Dimensional Latent Structure of ICD-11 Posttraumatic Stress Disorder, Complex PTSD, and Adjustment Disorder: Evidence from Ghana, Kenya, and Nigeria

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Abstract

With the release of ICD-11 in 2018, there has been a surge in studies examining the nosology of mental disorders, including disorders associated with stress, namely, posttraumatic stress disorder (PTSD), complex PTSD (CPTSD), and adjustment disorder (AjD). Few studies have examined the same in low- and middle-income countries that have disproportionate levels of exposure to trauma and stressors and are under-resourced in mental health services. The present study examined the latent factor structure of a joint model comprising PTSD, CPTSD, and AjD symptoms and their association with stressful and traumatic life events to assess the degree of distinctiveness between these disorders. Participants were 2,524 adults in the age range of 18-71 years (M/SD_{age} = 30.44/8.67) from Ghana, (n = 500; 50% female), Kenya (n = 1,006; 49.8% female), and Nigeria (n = 1,018; 50% female). Findings obtained through confirmatory factor analyses indicated that a dimensional and hierarchical second-order model comprising correlated latent factors of PTSD, DSO, and AjD provided the best goodness-of-fit indices. Furthermore, it was found that stressors were positively associated with AjD and PTSD, and traumatic life events largely with PTSD. Findings support the ICD-11 classification of related-although distinct stress-related disorders in adults from three African nations.

Keywords. ICD-11, PTSD, Complex PTSD, Adjustment Disorder, Africa.

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1. Introduction

A sequalae of exposure to stressful events can be an array of mental disorders, including anxiety disorders, affective disorders and substance use disorders (Cohen et al., 2019; Kilpatrick et al., 2013). Studies indicate that nearly 89.7% of the general population has experienced at least one stressful life event during their lifetime (Kilpatrick et al., 2013). Notably, posttraumatic stress disorder (PTSD), complex PTSD (CPTSD), and adjustment disorder (AjD) housed in the ICD-11's section on Disorders Associated with Stress (DAS), require exposure to a stressor as a qualifier for diagnosis but differ in the severity or intensity associated with the stressors (stressor vs. traumatic event; Karatzias et al. (2020); Maercker et al. (2013). Per ICD-10 classification, the diagnosis of disorders placed under DAS are relatively higher than the other disorders, with PTSD and AjD being the sixth and eighth most frequently diagnosed disorders by clinicians, respectively (Evan et al., 2013). While these rates suggest the popularity of the diagnoses of PTSD and AjD among clinicians, AjD was ranked lowest in the ease of use or goodness-of-fit in day-to-day clinical practice (Evan et al., 2013; Maercker et al., 2013). Such findings provided an impetus for the improvement of the scientific status of AjD in the new ICD-11.

While there has been a surge in literature focusing on ICD-11's mental health disorders, it is not surprising that the bulk of the research comes from high income countries that mirrors the availability of mental health services and resources for research and the lack thereof in low- and middle income countries (LMICs). As per the World Health Organization's Mental Health Atlas survey (WHO, 2017), globally 37% of the nations do not have stand-alone mental health laws, and the corresponding proportions rise to 44% in the continent of Africa (WHO, 2018). These dismal proportions reflect severe deficits in services

and service providers in the region with more stable regions such as Kenya reportedly having only 80 psychiatrists, 30 clinical psychologists, and less than 500 psychiatric nurses catering to a population of nearly 52 million (Gberie, 2016). In 2016, Ghana reportedly had 3 psychiatric hospitals and around 20 psychiatrists (Gberie, 2016). With a growing population in the midst of scarcity of resources and mental health policies, people in Africa are at an increased risk of mental health problems, including PTSD, CPTSD, and AjD. Hence, there is an urgent need to focus on mental health research in LMICs. The present study aims to contribute to this endeavor by examining the nosology of PTSD, CPTSD and AjD in a joint model to facilitate our understanding of comorbidities in three community samples of adults from three different nations—Ghana, Kenya, and Nigeria—in the continent of Africa.

1.1. **ICD-11 PTSD/CPTSD**

With the release of the World Health Organization's 11th edition of the International Classification of Diseases (ICD-11) in 2018, complex posttraumatic disorder (CPTSD) received formal acceptance as a disorder. Placed in the section on DAS as a sibling disorder of posttraumatic stress disorder (PTSD), CPTSD comprises three symptom-clusters of PTSD and an additional three symptom cluster reflective of disturbances in self-organization (DSO). Specifically, the PTSD symptom clusters are (i) reexperiencing of the trauma in the here and now (RE), (ii) avoidance of traumatic reminders (AV), and (iii) a persistent sense of current threat that is manifested by arousal and hypervigilance (TH). Directly related to a specific traumatic event or series of events, the PTSD symptoms are intended to be fear-based (Hyland et al., 2016).

