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The state of mental health among Ebola virus disease survivors through a cross-sectional study in Sierra Leone

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ABSTRACT

Background The West African Ebola virus disease (EVD) epidemic resulted in >28 000 disease cases and >11 000 fatalities. The unprecedented number of survivors from this epidemic has raised questions about the long-term mental health impacts of EVD survivorship and the capacity to meet these needs.

Objectives Assess the frequency and factors associated with mental health consequences of EVD survivorship in Sierra Leone.

Methods A cross-sectional study of 595 EVD survivors and 403 close contacts (n=998) from Sierra Leone assessed via in-person survey between November 2021 and March 2022. The assessment included validated mental health screening tools (Patient Health Questionnaire-9, PTSD Checklist-5, Alcohol Use Disorders Identification Test, Drug Abuse Screening Test-20) to indicate the presence/absence of disorder. The frequency of each disorder and factors associated with each disorder were assessed.

Findings EVD-associated post-traumatic stress disorder (PTSD) was reported by 45.7% (n=257) of EVD survivors. Moreover, 3.9% (n=22) and 12.0% (n=67) of EVD survivors reported major depression (MD) and substance use, respectively; all mental health outcomes were higher than baseline rates in the region (PTSD: 6%–16%, MD: 1.1%, substance use: 2.2%). PTSD among EVD survivors was associated with acute EVD duration of ≥21 days (adjusted OR, AOR 2.24, 95% CI 1.16 to 4.43), 35–44 years of age (AOR 3.31, 95% CI 1.33 to 8.24; AOR 2.99, 95% CI 1.09 to 8.24) and residential mobility (AOR 4.16, 95% CI 2.35 to 7.35).

Conclusions Concerningly, the levels of mental health disorders among EVD survivors in Sierra Leone remained elevated 6–8 years after recovery.

Clinical implications Results can be used to inform policy efforts and target resources to address mental health in EVD survivors.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Research has shown that in the immediate aftermath of the West African Ebola virus disease (EVD) epidemic, a quarter of EVD survivors met the diagnostic criteria for post-traumatic stress disorder (PTSD) while 5% met criteria for major depressive disorder. However, community supports, including those for mental health provided by aid agencies and charitable organisations, have all but disappeared for the survivor community in Sierra Leone.

WHAT THIS STUDY ADDS

⇒ This is the first long-term follow-up on the mental health of EVD survivors, with surveys conducted in 2021 and 2022. Our findings suggest that levels of major depression remained unchanged compared with the immediate aftermath of the epidemic while the incidence of PTSD has doubled in that time frame. Likewise, we demonstrated that rates of mental health disorders in our sample were three times higher when compared with the general population of Sierra Leone.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ This study identified a community affected by a lack of effective mental healthcare access, trained professionals (eg, psychiatrists, general practitioners, nurses) and culturally sensitive mental health and psychosocial support programmes in partnership with community and spiritual leaders among EVD-affected communities.

BACKGROUND

The 2013–2016 West African Ebola virus disease (EVD) epidemic remains the largest recorded Ebola virus outbreak, with 28 652 cases and 11 325 deaths reported.[1] An estimated 17 000 individuals recovered from EVD during this epidemic, highlighting the importance of not only responding to the acute impact of EVD outbreaks but also its long-term consequences.[2] In Sierra Leone, there were 14 124 cases,[1] the most of all affected countries in West Africa during this outbreak. While Sierra Leone has 3466 registered survivors, it has been estimated the total number could exceed 5000.[2]

The unprecedented number of survivors has raised questions about the long-term health complications of EVD survivorship and

the capacity of local health systems to meet these needs.[3] Past studies have shown that physical symptoms (eg, joint pain, reduced hearing and blurry vision) are associated with significant mental health problems among survivors.[4 5] Unfortunately, many countries affected by EVD often lack mental health and psychosocial support (MHPSS) programmes and trained professionals (eg, psychiatrists, general practitioners, nurses) or do not have the resources to put them in place.[6] From 1991 to 2002, the civil war in Sierra Leone resulted in tens of thousands of civilian fatalities and displaced >2000 000 people, leaving the health system decimated over the course of the civil war.[7] Today, health services remain underdeveloped and fraught with barriers to accessing care.[8 9] While charitable organisations and aid agencies provided supports during these crises, shortages of mental health professionals from chronic underfunding of mental health services left people without continuing support in the aftermath of these crises.[9]

Few studies have assessed the mental health of EVD survivors.[3 10–12] With little is known about demographic associations to the mental health experiences of EVD survivors including whether sex plays a role in those experiencing mental health issues. A recent Amnesty International report found that EVD survivors were still struggling with a range of physical and mental health symptoms and that the COVID-19 pandemic had brought back distressing memories, with some survivors speaking of a 'persistent fear of death'.[9] In Sierra Leone, one of the few studies that assessed the nationwide impact of the EVD epidemic found that one of every five participants reported symptoms that met the diagnostic criteria for post-traumatic stress disorder (PTSD) using the Impact of Event Scale-6.[11 13] Varying levels of reported mental health symptoms by EVD survivors suggest that further investigations are required to better understand the specific mental health impact of the epidemic.[11] No studies have followed up on the mental health outcomes beyond 3 years after the epidemic was declared over leaving a gap in knowledge on the current state of mental health disorders among the survivor population in Sierra Leone as well as what the long-term mental health outcomes of EVD survival are. The aim of this study was to provide the first long-term follow-up on EVD survivor mental health 8 years postrecovery of EVD survivors, providing insight into what the prevalence of mental health is following interventions implemented in the country of Sierra Leone and what factors continue to influence mental health outcomes and substance use among the EVD survivor population in comparison to close contacts.

OBJECTIVES

Using cross-sectional data, this study provides an assessment of the long-term consequences of EVD on the mental health of EVD survivors when compared with close contacts in Sierra Leone in 2022. The main objective was to describe the prevalence of major depression (MD), PTSD, substance use and alcohol use among EVD survivors at the time of assessment 6–8 years after recovery. The second objective was to identify demographic and clinical health factors associated with MD and PTSD in EVD survivors.

