Prevalence of ICD-11 Disorders Specifically Associated with Stress in Africa: A Cross-Country Comparison of Kenya, Nigeria and Ghana

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ACKNOWLEDGMENT

The study was funded by an internal research grant awarded to Professor Ben-Ezra from Ariel University RA1700000037.

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Psychiatric screening based on ICD-11 Disorders Specifically Associated with Stress: A cross-country comparison of Kenya, Nigeria and Ghana

Summary

Background The Global Forum for Health Research, with the support of the World Health Organization, highlighted the need to prioritize mental health research in Africa. The introduction of revised descriptions of Posttraumatic Stress Disorder (PTSD) and Adjustment Disorder, along with new diagnoses of Complex PTSD and Prolonged Grief Disorder, in the ICD-11 creates a need for additional national level epidemiological studies on the prevalence of stress-related disorders.

Methods The prevalence rates of these four ICD-11 stress disorders were assessed in three African countries including Nigeria (N = 1006), Kenya (N = 1018), and Ghana (N = 500). Participants completed disorder-specific measures for each disorder.

Findings Across the entire sample, the current prevalence rate of probable Adjustment Disorder was 8.4% (95% C.I. = 7.4%, 9.6%), probable PTSD was 18.6% (95% C.I. = 17.2, 20.2%), probable Complex PTSD was 15.9% (95% C.I. = 14.5%, 17.4%) and probable Prolonged Grief Disorder was 3.7% (95% C.I. = 3.1%, 4.5%).

Interpretation The results are applicable primarily to well-educated urban and suburban adults in these African countries. Results indicated that Adjustment Disorder, PTSD, and CPTSD are highly prevalent in these three African countries. There is now a pressing need to develop culturally sensitive interventions to enable recovery from these conditions.

Funding: The study was funded by Ariel's University research authority internal Fund.

Keywords: ICD-11; Stress Disorders; Adjustment Disorder; Post Traumatic Stress Disorder; PTSD; Complex PTSD; Prolonged Grief Disorder; African Countries; Epidemiology

Introduction

In 2009, the Global Forum for Health Research (GFHR), with the support of the World Health Organization (WHO), emphasized the need for research in Africa to determine the prevalence of different psychiatric disorders[1]. Nearly half (43.9%) of all mental health professionals identified mental health disorders that occur within the context of traumatic life events being the top priority for empirical research[1].

In 2018, the WHO published the 11th version of the *International Classification of Diseases* (ICD-11). The ICD-11 is used by all United Nations member states to track the prevalence rates of mental and physical disorders worldwide[2]. ICD-11 includes a collection of disorders specifically associated with exposure to stressful or traumatic life events including Adjustment Disorder (AjD), Posttraumatic Stress Disorder (PTSD), Complex PTSD (CPTSD), and Prolonged Grief Disorder (PGD) (See Figure 1). CPTSD and PGD are new additions to ICD-11 while PTSD and AjD criteria have been revised markedly from the ICD-10. It is imperative, therefore, that population-based studies are conducted across the world to estimate the current prevalence rates of these conditions. Such research is in its infancy, but preliminary population-based studies indicate that 11.6% of the Israeli adult population[3], 2.0% of the German adult population[4], and 7.2% of the United States adult population[5] qualify for a diagnosis of PTSD or CPTSD. Very few studies have examined the prevalence rates of AjD and PGD. In Germany, 2.0% of the adult population met the diagnostic criteria for AjD[6]. This rate is lower in comparison to an Israeli study which reported a prevalence rate of 17.8% of AjD[7], likely due to the fact that in Israel this rate was not adjusted for the presence of other stress-related disorders. For PGD, the only national representative study was conducted in Israel and reported a prevalence rate of 2.0%[7].

Studies examining the prevalence of stress-related disorders on the African continent are scarce[1,8]. Notable exception are studies conducted by the World Mental Health Survey Initiative which identified a lifetime PTSD operationalized in terms of the diagnostic criteria of the fourth edition of the *Diagnostic and Statistical Manual for Mental Disorders*[9]) prevalence rate of 3.5%[10] in South Africa. In addition, another study conduced by the World Mental Health Survey Imitative in Nigeria and other countries assessed the prevalence of at least one traumatic event with prevalence rates divide to three main categories (less of 55%, between 55%-70% and above 70%) (Benjet et al., 2016).

Another study from 2001, targeting post-conflict settings, found a prevalence rate of 15.8% in Ethiopia (refugee camps), 17.8% in the Gaza strip (community sample), 28.4% in Cambodia (returnees from the Thailand border refugee camps and community samples) and 37.4% in Algeria (settled community)[11]. No study, to date, has explored the prevalence of AjD or PGD in the African countries namely Nigeria, Kenya and Ghana. Additionally, no study in the world has explored the prevalence of all ICD-11 stress disorders in a single study. We aimed to fill this gap in the literature by examining the current prevalence rates of all *ICD-11* stress-related disorders (AjD, PTSD, CPTSD, and PGD) among nationally representative samples drawn from three African countries; Nigeria, Kenya, and Ghana.

[Insert Figure 1 about here]

Methods

Procedure

Before commencing the study have delineated several methodological constraints in order to obtain a meaningful sample. 1st: The intent panels should be large enough for conducting sampling based on the country's census. 2nd: The chosen countries have to be with high internet penetration and English proficiency. 3rd: The internet panel company must abide ESOMAR guidelines for intent panels (https://www.esomar.org/uploads/public/knowledge-and-standards/codes-and-guidelines/ICCESOMAR_Code_English_.pdf). Following the above, the chosen countries were: Nigeria, Kenya & Ghana.