The conceptualization of CPTSD was originally proposed by Judith Herman to meet the needs of describing symptoms of long-term trauma that included behavioral, emotional, cognitive and interpersonal difficulties, and somatization (Herman, 1992). In ICD-11, CPTSD has the core PTSD symptom clusters, and three symptom clusters, namely, (i)

affective dysregulation (AD), (ii) negative self-concept (NSC), and (iii) disturbance in relationships (DR). These symptoms are associated with exposure to chronic and multiple forms of traumatic events (e.g., polyvictimization, child sexual abuse, genocide, domestic violence, torture; Brewin et al., 2017). Given its symptom composition, CPTSD is conceptualized as a broader clinical disorder wherein the traumatic event impacts an individuals' emotion regulation, identity, and interpersonal domains (Hyland et al., 2016). Factor analytic studies consistently indicate a distinction between PTSD symptom clusters and DSO symptom clusters, and suggest either a correlated first order six-factor model comprising reexperiencing, sense of threat, avoidance, affective dysregulation, negative self-concept, and disturbed relationships (e.g., treatment seeking sample from Germany, Bottche et al., 2018; adults refugees residing in the US, Frost et al., 2019; college students from China, Ho et al., 2019; adolescents from Lithuania; Kazlauskas et al., 2020, or a correlated second-order two-factor model wherein the higher order factor of PTSD takes into account the covariance between reexperiencing, sense of threat, and avoidance, and the higher order factor of DSO accounts for the covariances between the factors of affective dysregulation, negative self-concept, and disturbed relationships (e.g., male perpetrators of partner violence from Israel: Gilbar et al., 2018; treatment seeking sample from United Kingdom: Hyland et al., 2017; treatment seeking refugees and asylum seekers in Switzerland: Nickerson et al., 2016 Syrian refugees: Vallieres et al., 2018).

1.2. **Adjustment Disorder**

The diagnosis of adjustment disorder (AjD) made appearance for the first time in the third edition of the Diagnostic and Statistical Manual of Mental Disorder (APA, 1980) and with it followed many controversies over the validity of its nosology. AjD was thus treated as a 'waste-basket' of the psychiatric classification scheme (Casey & Bailey, 2011) primarily due to its elusive description. Recently, ICD-11 revised the definition of AjD and it is now

recognized as a stress-response syndrome along with other disorders associated with stress, namely, PTSD, CPTSD, and prolonged grief disorder. A diagnosis of ICD-11AjD requires an experience of at least one identifiable stressor, and maladaptive responses to the stressor(s) in the form of two sets of symptom categories, namely, (i) preoccupation with the stressors or its consequences, and (ii) a failure to adapt. Symptoms of preoccupation with the stressors include excessive worry, recurrent and distressing thoughts about the stressor or constant ruminations about its consequence, and failure to adapt includes symptoms interfering with everyday functioning, such as difficulties in concentration and sleep disturbances. Notably, if the symptoms meet the requirement of another disorder, then that disorder is diagnosed instead of AjD (Maercker et al., 2013).

AjD is caused by a stressful life event and PTSD/CPTSD are precipitated by traumatic life events (Maercker et al., 2013). But there is evidence suggesting that AjD can be predicted by stressful life experiences and prior traumatic event in the same sample (Mahat-Shamir et al., 2017). Comorbidity between the Disorders Associated with Stress, including PTSD/CPTSD and AjD are expected and need to be explored to inform clinical interventions as presence of comorbidity can change treatment plans to avoid a poor prognosis. To our knowledge, only one prior study has attempted to examine the comorbidity between PTSD, CPTSD, and AjD by investigating their dimensional latent structure in a clinical sample from Scotland (Karatzias et al., 2020).