METHODS

Study design

Our population of EVD survivors has previously been described in Schindell *et al*.[14] Data were from a national cross-sectional study in Sierra Leone conducted from November 2021 to March 2022. We computed a minimum sample size estimate of 1000 across all districts, based on estimates of the national EVD survivor population in Sierra Leone (n=3000–5000) and accounting for non-responses.[14] Study recruitment and surveying occurred in parallel across all EVD-affected districts (Bo, Bombali, Falaba, Kailahun, Kambia, Karene, Kenema, Koinadugu, Kono, Moyamba, Port Loko, Pujehun, Tonkolili, Western Area Rural and Western Area Urban).[14]

A multistage sampling approach was used, whereby known survivors provided by the Sierra Leone Association of Ebola Survivors were stratified by district and gender followed by random sampling within each district. This multistage sampling method started in the south of the country and moved to the north and finished in the west of Sierra Leone, ending in the Western region. Due to a lack of reliable internet access in many areas, our recruitment team surveyed participants where they translated measures to Krio for those who did not speak English (the most common language after English spoken in Sierra Leone) and assisted those who were unable to read. As shown in our previously published flow chart,[14] we recruited 1247 respondents, with 5 who did not consent, 197 duplicate/no responses, 10 did not meet the age inclusion criteria and 37 did not provide an EVD survivor status for a total of 998 participants included in the study and 824 presented in our analysis here (354 close contacts and 470 survivors).

Participants

Eligibility criteria for EVD survivor participants included providing an EVD discharge card, or certificate from an Ebola treatment centre (ETC) in Sierra Leone between March 2014 and March 2016, as proof of EVD recovery. Eligibility criteria for close contacts included providing proof of being a family member of either an EVD survivor, or of a deceased EVD patient, by providing an EVD discharge card, certificate or a death certificate for their deceased family member. Finally, only those between 18 and 50 years of age were eligible to participate. All participants provided informed consent.

Patient and public involvement

Questionnaires were informed by prior studies of EVD survivors as described previously.[14] EVD survivors were informed about the scope, expected outcomes of the study and their ability to end participation at any time

without any repercussions via a consent disclosure statement, with continuation only occurring for those participants who consented to participate. All research staff who were involved in the collection and analysis of study data had training on ethical conduct for research involving humans and applicable personal and health privacy legislation.

Author reflexivity statement

This study directly addressed ongoing health complications found among individuals living in Sierra Leone who had previously recovered from EVD during the 2014–2016 West African EVD epidemic. Local community members provided advisement for the study, including the participant recruiters and the Sierra Leone Ebola Survivors Association. JBK is a local researcher based in Sierra Leone and provided ongoing advisory support for all recruiters during the study and community engagement. Information from these studies will be communicated to study participants through ongoing partnerships with Ebola survivor association community organisations and through ongoing collaboration with the National Public Health Agency in Sierra Leone. All study data were fully anonymised and are openly available at request from the corresponding authors.

Instruments

Demographics

Sociodemographic and behavioural characteristics included age, sex assigned at birth (female/male), any formal education (yes/no), employment status, survivor status, Ebola survival stigma, marital/relationship status prior to and since EVD, religious affiliation (Christian/Muslim/traditional/other/none), district/province of residence prior to and since EVD, place of residence (city/town/village) and change of residence at the time of the survey. Stigma was assessed as previously described, but briefly, it measured eight different dimensions of stigma.[14] Clinical health factors assessed in the context of mental health included acute EVD length, acute EVD symptoms, acute treatment at an ETC and current sequelae including eye pain, blurred vision, reduced hearing, hypertension, chest pain, abdominal pain, joint pain, headache, memory loss, sleeping issues, fatigue and night sweats.

Patient Health Questionnaire

The Patient Health Questionnaire (PHQ-9) is a nine-item self-administered questionnaire to evaluate depressive symptoms during the preceding 2 weeks.[15] These nine items are directly based on the nine diagnostic criteria for major depressive disorder (MDD) in the Diagnostic and Statistical Manual-Fifth Edition (DSM-5). This instrument serves a dual purpose in that it screens for both the presence of a depressive disorder and assesses symptom severity. Each item of the index is scored on a 4-point Likert scale from 0 (not at all) to 3 (nearly every day), with scores ranging from 0 (no depressive symptoms) to 27 (severe depressive symptoms). A tentative diagnosis of MDD is given if PHQ-9 total score ≥10 (If five or more of the depressive symptom items have been scored at least 2 (ie, more than half the days during the last 2 weeks) and one symptom is anhedonia (depressed mood/lack of interest)).[16] This index had a Cronbach's α of 0.76 demonstrating good internal reliability for this study. This instrument has been previously used and validated for use in sub-Saharan Africa.[15]

PTSD Checklist

The PTSD Checklist (PCL-5) is a 20-item self-report measure that assesses the presence and severity of PTSD symptoms during the previous month. The 20 items directly correspond with the DSM-5 PTSD criteria, assessing intrusion symptoms (eg, nightmares and unwanted memories), avoidance, alterations in negative cognitions and mood, and hyperarousal symptoms (eg, hypervigilance and sleep disturbance) related to having an EVD infection (ie, the index trauma). As such, the measure was used to make a provisional diagnosis of PTSD. Each item of the index is scored on a 5-point Likert scale from 0 (not at all) to 4 (extremely) with total symptom severity scores ranging from 0 to 80. A cut-off score of 33 was used to provide participants with a provisional diagnosis of PTSD.[17] The PCL-5 has a Cronbach's α of 0.97 demonstrating excellent internal reliability for use in our study and has been used in Sierra Leone and other West African populations.[18 19]

Alcohol Use Disorders Identification Test

The Alcohol Use Disorders Identification Test (AUDIT) is a 10-item self-report measure of alcohol use during the past year. Each item is scored on a 5-point Likert scale from 0 (never) to 4 (daily or almost daily) with total frequency scores ranging from 0 to 40. A cut-off score of 8 was used to assess the presence of harmful alcohol use, resulting in a tentative diagnosis of alcohol use disorder.[20] This index had a Chronbach's α of 0.89 demonstrating good internal reliability for use in our EVD population.

Drug Abuse Screening Test

The Drug Abuse Screening Test (DAST-20) is a 20-item self-report measure of drug use (excluding alcohol) during the preceding year.[21] Each item of the index is scored on a binary (yes/no) scale producing a total drug use score between 0 (no drug use) and 20 (severe drug use). A cut-off score of 6 was used to screen for participants with tentative drug use as this level meets DSM-5 criteria for a diagnosis of a substance use disorder.[21 22] This index had a Chronbach's α of 0.95 demonstrating high internal reliability for use in our study.