Participants

This study included a total of 2,524 participants drawn from Nigeria (n = 1,006), Kenya (n = 1,018), and Ghana (n = 500). Each national sample was approximately a representative of the population based on comparison to Age and Sex in the African countries' census. However, the internet cohort panels themselves are not representative of the population. The samples were obtained via an internet panel of 26,500 Nigerians, 20,800 Kenyans, and 12,500 Ghanaians. The response rates for each sample were 23.0% (Nigeria), 34.0% (Kenya), and 33.0% (Ghana). In order to maintain a close approximation of representativeness in terms of census data on age and sex in each country, each sample was drawn from the panel using stratified and random probability sampling methods. Following ethical approval from the researchers' university (MBE), potential participants were invited to participate in the study via email. Each participant

signed an electronic informed consent document before accessing the questionnaire. Eligibility for participation included citizenship of one of the aforementioned countries, being aged 18 years or older at the time of the survey and possessing English proficiency sufficient to complete the surveys. Demographic details for each sample are presented in Table 1.

[Insert Table 1 about here]

Measurements

Adjustment disorder was measured using the Adjustment Disorder New Module (ADNM-20)[12,13] which consists of a list and a 20-item scale. The ADMN-20 includes two components: (a) a list of 16 common stressors (e.g. divorce, moving home, conflict with neighbors, serious illness), and (b) a list of 20 symptoms of which 19 items measure AjD symptoms and one item measures functional impairment. For the purposes of the current study, eight items were used which reflect the core symptoms associated with the ICD-11 description of AjD. These two symptom clusters are 'Preoccupations with the stressor' and 'Failure to adapt', each measured by four items. One item was used to assess functional impairment. All symptoms were answered using a four-point Likert scale indicating how frequently each symptom was experienced (1 = never, to 4 = often). Diagnosis of AjD is made if an individual identifies a stressful life event, and there is one symptom rated ≥ 3 and at least two items rated ≥ 2 in both symptom clusters, and a rating ≥ 3 on the functional impairment criterion. Previous research showed the ADNM-20 scores to have good internal reliability for the total scale (α=.94) and for the different subscales (α =.80–.90)[13]. The internal consistency estimates in the present samples were excellent (Nigerian sample, α = .94; Kenyan sample, α = .95; Ghanaian sample, α = .95; full sample α = .95).

Lifetime Traumatic Exposure was measured using the Life Events Checklist for DSM-5 (LEC-5)[14], a 16-item self-report measure designed to screen for potentially traumatic life events (e.g., natural disaster, physical assault, life threatening illness/injury). For each item, respondents indicate whether they were directly exposed to the event (1 = Yes) or not (0 = No). A summed total can be calculated to represent the number of different traumatic life events ranging from 0 to 16.

PTSD and CPTSD symptoms were measure using the International Trauma Questionnaire (ITQ[15]). The ITQ includes six PTSD items and six `Disturbances in Self-

Organization' (DSO) items. The PTSD symptom clusters of re-experiencing in the here and now, avoidance, and sense of threat are measured using two items each. There are three items measuring functional impairment associated with these symptoms. The DSO symptom clusters of affective dysregulation, negative self-concept, and disturbances in relationship are measured by two items each. Additionally, three items measure functional impairment with these symptoms. The internal consistency estimates (Nigerian sample, α = .93; Kenyan sample, α = .93; Ghanaian sample, α = .92; full sample, α = .93) of the ITQ in this study were excellent.

PTSD items are answered in terms of how much one has been bothered by each symptom in the past month, and the DSO items are answered in terms of how one typically responds. All items were answered using a five-point Likert scale ranging from 'Not at all' (0) to 'Extremely' (4). Following standard practice in trauma research[16,17], scores ≥2 ('Moderately') were used to indicate the presence of a symptom. Diagnosis of PTSD requires traumatic exposure, the endorsement of one of two symptoms from each PTSD cluster, and endorsement of functional impairment associated with these symptoms. Diagnosis of CPTSD requires trauma exposure, the endorsement of one of two symptoms from each of the six PTSD and DSO clusters, plus endorsement of functional impairment associated with both sets of symptoms. The ICD-11 taxonomic structure dictates that a person may only receive a diagnosis of PTSD or CPTSD, but not both.

PGD symptoms were measured by the Inventory of Complicated Grief-Revised (ICG-R)[18]. The ICG-R identifies if a person has ever experienced a bereavement, and how long age the bereavement occurred. Seven items measure each ICD-11 PGD symptom and one item that measures functional impairment associated with these symptoms. Based on previous research,[18] a symptom was considered present if rated "4" or "5", and absent if rated "1", "2" or "3" on its five-point scale. The diagnostic algorithm requires the presence of one of two 'core' symptoms (ICG-R1 and ICG-R2) and three of five 'accessory' symptoms (ICG-R3 to ICG-R7).[18-20]

The internal consistency estimates (Nigerian sample, α = .91; Kenyan sample, α = .92; Ghanaian sample, α = .91; full sample, α = .91).

Statistical analysis

The analytic plan for the current study included four steps. First, the prevalence rates of AjD, PTSD, CPTSD and PGD were calculated and compared across the three countries with

95% Confidence Interval (C.I)[22,23]. Based on the ICD-11 diagnostic guideline, and in order to prevent illusionary comorbidity and inflated prevalence rates, a diagnostic hierarchy was used in this study. Namely, AjD is considered to be the gate for stress disorders in the ICD-11 followed by more severe stress-related conditions. Therefore, a person who met the diagnostic criteria of AjD and a more severe disorder (i.e. PTSD, CPTSD or PGD) was only diagnosed with the most severe condition. Moreover, if a person met the diagnostic criteria of PTSD and CPTSD, the diagnosis that was rendered was CPTSD. Second, a comparison for each country and each condition (AjD, PTSD, CPTSD, PGD) was conducted using Kolmogorov-Smirnov Z Statistic[24]. Third, logistic regression was used to examine the associations between each stressful and traumatic life event and each stress-related disorder (AjD, PTSD, CPTSD, PGD) using odds ratio (OR) and 95% C.I. Fourth, a comparison between prevalence rates of stressful and traumatic events among the three countries was conducted using the non-parametric test Standard Jonckheere-Terpstra Statistic[25,26].