Specifically, in a sample of 331 patients at an outpatient trauma center in Scotland, five models of the latent structure of PTSD, CPTSD, and AjD were investigated for the most optimal model (Karatzias et al., 2020). Model 1 was the 'Stress response' model wherein all items of the three disorders loaded on a single latent factor. Assuming a unidimensional structure of each disorder, Model 2 specified the PTSD, CPTSD, and AjD items on three first-order latent factors, namely, 'PTSD,' 'DSO', and 'Adjustment disorder.' Model 3

assumed the multidimensional nature of each disorder and comprised eight correlated first-order latent variables with no hierarchical organization. Model 4 tested the variation and covariation among the eight first-order latent variables as explained by a single second-order latent factor 'Stress response.' A close representation of the ICD-11, Model 5 had the three disorders as multidimensional and hierarchical and optimally fitted the data in comparison to other models. Specifically, the AjD items were specified to measure two latent factors, 'preoccupation' and 'failure to adapt', and the variation and covariation between these first-order latent factors were specified to be explained by the single second-order latent factor of 'Adjustment disorder.' It also specified two correlated second-order factors—PTSD and DSO—to explain the covariation among the six first-order factors, namely, reexperiencing, avoidance, and sense of threat loaded on the PTSD latent factor, and negative self-concept and affect regulation loaded on the DSO latent factor. All three second-order factors of PTSD, DSO, and AjD were also correlated to explain the covariance between the eight first-order factors. Additionally, the study also examined the predictive utility of different types of stressors and traumatic events to enable differential diagnosis for these disorders. The present study will examine these joint structures of PTSD, DSO, and AjD in three community samples of adults from Ghana, Kenya, and Nigeria in Africa. We also investigate the predictive utility of lifetime stressors and traumatic events to facilitate differential diagnosis between the three conditions. This would highlight the optimal dimensional structure and the degree of distinctiveness of these disorders in samples from Africa.

1.3. **The Present Study**

The current study aimed to examine a joint latent factor structure of PTSD, DSO, and AjD in order to yield the distinguishability between three disorders in ICD-11, namely, PTSD, CPTSD, and AjD in three large community sample of adults from Kenya, Nigeria and Ghana in Africa. To the best of our knowledge, this is the first study examining the joint

factor structure in community samples from a non-western country. A series of five structural models suggested by Karatzias et al. (2020) will be tested across the three samples. First, we hypothesize that the joint latent factor model that bears close semblance to the ICD-11 representation of the three disorders wherein each measure (of the disorder) is multidimensional and hierarchical (Model 5, Karatzias et al., 2020) will be the most parsimonious and with the best goodness-of-fit indices. Second, we hypothesize that exposure to lifetime stressors would predict the latent factor of AjD and PTSD (Mahat-Shamir et al., 2017); however, only exposure to traumatic events would predict the latent factor structure of PTSD and DSO (Karatzias et al., 2020; Mahat-Shamir et al., 2017).

2. Method

2.1. **Participants**

The study sample comprised a total of 2,524 participants from Ghana (n = 500, 19.8 %), Kenya (n = 1,006, 39.9%), and Nigeria (n = 1,018; 40.3%). The gender (binary gender) of the participants was equally distributed across the three samples (Ghana, n = 250, 50% female; Kenya, n = 505, 50.2%, males, n = 501, 49.8% females; Nigeria, n = 518, 50.9 % males, n = 500 49.1% females. Participants from Ghana were between 18-68 years old (M = 28.96, SD = 7.93), from Kenya between 18-71 years old (M = 30.14, SD = 8.72), and from Nigeria between 17-68 years old (M = 32.23, SD = 9.36). Other demographic details are provided in Table 1.

2.2. **Measures**

2.2.1. **ICD-11 PTSD and CPTSD.** The *International Trauma-Questionnaire (ITQ*: (Cloitre et al., 2018) is a self-report measure of ICD-11 PTSD and CPTSD. The ITQ is composed of 18 items distributed in two sections, (i) PTSD (9 items) and (ii) Disturbances of self-organization (DSO, 9 items). The first section is composed of 6 items that measure PTSD symptoms (re-experiencing, RE1 and RE2; avoidance, AV1 and AV2; and sense of threat,

TH1 and TH2), and three items measuring functional impairment association with PTSD. Similarly, the second section was composed of 6 items measuring DSO (affective dysregulation, AD1 and AD2; negative self-concept, NSC1 and NSC2; disturbances in relationships, DR1 and DR2) and three items measuring functional impairment associated with DSO. Each item is measured on a five-point Likert scale ranging from 0 = *'Not at all'* to 4 = '*Extremely*'. For a diagnosis of PTSD, endorsement of at least one symptom in each cluster (RE, AV, and TH) with a score of 2 or greater (from 2 = *Moderately* to 4 = *Extremely*) and show the same score (≥ 2) on the three functional impairment items. For a diagnoses of CPTSD, participants must have a PTSD diagnosis and additionally endorse at least one symptom in each DSO cluster (AD, NSC, and DR) with a score of 2 or greater (i.e., from 2 = *Moderately* to 4 = *Extremely*) and show same score (≥ 2) on the three functional impairment items, indicative of impairment social life, work-life, and other important obligations.