Statistical analysis

Descriptive statistics were used for reporting continuous (mean/SD or median/IQRs) and categorical variables (frequency/percentages). χ^2 or Fisher's exact tests were used to test associations between independent variables (eg, sociodemographic variables, such as age) and

dependent variables (MD, PTSD, substance use disorder and alcohol use disorder). We report the prevalence of PTSD, depression, substance use and alcohol use disorder in the EVD survivors and close contacts. We then used logistic regression to test the statistically significant psychosocial and health variables for associations with mental health and sex through sex-based stratification. For univariable, bivariate and multivariable analyses, depression, PTSD, substance use disorder and alcohol use disorder were converted into binary outcomes based on their respective cut-off scores (PHQ-9≥10, PCL-5≥33, AUDIT≥8, DAST-20≥6) and presented in comparison to close contacts. Independent variables (ie, demographic and health related variables) with p≤0.1 in bivariate analysis (χ^2 or Fisher's exact test) were used in the univariable logistic regression models computing a crude OR. Variables with p≤0.05 in the univariable models were included in the multivariable logistic regression model determining which factors independently associated with the outcomes. Statistical significance was defined as two-tailed p≤0.05; crude and adjusted ORs (AORs), and 95% CIs are presented here for statistically significant variables.

Stata V.17.0 (StataCorp) was used to perform all analyses. Missing data were minimal, however, when needed for variable analysis in the multivariate logistic regression models pairwise deletion was used to ensure the dataset for assessed variables was complete. Authors had access to the fully anonymised version of the dataset.

RESULTS

Participant characteristics

Here, we included 824 participants in the study, with 470 (57.0%) EVD survivors and 354 (43.0%) close contacts, with the total participant demographics included in table 1. The median age of EVD survivors was 30 years at survey administration (IQR=25–40) and the median duration of EVD was 21 days (IQR=9–24) (online supplemental table A). The majority of EVD survivors were treated in an ETC (68.7%, n=323), and 27.4% (n=129) were treated in the hospital with a further 3.9% (n=18) treated at other locations. Approximately, half of EVD survivors reported experiencing stigma at the time of the survey (54.7%, n=257).

Table 1 Demographics of participants by EVD survival status

	Close contacts (n=354)		EVD survivors (n=470)		Total		P value
Biological sex							<0.001
Male	223	63.0%	232	49.4%	455	55.2%	
Female	131	37.0%	238	50.6%	369	44.8%	
Age group							0.090
<20	20	5.6%	42	8.9%	62	7.5%	
20–24	36	10.2%	61	13.0%	97	11.8%	
25–29	63	17.8%	88	18.7%	151	18.3%	
30–34	88	24.9%	100	21.3%	188	22.8%	
35–39	71	20.1%	66	14.0%	137	16.6%	
40–44	37	10.5%	61	13.0%	98	11.9%	
45+	39	11.0%	52	11.1%	91	11.1%	
Education							0.572
No	207	58.2%	284	60.4%	491	59.6%	
Yes	147	41.8%	186	39.6%	333	40.4%	
Employment							<0.001
No	146	41.4%	402	85.5%	548	66.5%	
Yes	208	58.6%	68	14.5%	275	33.5%	
Provinces							<0.001
Northern	11	3.1%	46	9.8%	57	6.9%	
Eastern	130	36.9%	182	38.7%	312	37.9%	
Southern	69	19.6%	99	21.1%	168	20.4%	
Western	92	26.1%	84	17.9%	176	21.4%	
North West	52	14.2%	59	12.6%	111	13.4%	

EVD, Ebola virus disease.

Table 2 Mental health of respondents by EVD survivor status

	Close contact (n=354)		EVD survivor (n=470)		Total		P value
PTSD							
No PTSD	N/A	N/A	249	53.0%	249	53.0%	
PTSD	N/A	N/A	221	47.0%	221	47.0%	
Depression							0.017
No depressive symptoms	350	98.9%	452	96.2%	802	97.3%	
Depressive symptoms	4	1.1%	18	3.8%	22	2.7%	
Drug use							<0.001
No drug use	346	97.8%	424	90.2%	770	93.4%	
Drug use	8	2.2%	46	9.8%	54	6.6%	
Alcohol use							0.431
Acceptable drinking	344	97.2%	452	96.2%	796	96.6%	
Harmful drinking	10	2.8%	18	3.8%	28	3.4%	

EVD, Ebola virus disease; N/A, not applicable.

Main outcomes

Mental health symptoms among the EVD survivor population and close contacts were assessed and are summarised in table 2. PTSD was reported by 47.0% (n=221) of EVD survivors when EVD was assessed as the index trauma and was the most common mental health issue assessed. 3.8% (n=18) of EVD survivors reported symptoms congruent with MD, compared with 1.1% (n=4) of close contacts (p=0.017). Harmful levels of substance use (excluding alcohol) were reported by 9.8% (n=46) of EVD survivors, compared with 2.2% (n=8) in close contacts (p≤0.001). 3.8% (n=18) reported harmful levels of alcohol use, with 2.8% (n=10) of close contacts (p=0.431) reporting harmful levels of alcohol use. Several demographic variables demonstrated differences in comparison to close contacts. Online supplemental table B explores associations with EVD survival in comparison to close contacts when adjusted for sex, age, province of residence and employment status, demonstrating a significant association with drug use (AOR 4.43, 95% CI 1.85 to 10.61, p≤0.001), but not with MDD or harmful drinking levels.

Table 1 shows demographics when EVD survivors are compared with close contacts. Notably in comparison to close contacts significantly fewer survivors were employed/had an income source (14.5%, n=68, p≤0.001) compared with their close contacts (58.6%, n=207). Online supplemental table C shows that the AOR of survivors to be unemployed is 13.9 (95% CI 9.13 to 21.27, p≤0.001) when compared with close contacts and adjusted for sex, age, province of residence, education and religion. There were also significant differences in the geographical distribution of survivors when compared with close contacts with significantly more close contacts living in the urban capital region (26.1%, n=92) compared with EVD survivors (17.9%, n=84). This difference in province of residence was highlighted in online supplemental table C where EVD survivors were significantly more likely to be living in the Northern (AOR 5.21, 95% CI 2.16 to 12.61, p≤0.001), Eastern (AOR 2.74, 95% CI 1.66 to 4.53, p≤0.001), Southern (AOR 2.57, 95% CI 1.46 to 4.52, p≤0.01) and Northwestern (AOR 2.13, 95% CI 1.13 to 4.02, p≤0.05) regions of the Sierra Leone.