Results

The most frequently endorsed stressful life events were financial problems (86.6%), followed by death of a loved one (61.6%), too much/too little work (60.0%), unemployment (59.5%), illness of a loved one (59.5%), time related pressures (58.6%) and family conflicts (53.8%). In addition, the following stressful events differed between the African countries. These stressor include moving to a new home (34.7%; Jonckheere-Terpstra Statistic = 2.726; $p < 0.01$), conflicts with the neighbors (28.6%; Jonckheere-Terpstra Statistic = 3.746; $p < 0.001$), assault (20.2%; Jonckheere-Terpstra Statistic = 2.712; $p < 0.01$) and divorce or separation (14.5%; Jonckheere-Terpstra Statistic = 2.644; $p < 0.01$) were significant.

The most common traumatic life event was physical assault (51.8%), followed by motor vehicle accident (42.3%), serious accident at work, home, or during recreational activity (29.8%), unwanted or uncomfortable sexual experience (28.8%), life-threatening illness or injury (26.2%) and natural disasters (25.4%). See online supporting material Table 1a and Table 2a for more information.

The prevalence rate of probable AjD in Nigeria was 5.8% (95% C.I. = 4.5%, 7.4%), in Kenya was 9.5% (95% C.I. = 7.9%, 11.5%), and in Ghana was 9.6% (95% C.I. = 7.3%, 12.5%). The prevalence rate differed significantly the African countries (J-Ta = -3.245; $p <.001$) with the lowest rates reported in Nigeria and the highest rates in Ghana. The prevalence rate of probable

PTSD in Nigeria was 17.4% (95% C.I. = 15.2%, 19.9%), in Kenya was 20.3% (95% C.I. = 18.0%, 22.9%), and in Ghana was 17.6% (95% C.I. = 14.5, 21.2%). Regarding CPTSD, in Nigeria the prevalence rate was 19.6% (95% C.I. = 17.3%, 22.2%), in Kenya was 13.7% (95% C.I. = 11.7%, 16.0%), and in Ghana was 13.0% (95% C.I. = 10.3%, 16.2%). Finally, the prevalence of probable PGD in Nigeria was 4.6% (95% C.I. = 3.4%, 6.0%), in Kenya was 3.4% (95% C.I. = 2.5%, 4.8%), and in Ghana was 2.6% (95% C.I. = 1.5%, 4.4%). See Table 2 for more details.

[Insert Table 2 about here]

No sex differences were found in any of the conditions. For more information See Table 3 for more details.

[Insert Table 3 about here]

Results from the logistic regression analyses revealed that probable PTSD was significantly associated with exposure to natural disasters in Nigeria and Kenya (OR = 1.716 or higher [95% C.I. 1.156-2.547; $p < 0.01$]) and with severe human suffering in Nigeria and Ghana (OR = 2.256 or higher [95% C.I. 1.350-3.770; $p < 0.01$ or lower]). In addition, probable PTSD was significantly associated with serious accident at work, home, or during recreational activity in Nigeria (OR = 1.657 [95% C.I. 1.096-2.504; $p < 0.05$]) and with sexual assault (OR = 2.088 [95% C.I. 1.218-3.579; $p < 0.01$]). However, probable PTSD was significantly associated with physical assault (OR = 1.798 [95% C.I. 1.234-2.620; $p < 0.01$]) and with sudden violent death (OR = 1.931 [95% C.I. 1.048-3.558; $p < 0.05$]) in Kenya. See Table 4 for more details.

[Insert Table 4 about here]

Logistic regression revealed that in each of the African countries probable CPTSD was significantly associated with severe human suffering (OR = 2.074 or higher [95% C.I. 1.261-3.411; $p < 0.01$ or lower]). In addition, probable CPTSD was significantly associated with physical assault in Nigeria and Kenya (OR = 2.320 or higher [95% C.I. 1516-3.551; $p < 0.001$])

and with other unwanted or uncomfortable sexual experience (OR = 1.947 or higher [95% C.I. 1.272-2.979; $p < 0.01$ or lower]). Finally, probable PTSD was significantly associated with sexual assault in Nigeria (OR = 1.688 [95% C.I. 1.044-2.731; $p < 0.05$]) and with life-threatening illness or injury (OR = 1.556 [95% C.I. 1.023-2.367; $p < 0.05$]). In Kenya, probable CPTSD was significantly associated with serious accident at work, home, or during recreational activity (OR = 2.197 [95% C.I. 1.411-3.420; $p < 0.001$]). In Ghana, probable CPTSD was significantly associated with life-threatening illness or injury (OR = 2.275 [95% C.I. 1.134-4.566; $p < 0.05$]). See Table 5 for more details.

[Insert Table 5 about here]

Results of the logistic regression revealed a significant association between probable AjD and conflicts in work-life relations in Nigeria (OR = 1.642 [95% C.I. 1.016-2.653; $p < 0.05$]). In Kenya, probable AjD was significantly associated with family conflicts (OR = 2.025 [95% C.I. 1.057-3.878; $p < 0.05$]). In Ghana, probable AjD was significantly associated with divorce or separation (OR = 2.739 [95% C.I. 1.187-6.319; $p < 0.05$]), unemployment (OR = 2.343 [95% C.I. 1.163-4.722; $p < 0.05$]), moving to a new home (OR = 2.038 [95% C.I. 1.041-3.989; $p < 0.05$) and having a serious illness (OR = 2.030 [95% C.I. 1.002-4.114; $p < 0.05$]). See online supporting material Table 3a for more information.

