees, and those residing in a youth-headed household were more likely to experience probable PTSD and depression. Such gender disparity in housing could be attributed to the norm in Acholi culture that sons inherit land from their fathers, while land ownership is commonly denied to daughters (Kobusingye, 2018). On the other hand, female abductees who endured wartime sexual violence might have avoided returning home out of fear of stigmatization and rejection, especially those who had borne children in the bush (Patel et al., 2013; Atim et al., 2018). Evidence shows that child/youth-headed households in Uganda face a myriad of daily difficulties including frequent illnesses, fear of abuse or property theft, thwarted educational opportunities, and substandard living conditions (Satzinger et al., 2012; Collins et al., 2016). Given our findings, continued investment is needed to assist local residents with rebuilding homesteads, resolve post-conflict land disputes, and ensure safe, stable housing for vulnerable community members (Nuttman-Shwartz et al., 2011). As well, we recognize the enormous value of reviving pre-war agricultural lifestyle to help the Acholi people restore communal work

and cultural connectedness (McElroy et al., 2012).

Our study indicates a higher prevalence of probable PTSD and depression among conflict-affected women than men, affirming what has been widely demonstrated in the literature (Ditlevsen and Elklit, 2012; Tolin and Foa, 2008). Some suggest that higher rates among women may be explained by greater exposure to high-impact trauma such as war-related sexual assault, a tendency toward internalizing symptoms, emotion-focused versus problem-focused coping, and sex-differentiated neurobiological mechanisms involving oxytocin (Ainamani et al., 2020; Olff, 2017). The gender disparity in mental health observed in this study must be understood within the context of widespread sexual violence against women during the 20-year war. Women in our study who reported coerced sexual debut and/or were sexually abused were more likely to experience probable PTSD and depression in bivariate analysis; sexual abuse in the context of war retained significance in the final multivariable model with probable depression. These results lend support to evidence indicating that early sexual trauma has severe consequences on long-term health (Amone-P'Olak et al., 2016; Maniglio, 2009; Kinyanda et al., 2010). Narrative exposure therapy, trauma-focused cognitive-behavioural therapy, psychoeducation, and group therapies have shown efficacy in mitigating psychological harms of war-related sexual violence (Amone-P'Olak et al., 2018; Ainamani et al., 2020).

Despite the small percentage of women reporting intimate partner violence (IPV) in our study, those who had been physically forced to have sex by their partner were more likely to experience probable depression. Established research addressing IPV in conflict-affected settings suggests that exposure to war may cause emotional

Table 5

Comparison of baseline characteristics of former abductees by gender.

	Male (N = 283)	Female (N = 320)	Total (N = 603)	P-value
District				0.899
Gulu	122 (43.1%)	141 (44.1%)	263 (43.6%)	
Amuru	91 (32.2%)	105 (32.8%)	196 (32.5%)	
Nwoya	70 (24.7%)	74 (23.1%)	144 (23.9%)	
Mean Age (years)				0.300
13–19	29 (10.2%)	34 (10.6%)	63 (10.4%)	
20–24	37 (13.1%)	43 (13.4%)	80 (13.3%)	
25–29	50 (17.7%)	80 (25.0%)	130 (21.6%)	
30–34	60 (21.2%)	61 (19.1%)	121 (20.1%)	
35–39	49 (17.3%)	46 (14.4%)	95 (15.8%)	
40–44	37 (13.1%)	29 (9.1%)	66 (10.9%)	
45–49	21 (7.4%)	27 (8.4%)	48 (8.0%)	
Youth-headed household				0.183
No	240 (84.8%)	284 (88.8%)	524 (86.9%)	
Yes	43 (15.2%)	36 (11.2%)	79 (13.1%)	
Frequency of going back home				<0.001
Living at home	106 (37.5%)	81 (25.3%)	187 (31.0%)	
Once a month or more	132 (46.6%)	117 (36.6%)	249 (41.3%)	
Less than once a month	25 (8.8%)	67 (20.9%)	92 (15.3%)	
Never	20 (7.1%)	55 (17.2%)	75 (12.4%)	
Hopeful about returning home permanently[a]				<0.001
No	34 (19.3%)	133 (55.6%)	167 (40.2%)	
Yes	142 (80.7%)	106 (44.4%)	248 (59.8%)	
Number of abductions				0.061
1	171 (60.6%)	217 (68.0%)	388 (64.6%)	
2+	111 (39.4%)	102 (32.0%)	213 (35.4%)	
Age at first abduction				<0.001
<15	97 (34.4%)	189 (60.4%)	286 (48.1%)	
15+	185 (65.6%)	124 (39.6%)	309 (51.9%)	
Longest time spent in captivity				0.007
< 2weeks	120 (43.0%)	171 (54.3%)	291 (49.0%)	
≥2 weeks	159 (57.0%)	144 (45.7%)	303 (51.0%)	
Carried loads in the bush				0.011
No	50 (17.7%)	85 (26.6%)	135 (22.4%)	
Yes	233 (82.3%)	235 (73.4%)	468 (77.6%)	
Beaten in the bush				<0.001
No	113 (39.9%)	184 (57.5%)	297 (49.3%)	
Yes	170 (60.1%)	136 (42.5%)	306 (50.7%)	
Injured in the bush				<0.001
No	129 (45.6%)	193 (60.3%)	322 (53.4%)	
Yes	154 (54.4%)	127 (39.7%)	281 (46.6%)	
Witnessed killing in the bush				0.001
No	121 (42.8%)	179 (55.9%)	300 (49.8%)	
Yes	162 (57.2%)	141 (44.1%)	303 (50.2%)	
Killed others in the bush				<0.001