In the fully adjusted model, EVD survivors who were middle-aged (35–39 AOR 3.31, 95% CI 1.33 to 8.24, p≤0.05; 40–44 AOR 2.99, 95% CI 1.09 to 8.24, p≤0.05), were from the Northwestern province (AOR 14.2, 95% CI 3.58 to 56.46, p≤0.001) or had changed their district of residence (AOR 4.16, 95% CI 2.35 to 7.35, p≤0.001) had a higher association with PTSD (table 3).

EVD survivors who had acute EVD of 15 to over 21 days had a greater association with PTSD. Of participants who did not meet the criteria for PTSD, the largest proportion of participants reported acute EVD lasting <7 days (41.0%, n=102) while most participants that met the criteria for PTSD had acute EVD lasting over 21 days (51.6%, n=114). Treatment in an ETC was more common among survivors that met criteria for PTSD (90.5%, n=200, p≤0.001) compared with in hospital (5.9%, n=13, p≤0.001). For survivors who did not meet the criteria for a PTSD diagnosis, 49.4% (n=123) reported treatment in an ETC and 46.6% (n=116) reported treatment in the hospital.

Associations to other mental health-related symptoms were also assessed and are presented in table 4 (adjusted for; sex, age group, stigma, depression, headache, memory loss, sleeping issues, fatigue and night sweats). PTSD is associated with reported stigma (AOR 5.20, 95% CI 2.77 to 9.75, p≤0.001) and headaches (AOR 2.27, 95% CI 1.22 to 4.22, p≤0.01). Depressive symptoms were less common than PTSD symptoms, however, significantly more EVD survivors reported these symptoms that met PTSD symptoms criteria (5.9%, n=15) when compared with those who did not (2.3%, n=7, p=0.047).

Table 3 Demographic associations with PTSD for survivors—crude and adjusted ORs and 95% CI, logistic regression models

	Crude ORs	Adjusted ORs
Sex		
Male	1 (1.00 to 1.00)	1 (1.00 to 1.00)
Female	0.94 (0.67 to 1.31)	1.08 (0.65 to 1.80)
Age group		
<20	1.83 (0.87 to 3.87)	1.23 (0.47 to 3.21)
20–24	1 (1.00 to 1.00)	1 (1.00 to 1.00)
25–29	1.49 (0.80 to 2.78)	1.77 (0.77 to 4.07)
30–34	2.53** (1.38 to 4.65)	1.83 (0.76 to 4.40)
35–39	2.89** (1.51 to 5.53)	3.31* (1.33 to 8.24)
40–44	2.11* (1.08 to 4.12)	2.99* (1.09 to 8.24)
45+	1.27 (0.63 to 2.55)	1.85 (0.69 to 4.99)
Province		
Northern	0.039*** (0.01 to 0.12)	0.33 (0.06 to 1.66)
Eastern	0.24*** (0.14 to 0.41)	0.37 (0.12 to 1.13)
Southern	0.55* (0.31 to 0.97)	1.33 (0.41 to 4.35)
Western	1 (1.00 to 1.00)	1 (1.00 to 1.00)
North West	1.05 (0.52 to 2.10)	14.2*** (3.58 to 56.46)
Change in residence		
No	1 (1.00 to 1.00)	1 (1.00 to 1.00)
Yes	2.12*** (1.50 to 2.99)	4.16*** (2.35 to 7.35)
Education		
No	1 (1.00 to 1.00)	1 (1.00 to 1.00)
Yes	0.68* (0.48 to 0.97)	0.84 (0.46 to 1.53)
Employment		
No	1 (1.00 to 1.00)	1 (1.00 to 1.00)
Yes	0.61* (0.38 to 0.99)	1.08 (0.41 to 2.80)
Religion		
Christian	1.81*** (1.27 to 2.58)	1.54 (0.92 to 2.57)
Muslim	1 (1.00 to 1.00)	1 (1.00 to 1.00)
Employment since Ebola		
No	1 (1.00 to 1.00)	1 (1.00 to 1.00)
Yes	0.32*** (0.18 to 0.57)	0.17** (0.06 to 0.49)
Observations		472

Exponentiated coefficients; 95% CI in brackets.
*p<0.05, **p<0.01, ***p<0.001.
PTSD, post-traumatic stress disorder.

Table 4 Clinical and mental health associations with PTSD for survivors—crude and adjusted ORs and 95% CI, logistic regression models

	Crude ORs	Adjusted ORs
Sex		
Male	1 (1.00 to 1.00)	1 (1.00 to 1.00)
Female	0.94 (0.67 to 1.31)	0.56* (0.32 to 0.98)
Age group		
<20	1.83 (0.87 to 3.87)	1.53 (0.49 to 4.85)
20–24	1 (1.00 to 1.00)	1 (1.00 to 1.00)
25–29	1.49 (0.80 to 2.78)	0.55 (0.91 to 5.87)
30–34	2.53** (1.38 to 4.65)	2.31 (0.80 to 32.64)
35–39	2.89** (1.51 to 5.53)	1.74 (0.61 to 4.94)
40–44	2.11* (1.08 to 4.12)	0.57 (0.20 to 1.66)
45+	1.27 (0.63 to 2.55)	0.69 (0.22 to 2.23)
Stigma		
No	1 (1.00 to 1.00)	1 (1.00 to 1.00)
Yes	6.21*** (4.27 to 9.03)	5.20*** (2.77 to 9.75)
Depression		
No depressive symptoms	1 (1.00 to 1.00)	1 (1.00 to 1.00)
Depressive symptoms	2.64* (1.06 to 6.58)	1.27 (0.36 to 4.48)
Headache		
No	1 (1.00 to 1.00)	1 (1.00 to 1.00)
Yes	4.33*** (2.92 to 6.43)	2.27** (1.22 to 4.22)
Memory loss		
No	1 (1.00 to 1.00)	1 (1.00 to 1.00)
Yes	0.27* (0.09 to 0.81)	0.41 (0.09 to 1.86)
Sleeping issues		
No	1 (1.00 to 1.00)	1 (1.00 to 1.00)
Yes	47.3*** (28.04 to 79.76)	43.3*** (23.63 to 79.23)
Fatigue		
No	1 (1.00 to 1.00)	1 (1.00 to 1.00)
Yes	2.97*** (1.94 to 4.56)	1.09 (0.53 to 2.23)
Night sweats		
No	1 (1.00 to 1.00)	1 (1.00 to 1.00)
Yes	1.80* (1.06 to 3.07)	0.95 (0.42 to 2.15)
Observations		551

Exponentiated coefficients; 95% CIs in brackets.
*p<0.05, **p<0.01, ***p<0.001.
PTSD, post-traumatic stress disorder.