The results of the logistic regression revealed a significant association of probable PGD with unexpected death of someone close in Nigeria (OR = 3.085 or higher [95% C.I. 1.518-6.268; $p < 0.01$]). See online supporting material Table 4a for more information.

4. Discussion

Our findings show that probable AjD rates are lowest in Nigeria (5.8%) followed by Kenya (9.5%) and Ghana (9.6%). These rates are lower than those found in Israel (17.8%)[27]. However, it is important to note that contrary to the probable AjD rates in Israel which also included cases of probable PTSD, CPTSD, and PGD, the present rates include only probable AjD cases with no other comorbid conditions. According to the ICD-11 hierarchical diagnostic rules, if a person fulfils criteria for two or more diagnoses, they will only be diagnosed with the

most severe diagnosis. AjD is considered the less severe condition, followed by PTSD and CPTSD which is the most severe condition. While the prevalence rates of AjD were low in the present study, they should be viewed as transitory stressors that can change over time. However, this is far less true when considering more debilitating conditions such as PTSD and CPTSD.

PTSD rates in the African countries ranged from 17.4% to 20.3%. These rates are considerably higher when compared with other countries such as Israel (9.0%)[28], Germany (1.5%)[29], and the US (3.4%)[5]. Furthermore, these prevalence rates are more pronounced for CPTSD. While in the African countries the prevalence of CPTSD ranged between 13.0% to 19.6%, the rate in the US was 3.8%[5], in Israel it was 2.6%[28], and in Germany it was 0.5%[29]. These studies used similar instrument as in the current study that are based on the ICD-11.

It is uncertain why prevalence rates of PTSD and CPTSD in these African countries are higher compared to those in Germany, the US, and Israel. It might well be the case that there are higher levels of exposure to stressful and traumatic life events in these African countries compared to the other countries' studies. Using the same methods as presented in the World Mental Health survey in which they looked in at least of exposure to traumatic event (Benjet et la., 2016), the results of their study in comparison to other countries our results reveal that the African countries ranked top in exposure to a least one traumatic event (Nigeria 88.6%; Kenya 89.1%; Ghana 85.2%). These rates put them in line and above with countries with the highest rate of exposure to at least one traumatic event (Ukraine 84.6%; Peru 83.1%; Columbia 82.7% and U.S. 82.7%) for more information on other countries with lower rates (see, Benjet al., 2016).

In the present study, in seven stressful events out of sixteen, the prevalence rate was more than 50%. With regard to traumatic life events, six out sixteen traumatic events had a prevalence rate of over 25%. These events range from traumatic events affecting the individual such as unwanted sexual experiences, physical assault, and life threating illness or injuries, to natural disasters that affect the population at large. Exposure rates to traumatic life events in these African countries are high when comparing these to other nationally representative samples. For example, the rates of exposure to traumatic events in Germany are very low ranging from (0.6%-7.7%)[2]. Further research is required to confirm these findings although high prevalence rates of PTSD and CPTSD in the African countries demonstrate the need for appropriate care to aid recovery from these debilitating conditions[1,8]. Finally, the prevalence rates of PGD in the three

African countries ranged from 2.6% to 4.6%, reasonably similar to what was found in Israel (2.0%)[7].

Considering the prevalence rates of all these disorders collectively, it appears that almost half of the population in the aforementioned African countries have a probable one stress disorder (ranging from probable AjD via PTSD and CPTSD ending at PGD), even when applying the most conservative and stringent diagnostic rules (47.3% of the sample in Nigeria, 47.0% of the sample in Kenya and 42.8% of the sample in Ghana). However, one should take into account that there is a potential cultural bias in both the potential imposing of western views on psychological trauma on non-western countries (Summerfield, 1995). and conducting screening for stress disorders in low resource settings (Kagee et al., 2013). Moreover, as Psychiatry is a European concept along with the clear distinction between somatic illness and mental illness (body mind dualism). These distinctions and concepts are not necessarily valid in other cultures (Gopalkrishnan, 2018). Taking this into account, the study focused only on core symptoms as part of ongoing endeavor to validate the ICD-11 as a global standard measure of mental health.

These findings highlight an urgent need to develop and implement appropriate and effective treatments for stress disorders in the African countries. There is currently little evidence on the effectiveness of existing interventions for these conditions in the African countries' context. These findings highlight the need to strengthen mental health service provision and access[30,31] in the African countries. Poor access to, and lack of adequate mental health services in the African countries will result in poor recovery rates from these mental health problems[8]. Significant financial problems and lack of resources, which are present for many people living in these African countries may compromise the ability to cope with stressful life events and successfully adapt to the hardships of life. Resource theory[32] has taught us that the loss of resources in the face of adversity not only depletes existing resource but also prevents successful coping. Furthermore, the prevalence rates of stress-related disorders observed in the present study will ultimately have an impact on the economy, prosperity, and development of a country in general. There is ample evidence to suggest a significant association between stress, economic crisis, and health costs[33,34].