Table 5 (*continued*)

	Male (N = 283)	Female (N = 320)	Total (N = 603)	P-value
No	244 (86.5%)	306 (95.6%)	550 (91.4%)	
Yes	38 (13.5%)	14 (4.4%)	52 (8.6%)	
Military training in the bush				0.012
No	173 (61.1%)	226 (70.8%)	399 (66.3%)	
Yes	110 (38.9%)	93 (29.2%)	203 (33.7%)	
Sexually abused in the bush				<0.001
No	271 (95.8%)	228 (71.5%)	499 (82.9%)	
Yes	12 (4.2%)	91 (28.5%)	103 (17.1%)	
Given as a wife in the bush				
No		234 (73.4%)		
Yes		85 (26.6%)		
Probable PTSD (HTQ score ≥ 2.00)				<0.001
No	232 (83.5%)	226 (71.1%)	458 (76.8%)	
Yes	46 (16.5%)	92 (28.9%)	138 (23.2%)	
Probable depression (HSCL score ≥ 1.75)				<0.001
No	236 (84.6%)	202 (63.5%)	438 (73.4%)	
Yes	43 (15.4%)	116 (36.5%)	159 (26.6%)	

[a] Among those not living at home.

dysregulation in individuals and sensitize them to subsequent trauma (Breslau and Anthony, 2007; Betancourt et al., 2013). On the other hand, literature suggests that individuals who display PTSD symptoms appear to be at a heightened risk for IPV victimization (Kinyanda et al., 2016; Krause et al., 2006). Taken together, these realities point to the need to establish gender-sensitive mental health programs, such as by recruiting and training female support workers to counsel women regarding the impact of sexual trauma (Liebling et al., 2016). These include addressing relationship and marital stressors and reproductive health (Liebling et al., 2016).

Women living with HIV were more likely to experience probable depression, whereas no such association was found for men. This is deeply concerning given that HIV infection was significantly more prevalent among women than men in our study. It has been demonstrated that HIV and mental health are interrelated via complex bidirectional mechanisms. Trauma-related mental distress leads to HIV vulnerability by suppressing the body's immune function, increasing high-risk behaviours, and impeding HIV treatment initiation and adherence (Sharer and Gutmann, 2011; Koegler and Kennedy, 2018). Conversely, living with HIV is accompanied by chronic stress, stigma, healthcare burden, and neurobiological changes to the brain, all of which can induce or exacerbate mental health conditions (Odokonyero et al., 2015; Koegler and Kennedy, 2018). Women in particular are challenged by biological, social, and economic disadvantages, which may amplify the effects of trauma and HIV (Cuca et al., 2019). In resource-limited settings such as Northern Uganda, integrative HIV services beyond medications are rare despite the high disease burden (Katamba et al., 2020; Koegler and Kennedy, 2018; Bernard et al., 2017). There is an urgent need to scale up HIV programs that provide psychosocial supports such as routine mental health screening and trauma-informed care in consideration of the unique needs of women (Sharer and Gutmann, 2011). The training of lay community workers has been suggested as a potential solution to the shortage of mental health specialists in those settings (Odokonyero et al., 2015).

Table 6

Multivariable models of factors associated with probable PTSD among former abductees ($N = 603$).