Sex-based associations of mental health and EVD

Among EVD survivors who reported PTSD, female EVD survivors were more associated with stigma (AOR 6.20, 95% CI 2.76 to 13.93, p≤0.001) (online supplemental table D) and living outside the Western Province compared with male EVD survivors (Northern province AOR 13.8, 95% CI 1.08 to 177.75, p≤0.05; Eastern province AOR 13.0, 95% CI 4.23 to 40.07, p≤0.001; Southern province AOR 24.5, 95% CI 7.82 to 76.81, p≤0.001; Northwestern province AOR 22.9, 95% CI 5.22 to 100.49, p≤0.001) compared with their male counterparts (online supplemental table E). There was no significant association observed among EVD survivors who reported PTSD between female survivors and MD (AOR 2.20, 95% CI 0.61 to 7.94, p≥0.05). Likewise, no significant association was observed between biological sex and PTSD (AOR 1.16, 95% CI 0.73 to 1.82, p≥0.05) when adjusted for

demographics. Differences in the prevalence of mental health problems were found between sexes and among EVD survivors and their close contacts (online supplemental tables F–H). Alcohol use was more prevalent among female EVD survivors (4.8%, n=14) compared with close contacts (0.8%, n=1, p=0.045) however, the same difference was not found between male EVD survivors (4.6%, 12) compared with close contacts (4.1%, n=9, p=0.826). While both male EVD survivors (9.7%, n=25) compared with close contacts (2.7%, n=6, p=0.002) and female EVD survivors (13.6%, n=40) compared with close contacts (1.5%, n=2, p≤0.001) reported increased prevalence of drug use.

DISCUSSION

This paper assesses the prevalence of, and factors associated with, mental health symptoms among EVD survivors in Sierra Leone. Regarding PTSD in EVD survivors, we found that the prevalence of PTSD in our sample (47.0%) was higher than reported in previous studies of EVD survivors in Sierra Leone. In a 2018 study, 27% of EVD survivors met levels of clinical concern for PTSD while 16% met levels of probable PTSD diagnosis; notably, PTSD was assessed using the IES-6 scale, which is a shorter but less robust measure of DSM-V defined PTSD and reduced sensitivity may have affected probable diagnoses.[11 23] A more recent 2020 study of northern Sierra Leone conducted 2 years after the West African epidemic found a PTSD prevalence of 21.8%.[24] While we found that the prevalence of MD (3.8%) was congruent with previously reported levels of MD in EVD survivor populations, though these studies tended to examine the recent aftermath of the epidemic and not at an extended time scale as reported here and only one used the PHQ-9 while the others used the Centre for Epidemiologic Studies-Depression Scale or used self-reported depression.[3 25 26] For example, a study of mental health symptoms experienced by individuals who survived EVD across Sierra Leone, Liberia and Guinea also using the PHQ-9 found that 7.1%, 6.8% and 3.6% of the studied population met criteria for MDD in 2018, respectively.[3] Moreover, a 2018 study using hospital outpatient records of EVD survivors in Liberia found that 13% of survivors had depressive symptoms.[25] Finally, results from the PostEboGui cohort of survivors in Guinea found that 11% met the criteria for depression after a clinical consultation with a psychiatrist.[26] There was one outlier study that found depression in Northern Sierra Leone had a prevalence of 47.2%, however, it should be noted this study used a brief assessment of anxiety and depression (Hospital Anxiety and Depression Scale) which cannot assess MDD as described here with PHQ-9.[24 27] Nonetheless, it is notable that rates of depression have not decreased in the 8 years since the epidemic started. These results suggest a gap in care for EVD survivors, and that future epidemics may also lead to similar mental health symptoms.

Factors associated with the mental health effects of EVD survival have been reported to be wide ranging, including physical health effects seen and experienced by EVD survivors during their acute infection.[28] Previous studies have shown that these physical symptoms are associated with major mental health problems among survivors.[4 5] The physical symptoms associated with EVD (eg, fever, severe headache, muscle pain, weakness, fatigue, diarrhoea, vomiting, abdominal and stomach pain, unexplained haemorrhage) are significant stressors and can contribute mental health of affected individuals.[4 29] Here, we reported associations with both headaches and sleeping issues. Furthermore, EVD survivors with a unit increase in the time spent in the ETC were likely to report a decrease in mental health.[30] Our results agreed with these findings demonstrating that a prolonged duration of acute EVD increased the likelihood of experiencing PTSD. Other risk factors for anxiety depression and PTSD include experience of perceptions of others, mortality, socioeconomic insecurities, stigma and discrimination, all may have been experienced in Sierra Leone by EVD survivors.[11] EVD survivors who experienced a unit increase in Enacted Stigma were more likely to report a decreased level of mental health.[30] We demonstrated in our results that stigma is significantly associated with experiencing PTSD, with a more detailed analysis on this topic available in Schindell *et al*.[14] EVD survivors continue to suffer from psychological distress due to grief resulting from losing loved ones, social exclusion and community stigmatisation.[31 32] Limitations have led to survivors being unemployed, leading to dependence on others and a loss of self-worth particularly among those with advanced age.[10 31 33] We found that although unemployment among EVD survivors is not significantly associated with PTSD it is highly associated with EVD survival and likely a contributor to feelings of self-worth and internalised stigma and other rumination activities negatively affecting mental health.

It is important to look at other viral outbreaks and epidemics to see what can be learnt about the mental health effects that follow the resolution of the outbreaks and epidemics. It has been found that in contrast to our findings here, COVID-19 survivors had no significant association between mental health and length of stay at the COVID-19 treatment centre.[34] A population-based survey in Taiwan revealed 12% prevalence of psychiatric morbidity following SARS.[35] In Singapore, a community-based sample reported a quarter of all respondents had clinical levels of PTSD.[36] Similar to SARS, the 2009 H1N1 pandemic was associated with psychological distress among patients[37] with H1N1. Davtyan *et al* explored similarities between EVD-related and HIV-related stigma and found that many of the same features of HIV-related stigma were shared with EVD-related stigma,[38] similar findings have been separately reported among HIV/AIDS patients, in which internalised stigma was related to lower emotional well-being.[39] We can see that the experience of acute illness and the stigma that comes along with the

illness experienced by the individuals dealing with the infections are predictive of mental health outcomes for survivor and recovered populations.