Several limitations are associated with the present study. Although it is the first study to examine the prevalence rates of the different ICD-11 disorders associated with stress, results may

not be generalizable to other nations. The unique cultural and political context of the African countries impede such generalizations. Our response rates (23.0% in Nigeria, 34.0% in Kenya, 33.0% in Ghana) were low, albeit similar to a previous national sample in Israel (31.0%)[3]. However, the method used in this study was internet sampling which has a higher likelihood of yielding low response rates compared to phone surveys or face-to-face interviews. It is important to highlight that internet studies can adequately provide representative samples of a population based on key demographic factors[35]. Furthermore, the use of a self-report method of symptom endorsement, as opposed to a clinician-administered diagnostic interview, may have overestimated diagnostic rates. Finally, the sample is skewed towards highly educated individuals. Although, high rates of mental health distress were observed in the present study, education itself is a protective factor against mental health distress[36]. Another major limitation is that results are applicable primarily to well-educated urban and suburban adults in these countries. The fact that >90% had attended college (and 99% had at least secondary school education) and 84-93% lived in urban or suburban settings clearly means the results are not applicable to less educated and rural adults. Finally, we have to take into account another potential bias regarding internet access that will be more prevalent among those with higher education, economic status and English proficiency.

There are several avenues for future research. First, there is a need for more epidemiological studies in other countries in the African countries in order to replicate these findings[1,8]. Considering that the ICD-11 is a global initiative of the WHO, epidemiological studies covering more countries across the globe will allow cross-cultural comparisons with regards to mental health distress. Specific focus on disorders associated with stress will enable a better understanding of these conditions across different populations.

Implications for policy and practice

The study may give a rough estimation of the prevalence of stressful and traumatic events along with stress disorders per ICD-11 in African countries. These countries are seldom targeted for large mental health surveys. In this study, we tried to answer the call by the Global Forum for Health Research (GFHR)[1]. The study may imply that policy makers should take into account stressful and traumatic events as impeding forces of flourishing and growth. This stance, should

reflect on clinical practice as well. The aforementioned prevalence may use to devise unorthodox trauma therapy outside the box that is less conventional in Western setting. For example, active outreach along with allying local and tribal healers who should be educated in basic mental health care and a useful interventions and therapy techniques will enable to spread first aid mental health across the African countries by these agents. Moreover, allying with local and tribal healers also will help adapt Western therapy techniques by overcoming cross-cultural barriers. Another option that will be practical is to use the internet as a platform for delivering E-mental health to remote places and further enhance mental health education of local and tribal healers.

ACKNOWLEDGMENT

The study was funded by an internal research grant awarded to Professor Ben-Ezra from Ariel University RA1700000037.

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Table 1. Basic demographics of the study samples

	Nigeria (n = 1006)	Kenya (n = 1018)	Ghana (n = 500)
Age, Mean (SD)	30.15 (8.72)	32.23 (9.36)	28.96 (7.93)
Sex, women, n (%)	501 (49.8)	500 (49.1)	250 (50.0)
Marital status, in committed relationship, n (%)	553 (55.0)	565 (55.5)	228 (45.6)
Employment, n (%)			
Not employed, not seeking work	65 (6.5)	78 (7.7)	41 (8.2)
Not employed, seeking work	318 (31.6)	299 (29.4)	157 (31.4)
Part-time employed	198 (19.7)	183 (18.0)	84 (16.8)
Full-time employed	369 (36.7)	392 (38.5)	176 (35.2)
Voluntary work	56 (5.6)	66 (6.5)	42 (8.4)
Education, n (%)			
Primary school/No formal education	1 (0.1)	1 (0.1)	4 (0.8)
Secondary school	83 (8.3)	61 (6.0)	54 (10.8)
College/University	922 (91.7)	956 (93.9)	442 (88.4)
Area, n (%)			
Urban	611 (60.7)	709 (69.6)	297 (59.4)
Suburb	235 (23.4)	240 (23.6)	140 (28.0)
Rural	160 (15.9)	69 (6.8)	63 (12.6)

Table 2. Prevalence of disorders associated with Stress.

ICD-11 Stress disorders spectrum	Nigeria (n = 1006)	Kenya (n = 1018)	Ghana (n = 500)	Statistics	African sample (N = 2524)
Adjustment Disorder, yes, n (%)	58 (5.8)	97 (9.5)	48 (9.6)	J-Ta = -3.245***	212 (8.4)
PTSD, yes, n (%)	175 (17.4)	207 (20.3)	88 (17.6)	J-Ta = 1.433	470 (18.6)
Complex PTSD, yes, n (%)	197 (19.6)	139 (13.7)	65 (13.0)	J-Ta = -0.526	401 (15.9)
Prolonged Grief Disorder, yes, n (%)	46 (4.6)	35 (3.4)	13 (2.6)	J-Ta = .199	94 (3.7)

[a] Standard Jonckheere-Terpstra Statistic

Note: *p < 0.05; **p < .01; ***p<.001.

Table 3. Sex ratio across countries and conditions.

ICD-11 Stress disorders spectrum	Nigeria (n = 1006)	Kenya (n = 1018)	Ghana (n = 500)
Adjustment Disorder, yes, n (%)	Men:37 (5.9) Women:21 (4.4)	Men:58 (3.7) Women:39 (2.2)	Men:24 (4.8) Women:24 (4.8)
Sex comparison per country[a]	0.587	0.469	0.000
PTSD, yes, n (%)	Men:96 (9.5) Women:79 (7.9)	Men:102 (10.0) Women:105(10.3)	Men:52 (10.4) Women:36 (7.2)
Sex comparison per country[a]	0.317	0.379	0.699
Complex PTSD, yes, n (%)	Men:82 (8.2) Women:115 (11.4)	Men:61 (6.0) Women:78 (7.7)	Men:29 (5.8) Women:36 (7.2)
Sex comparison per country[a]	1.038	0.724	0.221
Prolonged Grief Disorder, yes, n (%)	Men:15 (1.5) Women:31 (3.1)	Men:16 (1.5) Women:19 (1.9)	Men:7 (1.4) Women:6 (1.2)
Sex comparison per country[a]	0.510	0.113	0.045

[a] Kolmogorov-Smirnov Z Statistic

Note: *p < 0.05; **p < .01; ***p<.001.