For the propose of the present study, only the items regarding the core symptoms were used (RE, AV, TH, AD, NSC, and DR). The preliminary versions of ITQ shows good construct validity (Hyland et al., 2017; Karatzias et al., 2016), that is, significant positive correlations of PTSD with other measures of PTSD of DSM-5 indicative of a good convergent validity (Karatzias et al., 2016). Discriminant validity was conducted comparing the PTSD and DSO scores with other mental health outcomes (Hyland et al., 2017). The ITQ has been validated and used on several populations (e.g., United Kindom: Cloitre et al., 2018); Israel: Gilbar et al., 2018; Germany: Karatzias et al., 2017). The Cronbach's alpha for the present study were acceptable (PTSD core symptoms: Ghana sample, α = .67 to .84; Kenya sample, α = .68 to .80; Nigeria sample, α = .65 to .79; DSO core symptoms range from: Ghana sample, α = .64 to .91; Kenya sample, α = .66 to .91; Nigeria sample, α = .72 to .90). The low reliability may be due to the small number of variables per core symptoms (two items), which is likely to underestimate the true reliability (Eisinga et al., 2013).

2.2.2. **Adjustment disorder.** Adjustment Disorder New Module (ADNM-20; Einsle et al., 2010) is a self-report scale that measures ICD-11 Adjustment disorder. The ADNM-20 consists of two parts, (i) a list of common stressors and (ii) a list of symptoms of Adjustment Disorder. The first part is composed of 16 stressors (e.g., family conflicts, serious accidents, and unemployment) measured as (0) absence or (1) presence of the stressors. The stressor list comprises seven types of acute events (e.g., divorce, moving) and nine types of chronic stressors (e.g., conflict with neighbors, serious illness). The total score is calculated by adding the 16 items to represent cumulative stress (ranging from 0 to 16). Due to the large number of items, all participants with total scores of 7 or greater were recoded as 6 in the present study. The second part comprises 20 items (19 items AjD symptomatology and one functional impairment) answered in a 4-point Likert scale indicating how frequently each symptom was experienced (1 = *'never'* to 4 = *'often'*).

For the purpose of the present study, the eight items that reflect the two clusters of the core symptomatology were used (preoccupations with the stressor: PR1-PR4, and failure to adapt: FA1-FA4). For a diagnosis of AjD, participants must identify at least one stressful event and score ≥ 3 in one symptom and a score of at least ≥ 2 in two items across both clusters and a rating ≥ 3 on the functional impairment criterion. The ADMN-20 was first developed and tested in two samples from outpatient clinics (Einsle et al., 2010). The ADMN-20 showed good internal reliability (α =.80–.90) (Lorenz et al., 2016) and re-test reliability (r_{tt} = .61 to .84) (Einsle et al., 2010). Similarly, the present measure showed good construct validity (Einsle et al., 2010) and diagnostic validity (Lorenz et al., 2016). The factor structure of ADMN-20 has not yet been tested in any country in the continent of Africa. The internal consistency of the core items of ADNM-20 was good (Ghana sample: PR α = .88 and FA α = .82; Kenya sample: PR α = .85 and FA α = .84; Nigeria: PR α = .83 and FA α = .95).

2.2.3. **Traumatic and Stressful Life Events.** The Life Events Checklist (LEC: Gray et al., 2004) is a 17-item self-report measure that screen potentially traumatic events in the participant's lifetime. The LEC assesses lifetime exposure to 16 traumatic events (e.g., natural disaster, physical assault, life-threatening illness/injury) and one last item that allows the participants to indicate any other traumatic experience that is not listed ("Any other very stressful event/experience"). Items are measured in a five-point Likert scale which indicates the levels of exposure (1 = *'Happened to me'*, 2 = *'Witnessed it happening to somebody else*', 3 = '*Learned about it happening to someone close to me'*, 4 = *'Part of my job'*, 5 = *'Not sure it applies'*, 6 = *'Doesn't apply to my experience'*). In the present study, items were recoded as (i) presence, those that indicated 1 ("Happened to me") and all other levels of exposure as (0) absence, except for items 14 (sudden violent death, for example, homicide, suicide) and 15 (sudden accidental death) that response 2 (witnessed it happening to somebody else) was also recoded as (1) presence. The total score was calculated, adding all items, except for item 17, ranging from 0 to 16, with a higher score indicative of exposure to more types of traumatic events.