Clinical implications

Providing access to suitable mental health services to both EVD survivors and the general population in West Africa is a challenge for numerous reasons including, but not limited to mental health expenditure remaining low, with an estimated US$0.02 spent annually per person in Liberia (data is not available for Sierra Leone), and insufficient health staffing, with an estimated 0.02–0.04 psychiatrists and 0.33–6.4 mental health nurses per 100 000 people across the three countries.[40] In, Sierra Leone, as of 2021, there were 3 psychiatrists and approximately 20 mental health nurses in the public workforce for a population of 7 million people,[9] with the majority of EVD survivors unaware of any psychological services, either through government health facilities or non-governmental organisations.[9] Infrastructure to provide specialised services such as psychiatric in-patient care remains insufficient while community stigma surrounding mental health conditions remains a barrier to both accessing and providing care.[41 42] However, efforts are being made to address these, as all three countries have official mental health policies which call for expanded resources for and access to mental health services and psychiatric medications.[40]

The WHO Mental Health Gap Action Programme emphasises improvement of mental health services is a joint responsibility that requires collaboration from governments, health professionals, donors, civil society, communities and families.[43] Countries affected by EVD often lack MHPSS programmes and trained professionals (eg, psychiatrists, general practitioners and nurses) or do not have the resources to put them in place.[6] Resulting in most MHPSS programmes in affected countries externally funded by international organisations.[44] However, the King's Sierra Leone Partnership which was supported by the WHO and was developed and lead by the Government of Sierra Leone, established a nurse-led MHPSS service with inpatient services and an outpatient clinic.[6] Mental health nurses and volunteers from the King's Sierra Leone Partnership trained 14 general nurses in EVD-focused psychological first aid, case identification and referral pathways.[6] The nurses offered a series of half-day well-being workshops on coping with stigma, discrimination, stress and self-care to the healthcare staff of the Connaught Hospital.[6]

Learning from past attempts, future interventions need to include comprehensive strategies that are community lead to ensure buy-in and success. Strategies that should be included in these initiatives include psychoeducation, cognitive techniques, peer support, legislative and policy change at the local and national level all need to be explored to improve EVD survivor mental health and quality of life.[30] Cognitive–behavioural therapy and interpersonal therapy should also be explored as part of mental healthcare interventions for subsequent outbreaks and for those who survived previous outbreaks.[24] Anti-stigma interventions can further these efforts in the form of mental health literacy campaigns (implemented by government or non-governmental organisations), peer support and interventions that encourage contact between EVD survivors and the public can help to overcome existing interpersonal divide and foster positive connection and interaction resulting in community reintegration and inclusion.[45]

Limitations

The data used were cross-sectional in nature, and therefore, could not establish a cause-and-effect relationship or analyse changes over time. Although data were collected in standardised validated question sets (PHQ-9≥10, PCL-5≥33, AUDIT≥8, DAST-20≥6), the data were self-reported, and therefore, respondents may have focused on past experiences. This limitation was overcome through framing questions on these question sets in a specific recent time period (in the past 2 weeks or months). We did not directly assess the effects of civil war (1992–2002) on study participants and therefore cannot determine how past history of PTSD in Sierra Leone may have influenced levels of clinical concern detected here. Recruiting close contacts as a control population allowed for matched experiences during the civil war and EVD epidemic as much as possible between the two populations of study. Tentative diagnoses of depression and PTSD could not be validated through clinical consultations. To overcome this limitation, valid and reliable diagnostic tools were used for their sensitivity and specificity in the preliminary diagnosis of mental health and substance use.[3]

Future directions

Future studies should look to expand on the findings presented here to determine causality in the factors associated with EVD-related mental health. Additionally, the assessment of PTSD associated with the civil war should be determined by how it relates to EVD survivors as well as the general population of Sierra Leone. Qualitative assessment should be included in future assessments to add context to individual experiences of mental health to help highlight barriers experienced by survivors and where improvements can be made. Conducting these recommendations as a longitudinal study could help track changes over time.

CONCLUSIONS

Overall, the results presented here underscore the continued mental health issues experienced by EVD survivors in Sierra Leone. Six to eight years after recovery, PTSD was the most prevalent mental health issue EVD survivors were facing. Although there have been a few programmes implemented in Sierra Leone by national organisations (King's Sierra Leone Partnership) and state institutions, more needs to be done to address the

clinical mental health needs of EVD survivors in Sierra Leone. Implementation of intervention programmes using assessments such as the PCL-5 used here are easy to implement and can decrease the burden on the health infrastructure through partnerships with community and spiritual leaders to identify individuals who would benefit from the care resources available. Such assessments of mental health and risk factors for mental illness can also support policy efforts to improve resources to address mental health and inform how resources can be deployed most efficiently in the aftermath of the West African epidemic and possible future outbreaks.

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Patient consent for publication Consent obtained directly from patient(s).

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APPENDIX:

Table A: Demographics of EVD survivors by PTSD Missing data

	No PTSD		PTSD PTSD		Total (n=470)		p-value
Biological Sex							0.518
Male	119	47.8%	113	51.1%	232	49.4%	
Female	130	52.2%	108	48.9%	238	50.6%	
Age Group							0.130
<20	23	9.2%	19	8.6%	42	8.9%	
20-24	38	15.3%	23	10.4%	61	13.0%	
25-29	50	20.1%	38	17.2%	88	18.7%	
30-34	43	17.3%	57	25.8%	100	21.3%	
35-39	32	12.9%	34	15.4%	66	14.0%	
40-44	30	12.0%	31	14.0%	61	13.0%	
45+	33	13.3%	19	8.6%	52	11.1%	
Education							0.059
No	140	56.2%	144	65.2%	284	60.4%	
Yes	109	43.8%	77	34.8%	186	39.6%	
Employment							0.087
No	206	82.7%	196	88.7%	402	85.5%	
Yes	43	17.3%	25	11.3%	68	14.5%	
Provinces							<0.001
Northern	42	16.9%	4	1.8%	46	9.8%	
Eastern	123	49.4%	59	26.7%	182	38.7%	
Southern	43	17.3%	56	25.3%	99	21.1%	
Western	26	10.4%	58	26.2%	84	17.9%	
Northwest	15	6.0%	44	19.9%	59	12.6%	
Ebola Survivor Residence Change							0.047
No	110	44.2%	77	34.8%	187	39.8%	
Yes	139	55.8%	144	65.2%	283	60.2%	
Stigma							<0.001
No	155	62.2%	58	26.2%	213	45.3%	
Yes	94	37.8%	163	73.8%	257	54.7%	
Duration of Acute EVD							<0.001
<7 Days	102	41.0%	0	0.0%	102	21.7%	
7-14 Days	35	14.1%	27	12.2%	62	13.2%	
15-21 Days	36	14.5%	80	36.2%	116	24.7%	
>21 Days	76	30.5%	114	51.6%	190	40.4%	
Acute EVD Symptoms							<0.001
No Symptoms	2	0.8%	0	0.0%	2	0.4%	
1-5 Symptoms	103	41.4%	175	79.2%	278	59.1%	
6-10 Symptoms	134	53.8%	36	16.3%	170	36.2%	
11 to 14 Symptoms	10	4.0%	10	4.5%	20	4.3%	
Ebola Treatment Center							<0.001
No	126	50.6%	21	9.5%	147	31.3%	
Yes	123	49.4%	200	90.5%	323	68.7%	
Hospital							<0.001
No	133	53.4%	208	94.1%	341	72.6%	
Yes	116	46.6%	13	5.9%	129	27.4%	