Table 4: Logistic regressions for set of traumatic events associated with PTSD – a profile for each country.

Posttraumatic Stress Disorder	OR (95% CI)		
	Nigeria (n = 1006)	Kenya (n = 1018)	Ghana (n = 500)
Natural disaster	1.716 (1.156-2.547)**	1.815 (1.199-2.746)**	.732 (.396-1.355)
Fire or explosion	1.155 (.749-1.780)	1.053 (.699-1.586)	1.632 (.835-3.187)
Transportation accident	1.267 (.864-1.857)	1.117 (.776-1.608)	.959 (.509-1.808)
Serious accident at work, home, or during recreational activity	1.657 (1.096-2.504)*	1.032 (.711-1.500)	.886 (.475-1.652)
Exposure to toxic substance	1.496 (.940-2.380)	1.390 (.941-2.052)	1.367 (.704-2.652)
Physical assault	1.468 (.987-2.184)	1.798 (1.234-2.620)**	.846 (.478-1.499)
Assault with a weapon	.907 (.560-1.467)	1.358 (.902-2.047)	.838 (.353-1.989)
Sexual assault	2.088 (1.218-3.579)**	1.257 (.814-1.940)	1.342 (.641-2.808)
Other unwanted or uncomfortable sexual experience	.638 (.395-1.030)	1.488 (.979-2.261)	.945 (.491-1.817)
Combat or exposure to a war-zone	.907 (.506-1.625)	1.340 (.837-2.146)	1.875 (.551-6.387)
Captivity	.400 (.157-1.021)	.946 (.450-1.988)	.705 (.105-4.718)
Life-threatening illness or injury	1.126 (.730-1.736)	1.130 (.746-1.711)	1.843 (.996-3.410)
Severe human suffering	2.256 (1.350-3.770)**	1.356 (.833-2.207)	3.283 (1.682-6.407)***
Sudden, violent death	.750 (.417-1.350)	1.931 (1.048-3.558)*	.471 (.136-1.637)
Sudden, unexpected death of someone close to you	1.309 (.816-2.102)	.830 (.510-1.352)	1.681 (.729-3.878)
Serious injury, harm or death you caused to someone else	.811 (.410-1.601)	1.121 (.575-2.186)	.792 (.301-2.084)

Controlled for demographics (age, sex, marital status, education, area)
Note: *p < 0.05; **p < .01; ***p<.001.

Table 5: Logistic regressions for set of traumatic events associated with CPTSD – a profile for each country.

Complex Posttraumatic Stress Disorder	OR (95% CI)		
	Nigeria (n = 1006)	Kenya (n = 1018)	Ghana (n = 500)
Natural disaster	1.229 (.805-1.875)	1.093 (.639-1.871)	.462 (.212-1.010)
Fire or explosion	1.290 (.839-1.983)	1.078 (.658-1.767)	1.075 (.449-2.578)
Transportation accident	.995 (.670-1.479)	.777 (.492-1.229)	1.373 (.680-2.771)
Serious accident at work, home, or during recreational activity	1.453 (.951-2.218)	2.197 (1.411-3.420)***	1.280 (.644-2.544)
Exposure to toxic substance	1.285 (.798-2.069)	1.039 (.637-1.692)	1.496 (.710-3.153)
Physical assault	2.320 (1.516-3.551)***	3.467 (2.082-5.771)***	1.845 (.947-3.596)
Assault with a weapon	1.336 (.845-2.113)	.884 (.532-1.467)	1.197 (.499-2.874)
Sexual assault	1.688 (1.044-2.731)*	1.390 (.824-2.346)	1.727 (.794-3.757)
Other unwanted or uncomfortable sexual experience	1.947 (1.272-2.979)**	2.344 (1.467-3.747)***	1.545 (.737-3.238)
Combat or exposure to a war-zone	.823 (.465-1.455)	1.009 (.557-1.828)	1.648 (.365-7.435)
Captivity	.799 (.362-1.765)	.787 (.333-1.859)	1.252 (.224-7.008)
Life-threatening illness or injury	1.556 (1.023-2.367)*	.931 (.557-1.558)	2.275 (1.134-4.566)*
Severe human suffering	2.074 (1.261-3.411)**	3.147 (1.862-5.320)***	3.015 (1.433-6.341)**
Sudden, violent death	1.113 (.649-1.908)	1.426 (.681-2.987)	1.238 (.332-4.624)
Sudden, unexpected death of someone close to you	1.254 (.794-1.979)	.947 (.535-1.677)	.825 (.295-2.309)
Serious injury, harm or death you caused to someone else	1.068 (.587-1.943)	1.298 (.596-2.827)	1.523 (.587-3.950)

Controlled for demographics (age, sex, marital status, education, area)
Note: *p < 0.05; **p < .01; ***p<.001.