2.3.**Procedure**

The selection of the countries to incorporate in the study was made based on their high internet presence and English proficiency (Kiprop, 2018; Silver & Johnson, 2018). The countries selected were Nigeria, Kenya, and Ghana. Ethical approval to carry out the study via an online survey were requested and approved by the Ariel University, Israel (author MBE's university). Participants signed an electronic informed consent before answering the questionnaire. Eligibility criteria after country selection were (i) citizenship of one of the three countries mentioned above; (ii) being 18 years old or above.

2.4.**Statistical Analysis**

The data analytical approach for this study followed two stages. First, descriptive statistics to test the sample's characteristics and bivariate correlations to test the association between the study variables were analyzed in IBM SPSS version 26. Second, factor analytic analyses were conducted in M*plus* version 8.4. Figure 1 shows the five alternative models tested as representing the AjD, PTSD, and DSO symptoms. Models 1-5 were the models tested by Karatzias et al. (2020) as described previously (see Figure 1). is a one-factor model where all symptoms load on the single latent variable (stress response). Model 6 tests the predictive ability of LEC traumatic events and ADMN-16 stressors predictive on the three second-order factors mentioned above.

Each model was specified and estimated using robust maximum likelihood (MLR; Yuan & Bentler, 2000), and weighted least squares means and variance adjusted (WLSMV; Muthén, 1997). The WLSMV (versus the MLR) estimation on the latent continuous response variable's polychoric correlation matrix is more appropriate when items have fewer than 5 response categories (Rhemtulla et al., 2012). Goodness-of-fit for each model was assessed with the indices of chi-square, the comparative fit index (CFI), and the Tucker-Lewis Index (TLI). Acceptable model fit was considered when the chi-square was non-significant, and CFI and TLI were greater than .90. Moreover, the Root Mean Square Error of Approximation (RMSEA) with a value less than 0.05 indicating close fit and values up to .08, indicating reasonable errors of approximation (Hu & Bentler, 1999). Additionally, to compare the models, BIC was generated using MLR estimation. Once that the best-fitting model of ICD-11 CPTSD was identified, Model 6 was created by adding the predictors on the identified latent variables. Last, composite reliability for the preferred model was calculated. Composite reliability is an alternative to Cronbach's alpha that estimates the internal consistency of a group of items without the strict assumptions of tau-equivalence (Raykov, 1997).

3. Results

3.1. **Descriptive statistics**

Tables 1, 2 and 3 contains bivariate correlations between the scores of the stressor's measures and the ADNM and ITQ subscales. Participants indicated the number of traumatic events and stressors experienced in their lifetime. Scores on the summed LEC ranged from 0 to 15 for the three countries (Ghana, $M = 3.25$, $SD = 2.93$; Kenya, $M = 3.82$, $SD = 3.09$; Nigeria, $M = 3.79$, $SD = 3.02$). The prevalence of the most common stressors and traumatic events are reported in Table 1. The endorsement of AjD without excluding those that met criteria for PTSD and CPTSD was 23.4% (n =117) for Ghana, 27.8% (n = 280) for Kenya and 17.7%. (n = 180) for Nigeria. Around a third of the participants met the criteria for PTSD (Ghana, n = 153, 30.6 %; Kenya, n = 372, 37.9 %; Nigeria n = 346, 34.0%.) and in a lesser extend met the criteria for complex PTSD (Ghana, n = 65, 13.0%; Kenya, n =197, 19.6%; Nigeria, n = 139, 13.7%).

3.2. **The latent structure of AjD, PTSD, and CPTSD**

The factor analytic analyses were carried out across the three different countries. Derived fit indices from MLR and WLSMV (see Tables 3) indicated that the multidimensional models with 8 first-order factors (Models 3, 4 and 5) fitted the data better than the 1 and 3 factor models (Models 1 and 2) for the three countries. The best fitting model means a balanced model fit and simplicity. As reported in Tables 4, 5, and 6, the RMSEA, CFI, TLI, and SRMR overall indicated acceptable fit for Models 3 and 5. However, the lower BIC in Model 5 indicated a better fit.