Table B: Mental health associations with participants by EVD survival status - Crude and Adjusted Odds Ratios (ORs) and 95% Confidence Intervals (95%CI), Logistic Regression Models

	Crude		Adjusted	
Depression				
No Depressive Symptoms	1	[1.00,1.00]	1	[1.00,1.00]
Depressive Symptoms	3.60*	[1.23,10.55]	3.39	[1.00,11.54]
Drug Use				
No Drug Use	1	[1.00,1.00]	1	[1.00,1.00]
Drug Use	5.83***	[2.76,12.29]	4.43***	[1.85,10.61]
Alcohol Use				
Acceptable Drinking	1	[1.00,1.00]	1	[1.00,1.00]
Harmful Drinking	1.69	[0.80,3.94]	1.26	[0.50,3.17]
Observations			898	

Exponentiated coefficients; 95% confidence intervals in brackets
* $p < 0{\cdot}05$, ** $p < 0{\cdot}01$, *** $p < 0{\cdot}001$

Table C: Demographic associations with participants by EVD survival status - Crude and Adjusted Odds Ratios (ORs) and 95% Confidence Intervals (95%CI), Logistic Regression Models

	Crude		Adjusted	
Sex				
Male	1	[1.00,1.00]	1	[1.00,1.00]
Female	1.94***	[1.48,2.55]	1.57*	[1.10,2.25]
Age Group				
<20	1.11	[0.58,2.15]	1.15	[0.55,2.44]
20-24	1	[1.00,1.00]	1	[1.00,1.00]
25-29	0.77	[0.47,1.28]	1.79	[0.94,3.43]
30-34	0.61*	[0.37,0.99]	1.65	[0.87,3.12]
35-39	0.54*	[0.32,0.90]	1.51	[0.79,2.87]
40-44	0.91	[0.52,1.59]	3.38**	[1.60,7.17]
45+	0.79	[0.45,1.38]	3.20**	[1.49,6.88]
Province				
Northern	5.12***	[2.51,10.45]	5.21***	[2.16,12.61]
Eastern	1.80**	[1.25,2.59]	2.74***	[1.66,4.53]
Southern	2.12***	[1.40,3.20]	2.57**	[1.46,4.52]
Western	1	[1.00,1.00]	1	[1.00,1.00]
North West	1.41	[0.88,2.26]	2.13*	[1.13,4.02]
Education				
No	1	[1.00,1.00]	1	[1.00,1.00]
Yes	0.91	[0.70,1.20]	1.52*	[1.03,2.24]
Employment				
No	8.21***	[5.98,11.27]	13.9***	[9.13,21.27]
Yes	1	[1.00,1.00]	1	[1.00,1.00]
Religion				
Christian	0.56***	[0.42,0.73]	0.72	[0.51,1.03]
Muslim	1	[1.00,1.00]	1	[1.00,1.00]
Yes	1	[1.00,1.00]	1	[1.00,1.00]
No	1	[1.00,1.00]	1	[1.00,1.00]
Yes	0.96	[0.09,10.71]	1.24	[0.54,2.83]
Observations			828	

Exponentiated coefficients; 95% confidence intervals in brackets
* $p < 0{\cdot}05$, ** $p < 0{\cdot}01$, *** $p < 0{\cdot}001$

Table D: Clinical and mental health associations with sex for survivors reporting PTSD - Crude and Adjusted Odds Ratios (ORs) and 95% Confidence Intervals (95%CI), Logistic Regression Models

	Crude		Adjusted	
Age Group				
<20	1.18	[0.37,3.77]	1.85	[0.48,7.20]
20-24	1	[1.00,1.00]	1	[1.00,1.00]
25-29	2.36	[0.85,6.61]	1.43	[0.45,4.58]
30-34	0.85	[0.33,2.20]	0.83	[0.28,2.45]
35-39	2.16	[0.79,5.84]	1.48	[0.48,4.59]
40-44	0.89	[0.31,2.52]	0.46	[0.14,1.51]
45+	1.40	[0.45,4.35]	0.69	[0.18,2.65]
Stigma				
No	1	[1.00,1.00]	1	[1.00,1.00]
Yes	5.05***	[2.60,9.82]	6.20***	[2.76,13.93]
Depression				
No Depressive Symptoms	1	[1.00,1.00]	1	[1.00,1.00]
Depressive Symptoms	1.87	[0.62,5.64]	2.20	[0.61,7.94]
Headache				
No	1	[1.00,1.00]	1	[1.00,1.00]
Yes	2.22*	[1.13,4.33]	1.28	[0.59,2.75]
Memory Loss				
No	1	[1.00,1.00]	1	[1.00,1.00]
Yes	1	[1.00,1.00]	1	[1.00,1.00]
Sleeping Issues				
No	1	[1.00,1.00]	1	[1.00,1.00]
Yes	1.24	[0.53,2.93]	1.06	[0.39,2.84]
Fatigue				
No	1	[1.00,1.00]	1	[1.00,1.00]
Yes	1.97*	[1.14,3.42]	1.05	[0.57,1.95]
Night Sweats				
No	1	[1.00,1.00]	1	[1.00,1.00]
Yes	1.81	[0.88,3.74]	1.24	[0.54,2.83]
Observations			248	