Figures

Figure 1. Outline of the ICD-11 for Stress Disorders

	ICD-11 Disorders specifically associated with stress			
	PTSD	CPTSD	PGD	AjD
ICD-11 Code:	6B40	6B41	6B42	6B43
Description	Post-traumatic stress disorder (PTSD) is a disorder that may develop following exposure to an extremely threatening or horrific event or series of events.	Complex post-traumatic stress disorder (Complex PTSD) is a disorder that may develop following exposure to an event or series of events of an extremely threatening or horrific nature, most commonly prolonged or repetitive events from which escape is difficult or impossible.	Prolonged grief disorder is a disturbance in which, following the death of a partner, parent, child, or other person close to the bereaved.	Adjustment disorder is a maladaptive reaction to an identifiable psychosocial stressor or multiple stressors.
Symptoms Clusters	1) re-experiencing the traumatic event or events. 2) avoidance of traumatic reminder. 3) persistent perceptions of heightened current threat.	All diagnostic requirements for PTSD are met followed by Disturbances in Self-Organization' (DSO). 1) problems in affect regulation. 2) beliefs about oneself as diminished, defeated or worthless. 3) difficulties in sustaining relationships and in feeling close to others.	Grief response characterized by: 1. Longing for the deceased or persistent preoccupation with the deceased. 2. Intense emotional pain.	The disorder is characterized by: 1. preoccupation with the stressor or its consequences constant rumination about its implications. 2. Failure to adapt to the stressor.
Duration	The symptoms persist for at least several weeks		The grief response has persisted for an atypically long period of time following the loss (more than 6 months at a minimum).	The condition usually emerges within a month of the stressor.
Functional Impairment	The disturbance causes significant impairment in personal, family, social, educational, occupational or other important areas of functioning.			

PTSD = Posttraumatic Stress Disorder; CPTSD = Complex Posttraumatic Stress Disorder; PGD= Prolonged Grief Disorder; AjD = Adjustment Disorder.

Online Supporting Material

Table 1a. Prevalence of stressful life events in the study samples.

Stressful Life events	Nigeria (n = 1006)	Kenya (n = 1018)	Ghana (n = 500)	Statistics	African sample (N = 2524)
Divorce / separation, yes, n (%)	192 (19.1)	110 (10.8)	64 (12.8)	J-Ta = -2.644**	366 (14.5)
Family conflicts, yes, n (%)	602 (59.8)	519 (51.0)	238 (47.6)	J-Ta = -.352	1359 (53.8)
Conflicts in work-life relations, yes, n (%)	457 (45.4)	379 (37.2)	158 (31.6)	J-Ta = .429	994 (39.4)
Conflicts with neighbors, yes, n (%)	286 (28.4)	324 (31.8)	111 (22.2)	J-Ta = 3.746***	721 (28.6)
Illness of a loved one, yes, n (%)	645 (64.1)	599 (58.8)	257 (51.4)	J-Ta = 1.432	1501 (59.5)
Death of a loved one, yes, n (%)	619 (61.5)	645 (63.4)	290 (58.0)	J-Ta = 1.927	1554 (61.6)
Adjustment due to retirement, yes, n (%)	68 (6.8)	67 (6.6)	24 (4.8)	J-Ta = 1.035	159 (6.3)
Unemployment, yes, n (%)	667 (66.3)	578 (56.8)	258 (51.6)	J-Ta = 0.083	1503 (59.5)
Too much / too little work, yes, n (%)	669 (66.5)	578 (56.8)	267 (53.4)	J-Ta = -.494	1514 (60.0)
Pressure to meet deadlines / time pressure, yes, n (%)	654 (65.0)	583 (57.3)	242 (48.4)	J-Ta = 1.475	1479 (58.6)
Moving to a new home, yes, n (%)	363(36.1)	373 (36.6)	141 (28.2)	J-Ta = 2.726**	877 (34.7)
Financial problems, yes, n (%)	892 (88.7)	883 (86.7)	415 (83.0)	J-Ta = 1.205	2190 (86.8)
Own serious illness, yes, n (%)	226 (22.5)	201 (19.7)	106 (21.2)	J-Ta = -1.041	533 (21.1)
Serious accident, yes, n (%)	132 (13.1)	113 (11.1)	45 (9.0)	J-Ta = 0.494	290 (11.5)
Assault, yes, n (%)	233 (23.2)	214 (21.0)	63 (12.6)	J-Ta = 2.712**	510 (20.2)
Termination of an important leisure activity, yes, n (%)	262 (26.0)	286 (28.1)	126 (25.2)	J-Ta = 1.328	674 (26.7)

[a] Standard Jonckheere-Terpstra Statistic

Note: *p < 0.05; **p < .01; ***p<.001.

Table 2a. Prevalence of traumatic events in the study samples.

Traumatic life Events	Nigeria (n = 1006)	Kenya (n = 1018)	Ghana (n = 500)	Statistics	African sample (N = 2524)
Natural disaster, yes, n (%)	294 (29.2)	203 (19.9)	143 (28.6)	J-Ta = -4.595***	640 (25.4)
Fire or explosion, yes, n (%)	255 (25.3)	257 (25.2)	104 (20.8)	J-Ta = 1.521	616 (24.4)
Transportation accident, yes, n (%)	412 (41.0)	474 (46.6)	182 (36.4)	J-Ta = 3.929***	1068 (42.3)
Serious accident at work, home, or during recreational activity, yes, n (%)	277 (27.5)	332 (32.6)	143 (28.6)	J-Ta = 2.156*	752 (29.8)
Exposure to toxic substance, yes, n (%)	180 (17.9)	246 (24.2)	98 (19.6)	J-Ta = 2.859**	524 (20.8)
Physical assault, yes, n (%)	553 (55.0)	549 (53.9)	205 (41.0)	J-Ta = 3.689***	1307 (51.8)
Assault with a weapon, yes, n (%)	220 (21.9)	245 (24.1)	71 (14.2)	J-Ta = 4.000**	536 (21.2)
Sexual assault, yes, n (%)	184 (18.3)	263 (25.8)	104 (20.8)	J-Ta = 3.212***	551 (21.8)
Other unwanted or uncomfortable sexual experience, yes, n (%)	319 (31.7)	267 (26.2)	142 (28.4)	J-Ta = -1.640	728 (28.8)
Combat or exposure to a war-zone, yes, n (%)	116 (11.5)	156 (15.3)	19 (3.8)	J-Ta = 6.277***	291 (11.5)
Captivity, yes, n (%)	53 (5.3)	67 (6.6)	13 (2.6)	J-Ta = 3.101**	133 (5.3)
Life-threatening illness or injury, yes, n (%)	286 (28.4)	230 (22.6)	144 (28.8)	J-Ta = -3.118**	660 (26.1)
Severe human suffering, yes, n (%)	179 (17.8)	193 (19.0)	91 (18.2)	J-Ta = 0.522	463 (18.3)
Sudden, violent death, yes, n (%)	165 (16.4)	104 (10.2)	36 (7.2)	J-Ta = -0.077	305 (12.1)
Sudden, unexpected death of someone close to you, yes, n (%)	248 (24.7)	202 (19.8)	81 (16.2)	J-Ta = 0.426	531 (21.0)
Serious injury, harm or death you caused to someone else, yes, n (%)	101 (10.0)	72 (7.1)	47 (9.4)	J-Ta = -2.033*	220 (8.7)