Variable	Units	Females			Males		
		AOR	CI.95%	P-value	AOR	CI.95%	P-value
District	Gulu	Ref			Ref		
	Amuru	1.65	[0.90;3.01]	0.106	2.29	[0.99;5.26]	0.052
	Nwoya	0.60	[0.28;1.26]	0.175	1.11	[0.42;2.96]	0.838
Age (years)		1.03	[0.99;1.06]	0.176	1.01	[0.97;1.06]	0.587
Youth-headed household	No	Ref			Ref		
	Yes	2.73	[1.16;6.42]	0.021	2.63	[0.94;7.35]	0.066
Frequency of going back home	Living at home				Ref		
	≥1 per month				0.67	[0.29;1.54]	0.346
	< 1 per month				0.97	[0.24;3.87]	0.967
	never				3.86	[1.10;13.57]	0.035
Abductions	1	Ref					
	2+	1.97	[1.10;3.53]	0.022			
≥ 2 weeks spent in captivity	No						
	Yes						
Injured in the bush	No				Ref		
	Yes				2.75	[1.13;6.68]	0.026
Witnessed killing in the bush	No	Ref			Ref		
	Yes	1.69	[0.94;3.05]	0.081	2.75	[0.95;8.01]	0.063
Military training in the bush	No				Ref		
	Yes				2.68	[1.12;6.42]	0.026
Sexually abused in the bush[1]	No	Ref					
	Yes	3.03	[1.66;5.54]	<0.001			
Given as a wife in the bush	No						
	Yes						

[1] Analyzed for females only due to small cell counts among males.

Table 7

Multivariable models of factors associated with probable depression among former abductees ($N = 603$).

Variable	Units	Females			Males		
		AOR	CI.95%	P-value	AOR	CI.95%	P-value
District	Gulu	Ref			Ref		
	Amuru	1.64	[0.92;2.93]	0.093	0.72	[0.30;1.75]	0.469
	Nwoya	0.99	[0.51;1.92]	0.985	0.83	[0.32;2.18]	0.713
Age (years)		1.03	[1.00;1.07]	0.056	0.98	[0.94;1.02]	0.364
Youth-headed household	No	Ref					
	Yes	2.67	[1.17;6.08]	0.020			
Frequency of going back home	Living at home	Ref			Ref		
	≥1 per month	1.36	[0.69;2.68]	0.379	0.48	[0.20;1.16]	0.103
	< 1 per month	2.49	[1.17;5.28]	0.018	1.01	[0.27;3.75]	0.992
	never	1.29	[0.57;2.95]	0.539	6.40	[1.95;20.98]	0.002
Abductions	1						
	2+						
≥ 2 weeks spent in captivity	No	Ref					
	Yes	0.61	[0.32;1.17]	0.138			
Injured in the bush	No				Ref		
	Yes				2.21	[0.92;5.33]	0.078
Witnessed killing in the bush	No	Ref			Ref		
	Yes	2.88	[1.57;5.28]	<0.001	2.56	[0.91;7.21]	0.075
Military training in the bush	No				Ref		
	Yes				2.18	[0.91;5.22]	0.079
Sexually abused in the bush[1]	No						
	Yes						
Given as a wife in the bush	No	Ref					
	Yes	2.40	[1.25;4.63]	0.009			

[1] Analyzed for females only due to small cell counts among males.

Limitations

This study has several limitations. First, it relies on self-reported data that may be subject to recall and reporting bias. Participants may have remembered wartime events inaccurately or underreported them due to emotional pain and sensitivities. In addition, the use of standardized tools might not have captured culture-specific elements of mental health (Betancourt et al., 2009). To our knowledge, the HTQ and HSCL-25 have not been validated in Northern Uganda despite their wide use among conflict-affected populations globally. The lower rates of probable PTSD and depression compared to other studies should be interpreted with caution: some studies have been conducted at different periods of time during or after the war; varying timeframes of symptom assessment; and differences in sampling techniques, psychometric instruments, and cut-off points used (Klasen et al., 2010). Since this study employed cross-sectional data, causality and temporality cannot be established between probable PTSD or depression and identified vulnerability factors. Lastly, we acknowledge that our data was collected after the 2006 Cessation of Hostilities Agreement was signed and may not reflect the present reality in study communities.

Conclusion

This study explored probable PTSD and depression among conflict-affected people in Northern Uganda after two decades of war. Our findings provide further evidence to the intersection of war trauma, forced displacement, sexual violence, and HIV infection in perpetuating psychological distress for IDPs. There is a clear need for trauma-informed mental health care and efforts to rejuvenate the agrarian economy and kin-based structures that had traditionally supported Acholi people's survival, protection, and wellbeing (McElroy et al., 2012). Specifically, we highlight the vulnerabilities of women, whose elevated risk for mental distress needs to be addressed via gender-sensitive programming and community-based actions. We also identified that former abductees of the LRA were at higher risk for mental distress. Previous research has called for interventions that promote abductees' social reintegration and long-term functioning while avoiding stigmatization (Annan et al., 2006; Werner, 2012; Miller and Jordans, 2016). Internationally, there must be more pressure preventing armed groups such as the LRA from recruiting and abusing children, in accordance with the Optional Protocol to the Convention on the Rights of the Child on the Involvement of Children in Armed Conflict (United Nations 2002).

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jmh.2022.100125.

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