Exponentiated coefficients; 95% confidence intervals in brackets
* $p < 0{\cdot}05$, ** $p < 0{\cdot}01$, *** $p < 0{\cdot}001$

Table E: Demographic associations with sex for survivors reporting PTSD - Crude and Adjusted Odds Ratios (ORs) and 95% Confidence Intervals (95%CI), Logistic Regression Models

	Crude		Adjusted	
Age Group				
<20	1.18	[0.37,3.77]	2.27	[0.44,11.77]
20-24	1	[1.00,1.00]	1	[1.00,1.00]
25-29	2.36	[0.85,6.61]	1.10	[0.28,4.42]
30-34	0.85	[0.33,2.20]	0.78	[0.20,3.12]
35-39	2.16	[0.79,5.84]	1.14	[0.35,5.77]
40-44	0.89	[0.31,2.52]	0.33	[0.07,1.47]
45+	1.40	[0.45,4.35]	0.39	[0.08,1.83]
Province				
Northern	6.25	[0.77,50.90]	13.8*	[1.08,177.75]
Eastern	8.14***	[3.40,19.50]	13.0***	[4.23,40.07]
Southern	14.5***	[5.90,35.58]	24.5***	[7.82,76.61]
Western	1	[1.00,1.00]	1	[1.00,1.00]
Northern	12.5***	[0.52,2.10]	22.9***	[5.22,100.49]
Change in Residence				
No	1	[1.00,1.00]	1	[1.00,1.00]
Yes	0.42**	[0.24,0.72]	0.93	[0.38,2.30]
Education				
No	1	[1.00,1.00]	1	[1.00,1.00]
Yes	0.75	[0.45,1.26]	0.51	[0.22,1.20]
Employment				
No	1	[1.00,1.00]	1	[1.00,1.00]
Yes	1.15	[0.53,2.49]	1.62	[0.43,6.05]
Religion				
Christian	0.67	[0.40,1.12]	1.52	[0.76,3.03]
Muslim	1	[1.00,1.00]	1	[1.00,1.00]
Employment Since Ebola				
No	1	[1.00,1.00]	1	[1.00,1.00]
Yes	1.30	[0.48,3.54]	0.55	[0.11,2.80]
Observations			226	

Exponentiated coefficients; 95% confidence intervals in brackets
* $p < 0{\cdot}05$, ** $p < 0{\cdot}01$, *** $p < 0{\cdot}001$

Table F: Mental health of female participants by EVD survival

	Close Contacts (n=130)		EVD Survivors (n=294)		Total		p-value
Age Group							0.851
<20	10	7.7%	24	8.2%	34	8.0%	
20-24	16	12.3%	43	14.6%	59	13.9%	
25-29	28	21.5%	58	19.7%	86	20.3%	
30-34	28	21.5%	60	20.4%	88	20.8%	
35-39	25	19.2%	44	15.0%	69	16.3%	
40-44	12	9.2%	30	10.2%	42	9.9%	
45+	11	8.5%	35	11.9%	46	10.8%	
Provinces							0.003
Northern	3	2.3%	23	7.8%	26	6.1%	
Eastern	55	42.3%	119	40.5%	174	41.0%	
Southern	32	24.6%	95	32.3%	127	30.0%	
Western	16	12.3%	12	4.1%	28	6.6%	
North West	24	18.5%	45	15.3%	69	16.3%	
Depression							0.165
No Depressive Symptoms	128	98.5%	280	95.2%	408	96.2%	
Depressive Symptoms	2	1.5%	14	4.8%	16	3.8%	
Drug Use							≤0.001
No Drug Use	128	98.5%	254	86.4%	382	90.1%	
Drug Use	2	1.5%	40	13.6%	42	9.9%	
Alcohol Use							0.045
Acceptable Drinking	129	99.2%	280	95.2%	409	96.5%	
Harmful Drinking	1	0.8%	14	4.8%	15	3.5%	

Table G: Mental health of male participants by EVD status

	Close Contacts (n=222)		EVD Survivors (n=259)		Total		p-value
Age Group							0.068
<20	10	4.5%	23	8.9%	33	6.9%	
20-24	20	9.0%	32	12.4%	52	10.8%	
25-29	35	15.8%	45	17.4%	80	16.6%	
30-34	58	26.1%	51	19.7%	109	22.7%	
35-39	46	20.7%	37	14.3%	83	17.3%	
40-44	25	11.3%	41	15.8%	66	13.7%	
45+	28	12.6%	30	11.6%	58	12.1%	
Provinces							0.010
Northern	8	3.6%	29	11.2%	37	7.7%	
Eastern	75	33.8%	97	37.5%	172	35.8%	
Southern	37	16.7%	40	15.4%	77	16.0%	
Western	76	34.2%	73	28.2%	149	31.0%	
North West	26	11.7%	20	7.7%	46	9.6%	
Depression							0.116
No Depressive Symptoms	220	99.1%	251	96.9%	471	97.9%	
Depressive Symptoms	2	0.9%	8	3.1%	10	2.1%	
Drug Use							0.002
No Drug Use	216	97.3%	234	90.3%	450	93.6%	
Drug Use	6	2.7%	25	9.7%	31	6.4%	
Alcohol Use							0.826
Acceptable Drinking	213	95.9%	247	95.4%	460	95.6%	
Harmful Drinking	9	4.1%	12	4.6%	21	4.4%	

Table H: Mental health reports of EVD survivors by biological sex.

	Biological Sex						
	Male (n=260)		Female (n=296)		Total		p-value
Stigma							0.011
No	135	51.9%	121	40.9%	256	46.0%	
Yes	125	48.1%	175	59.1%	300	54.0%	
PTSD							0.733
No PTSD	139	53.5%	163	55.1%	302	54.3%	
PTSD	121	46.5%	133	44.9%	254	45.7%	
Depression							0.386
No Depressive Symptoms	252	96.9%	282	95.3%	534	96.%	
Depressive Symptoms	8	3.1%	14	4.7%	22	4.0%	
Drug Use							0.148
No Drug Use	235	90.4%	255	86.1%	490	88.1%	
Drug Use	25	9.6%	41	13.9%	66	11.9%	
Alcohol Use							1.000
Acceptable Drinking	248	95.4%	282	95.3%	530	95.3%	
Harmful Drinking	12	4.6%	14	4.7%	26	4.7%	