[a] Standard Jonckheere-Terpstra Statistic

Table 3a: Logistic regressions for set of stressful life events associated with AjD – a profile for each country.

Adjustment disorder	OR (95% CI)		
	Nigeria (n = 1006)	Kenya (n = 1018)	Ghana (n = 500)
Divorce / separation	1.408 (.837-2.366)	1.353 (.603-3.033)	2.739 (1.187-6.319)*
Family conflicts	1.326 (.802-2.192)	2.025 (1.057-3.878)*	.814 (.403-1.644)
Conflicts in work-life relations	1.642 (1.016-2.653)*	1.518 (.828-2.783)	1.252 (.591-2.653)
Conflicts with neighbors	.735 (.443-1.220)	1.307 (.713-2.397)	.852 (.388-1.868)
Illness of a loved one	.746 (.448-1.242)	.875 (.460-1.666)	.880 (.430-1.804)
Death of a loved one	.895 (.540-1.483)	.794 (.433-1.456)	1.062 (.534-2.113)
Adjustment due to retirement	1.506 (.706-3.213)	1.289 (.476-3.492)	.499 (.110-2.258)
Unemployment	1.323 (.772-2.266)	1.153 (.621-2.142)	2.343 (1.163-4.722)*
Too much / too little work	1.278 (.751-2.173)	1.695 (.891-3.227)	.962 (.467-1.981)
Pressure to meet deadlines / time pressure	.909 (.537-1.539)	.737 (.389-1.398)	.972 (.495-1.909)
Moving to a new home	1.099 (.691-1.747)	.595 (.319-1.110)	2.038 (1.041-3.989)*
Financial problems	2.565 (.880-7.478)	1.272 (.419-3.864)	1.826 (.587-5.680)
Own serious illness	.917 (.536-1.567)	.941 (.477-1.856)	2.030 (1.002-4.114)*
Serious accident, yes	.926 (.490-1.751)	1.492 (.711-3.131)	1.703 (.600-4.838)
Assault, yes	1.390 (.822-2.351)	1.747 (.931-3.280)	1.065 (.431-2.632)
Termination of an important leisure activity	1.095 (.669-1.793)	.945 (.502-1.781)	.980 (.461-2.085)

Controlled for demographics (age, sex, marital status, education, area)
Note: *p < 0.05; **p < .01; ***p<.001.

Table 4a: Logistic regressions for set of traumatic events associated with PGD – a profile for each country.

Prolonged Grief Disorder	OR (95% CI)		
	Nigeria (n = 1006)	Kenya (n = 1018)	Ghana (n = 500)
Natural disaster	1.250 (.627-2.495)	1.259 (.553-2.867)	.258 (.044-1.519)
Fire or explosion	.926 (.448-1.912)	1.118 (.498-2.510)	1.445 (.331-6.311)
Transportation accident	1.652 (.847-3.224)	.842 (.390-1.817)	2.509 (.596-10.559)
Serious accident at work, home, or during recreational activity	.889 (.431-1.831)	2.044 (.958-4.361)	4.494 (1.105-18.266)*
Exposure to toxic substance	1.895 (.928-3.869)	1.327 (.613-2.872)	1.253 (.300-5.228)
Physical assault	.771 (.387-1.534)	1.606 (.690-3.738)	2.200 (.522-9.274)
Assault with a weapon	.808 (.354-1.844)	1.319 (.578-3.011)	1.102 (.224-5.431)
Sexual assault	1.186 (.538-2.616)	.845 (.338-2.114)	.489 (.093-2.570)
Other unwanted or uncomfortable sexual experience	1.286 (.626-2.644)	.734 (.307-1.758)	3.221 (.808-12.844)
Combat or exposure to a war-zone	.998 (.376-2.646)	.995 (.387-2.556)	1.856 (.128-26.998)
Captivity	.725 (.185-2.840)	1.642 (.486-5.551)	1.276 (.077-21.056)
Life-threatening illness or injury	1.822 (.900-3.691)	1.035 (.455-2.354)	.557 (.123-2.515)
Severe human suffering	.847 (.364-1.972)	1.488 (.611-3.623)	.263 (.033-2.082)
Sudden, violent death	.893 (.377-2.114)	1.826 (.594-5.612)	1.086 (.097-12.190)
Sudden, unexpected death of someone close to you	3.085 (1.518-6.268)**	.496 (.169-1.460)	2.419 (.526-11.117)
Serious injury, harm or death you caused to someone else	1.420 (.579-3.480)	.972 (.273-3.461)	3.015 (.571-15.928)

Controlled for demographics (age, sex, marital status, education, area)
Note: *p < 0.05; **p < .01; ***p<.001.