As the figures 2, 3 and 4 indicate all the loadings are positive and statistically significant ($p < .05$). The correlations among the second order latent variables were all positive and statistically significant for the Ghana sample (DSO-PTSD, $r = .581$; AjD-PTSD, $r = .573$; AjD-DSO $r = .686$), Kenya sample (DSO-PTSD, $r = .607$; AjD-PTSD, $r = .583$; AjD-DSO $r = .673$), and Nigeria sample (DSO-PTSD, $r = .651$; AjD-PTSD, $r = .638$; AjD-

DSO *r* = .770). Based on estimates derived from the CFA analysis composite reliability indicated that the eight first-order subscales demonstrated good reliability across the three countries (ranging from, RE = .749 to .782 AV = .796 to .837, TH = .657 to .690, AD = .671 to .731, NSC = .904 to .916, DR = .806 to .844, PR = .855 to .879, and FA = .821 to .841). Similarly, excellent reliability was found for the four items of PTSD (.893 to .904), the four of DSO (.930 to .931), and eight of AjD (.917 to .920),

Once the best fit model was indicated (model 5), predictors were added into the analysis creating model 6 (which contains eight first-order, three second order with predictors; see figure 2, 3, and 4). In these models, the ADNM-20 stressors and the LEC were added to the model and were specified to be correlated; the three second-order factors were regressed on these three trauma variables. Findings indicated that acute psychosocial and persistent stressors were predictors of AjD (*b* = .14 to .26) and PTSD (*b* = .20 to .43) across the three samples. Similarly, potentially traumatic events were predictors of PTSD (*b* = .31 to .44) for the three samples and of DSO for the Ghana sample only (*b* = .18).

4. Discussion

4.1.Main findings

The present study aimed to examine the joint latent structure of three disorders in the ICD-11s DAS, namely, PTSD, CPTSD, and AjD, and also investigated the predictive value of lifetime stressors and traumatic events on PTSD, DSO, and AjD. Our first hypothesis was accepted as we found that the multidimensional and hierarchical joint latent factor model with 8 first-order factors— reexperiencing, avoidance, sense of threat, negative self-concept, affect regulation, preoccupations with the stressor, and failure to adapt —and three second-order factors—PTSD, DSO and AjD—had the overall best goodness-of-fit indices among the five models examined. Our second hypothesis was partially supported as exposure to lifetime stressors predicted PTSD and AjD but not DSO across the three samples, and exposure to

lifetime traumatic events predicted PTSD only in the samples from Kenya and Nigeria, but it predicted PTSD and DSO in the Ghanaian sample. This study is the first to examine and find evidence for a joint latent factor model of PTSD, DSO, and AjD in adults community samples from Africa and the second study from across the globe after Karatzias et al. (2020). Findings are discussed in detail below.

Although not a hypothesis, it is important to highlight that in contrast to rates of AjD found in population based non-clinical sample from Ireland (i.e., 15.6%; Shevlin et al., 2020) and Lithuania (16.5%; Zelviene et al., 2020) without applying exclusion rules, the rates were higher (17.7% to 27.8%) in the present community sample of adults from the three African countries. In fact, the rates found in the study-samples were comparable to a high-risk sample from other western/developed nations (i.e., 27.3% in a sample from Switzerland; Perkonigg et al., 2018). Similarly, rates of PTSD (30.6% to 37.9%) and CPTSD (13% to 19.6%) found in present samples were higher than those found in non-clinical samples from developed nations (e.g., Israel: 9% PTSD vs. 2.6% CPTSD; Ben-Ezra et al., 2018). Furthermore, the average exposure to stressors was nearly two times higher in the present samples compared to a clinical sample from Scotland ($M = 4.79$; Karatzias et al., 2020) and the average exposure to traumatic events was similar ($M = 3.99$). These higher and comparable rates of stressors and trauma exposure in population-based samples from Africa (vs. clinical samples from the west) reflects their increased risk of exposure to multiple stressful experiences and traumatic events that can have an accumulating and detrimental effect on one's wellbeing (e.g., Charak et al., 2017; Cohen et al., 2019). These higher rates of stressors, traumatic events, and higher rates of AjD, PTSD, and CPTSD are a reflection of the deficits in mental health services and legislative mental health policies in many regions of Africa (Sankoh et al., 2018) as also highlighted by the WHOs Mental Health Atlas Report (WHO, 2017).

The present findings from the joint model support the distinctiveness of PTSD, CPTSD, and AjD as separate disorders as per the classifications in ICD-11. These findings conceptually replicate the findings of Karatzias et al. (2020) as they too found that the model with eight first-order factors— reexperiencing, avoidance, sense of threat, negative self-concept, affect regulation, preoccupations with the stressor, and failure to adapt —and three second-order factors—PTSD, DSO and AjD fit the data best, albeit in a clinical sample. There was moderate factor covariances between PTSD, DSO and AjD reflective of some amount of comorbidity but also independence between the latent factors. The factor covariance between AjD and DSO was the highest across all the three samples that was also found in the trauma exposed clinical sample from Scotland (Karatzias et al., 2020). These high covariances in the joint latent model can be viewed from the dimensional model of psychopathology—the hierarchical taxonomy of psychopathology—that proposes six spectra/dimensions of psychopathology including internalization and externalization (Forbes et al., 2016; Kotov et al., 2017). The DAS disorders of PTSD, CPTSD, and AjD would all be subsumed under the internalizing dimension that is characterized by negative affect, thus accounting for the comorbidity between the three disorders.

Furthermore, our findings that exposure to stressors predicted AjD and PTSD and that traumatic events largely predicted PTSD and DSO are in line with the criteria set in ICD-11 (WHO, 2018) and with a meta analytic study of 22 samples that exposure to both stressors and/or traumatic events is associated with posttraumatic stress symptoms although the magnitude of association is higher between traumatic events and posttraumatic stress symptoms (Larsen & Pacella, 2016). Our findings are in contrast to Mahat-Shamir et al. (2017) wherein they found stressors to be predictive of AjD only and traumatic events to be related with both PTSD and AjD, and with Karatzias et al. (2020) findings that stressors and traumatic event lead to AjD, PTSD, and DSO. Although the average exposure to traumatic

events was comparable between our community samples from Africa and the clinical sample from Scotland, it is noteworthy that rates of PTSD/CPTSD and AjD were higher in the clinical sample from Scotland. While these higher rates of diagnoses in a clinical sample compared to the rates in the present community-based samples are not surprising, they suggest that a number of additional characteristics of risk—multiple exposure, chronicity, interpersonal vs. non-interpersonal nature of the stressor—and protective factors (e.g., social support; Cohen et al., 2019; Hirai et al., 2020) can influence the associations between exposure to stressor vs. traumatic event, AjD, PTSD and CPTSD. Prior studies indicate that these characteristics are associated with an increased severity in psychopathological reactions (Cohen et al., 2019; Forbes et al., 2016). Consideration of these factors may have also explained our non-significant findings of lifetime trauma events as a predictor of DSO in Nigerian and Kenyan samples. Future studies should thus take into consideration the various characteristics of a stressor and traumatic events to better understand the conditions in which the magnitude of certain stressors causes harm and threat leading to posttraumatic stress reactions.

4.2.Limitations

The present study findings should be interpreted with the following limitations in mind. First, the study was based on a convenience sample of adults from Kenya, Ghana and Nigeria and cannot be generalized to the population at large. Second, this study was based on self-reported measures and was a cross-sectional design. The factor analytic joint model may reflect the properties of the self-report measures rather than the diagnostic classifications. Although clinician administered diagnostic interview are yet to be empirically tested for ICD-11 AjD, there is one study that has empirically tested the use of International Trauma Interview, a diagnostic interview for ICD-11 PTSD/CPTSD (Bondjers et al., 2019). Third, data were collected online in English language and from those with internet access. This

limited its accessibility to those with a higher education and economic status, and English proficiency. Notably, prior studies suggest that online forums provide anonymity to participants that may increase comfort and willingness to disclose sensitive information (e.g., regarding traumatic events) about themselves (Tourangeau, 1996).

4.3.Implications and conclusions

Nonetheless, the present findings have important implications and avenues for future research. Our findings that exposure to multiple stressors, traumatic events, rates of PTSD/CPTSD and AjD were higher in the three samples from Africa (vs. samples from the west) calls for more preventative interventions and strengthening the availability and capacity of mental health services and professionals in the region (Tol et al., 2014; WHO, 2018). For example, prior studies based on samples from under-resourced regions suggest a balanced approach with capacity building in terms of specialty care and non-specialist health care workers in community and primary care settings (Thornicroft & Tansella, 2013; Tol et al., 2014). The joint model suggests that there is comorbidity between AjD, PTSD, and CPTSD that stands in contrast to the classifications in ICD-11. Findings have implications for clinical interventions as a recent meta-analytic study examining the effectiveness of psychological interventions for PTSD/CPTSD found preliminary evidence that although trauma-focused interventions are effective in symptom reduction associated with traumatic memories, some non-trauma focused therapies, such as mindfulness and interpersonal therapy may also reduce symptoms of avoidance behavior in interpersonal relationships, disturbances in relationships, and developing a positive self-concept (Cloitre et al., 2012; Karatzias et al., 2019). Notably, the treatment consideration for borderline personality disorder that is often comorbid with PTSD include the focus is on alleviating self-harm behavior, fear of abandonment, alleviating chaotic relationships and establishing a stable sense of self through interventions such as Dialectical Behavioral therapy (Linehan, 1993). For AjD, CBT appears to bear promising

results (Maercker et al., 2015) although more cost-effective solutions—low intensity self-help interventions, internet-delivered interventions—will have to be developed for health care in under-resourced regions of the world (Eimontas et al., 2018; Maercker et al., 2015).

To conclude, our findings support the multidimensional and hierarchical model of ICD-11's DAS by examining a joint model of PTSD, CPTSD, and AjD in a culturally diverse sample from Kenya, Ghana, and Nigeria. Additionally, exposure to stressors and traumatic events had a differential effect on AjD and PTSD, with exposure to stressors being predictive of AjD and PTSD, and traumatic events largely predictive of PTSD.

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Table 1

Demographics and prevalence of most common traumatic events and stressors.

Variable	Ghana (*n* = 500)	Kenya (*n* = 1006)	Nigeria (*n* = 1018)
		n (%)	
Area			
Urban	297 (59.4)	611 (60.7)	709 (69.6)
Suburban	140 (28)	235 (23.4)	240 (23.6)
Rural	63 (12.6)	160 (15.9)	69 (6.8)
Marital status[*]			
In a committed relationship/Married	228 (45.6)	553 (55)	565 (55.5)
Employment status			
Not employed	198 (39.4)	383 (38.1)	377 (37.1)
Employed	260 (54.0)	567 (56.4)	470 (56.5)
Voluntary work	42 (8.4)	56 (5.6)	66 (6.5)
Level of education[**]			
College/University	442 (88.4)	922 (91.7)	956 (93.9)
Most common traumatic events			
Natural disaster	143 (28.6)	294 (29.2)	203 (19.9)
Transportation accident	182 (36.4)	412 (41.0)	474 (46.6)
Serious accident at work, home, or during recreational activity	143 (28.6)	277 (27.5)	332 (32.6)
Physical assault	205 (41.0)	553 (55.0)	549 (53.9)
Other unwanted or uncomfortable sexual experience	142 (28.4)	319 (31.7)	267 (26.2)
Life-threatening illness or injury	144 (28.8)	286 (28.4)	230 (22.6)
Most common stressors			
Death of a loved one	290 (58.0)	619 (61.5)	645 (63.4)
Unemployment	258 (51.6)	667 (66.3)	578 (56.8)
Too much /too little work	267 (53.4)	669 (66.5)	578 (56.8)
Pressure to meet deadlines	242 (48.4)	654 (65.0)	583 (57.3)
Financial problems	415 (83.0)	892 (88.7)	883 (86.7)
Death of a loved one	290 (58.0)	619 (61.5)	645 (63.4)
Unemployment	258 (51.6)	667 (66.3)	578 (56.8)

Note. [*]Remainder of the participants were not in a committed relationship/Not married.
[**]Remainder of the participants' level of education were primary/secondary school.

Table 2

Bivariate correlations between ADMN stressors, LEC and ADNM and ITQ Subscale scores Ghana (n = 500), Kenya (n = 1,006), and Nigeria (n =1,018)

	1	2	3	4	5	6	7	8	9	10
Ghana and Nigeria										
1. ADNM Stressors	1.00	**.465**	**.323**	**.320**	**.296**	**.327**	**.311**	**.287**	**.275**	**.314**
2. LEC	.395	1.00	**.274**	**.317**	**.376**	**.366**	**.334**	**.247**	**.232**	**.291**
3. AjD: Preoccupation	.409	.273	1.00	**.688**	**.409**	**.394**	**.386**	**.517**	**.465**	**.520**
4. AjD: Failure to adapt	.386	.268	.761	1.00	**.417**	**.372**	**.371**	**.501**	**.516**	**.537**
5. PTSD: Re-experiencing	.302	.345	.429	.394	1.00	**.573**	**.527**	**.407**	**.337**	**.329**
6. PTSD: Avoidance	.352	.315	.404	.345	.585	1.00	**.580**	**.434**	**.373**	**.410**
7. PTSD: Sense of threat	.335	.323	.402	.344	.603	.657	1.00	**.443**	**.327**	**.403**
8. DSO: Affective dysregulation	.344	.317	.492	.436	.430	.398	.391	1.00	**.562**	**.659**
9. DSO: Negative Self Concept	.308	.256	.494	.482	.329	.286	.302	.592	1.00	**.658**
10. DSO: Disturbed Relationships	.293	.304	.500	.435	.367	.344	.352	.602	.647	1.00
Kenya										
1. ADNM Stressors	1.00									
2. LEC	*.411*	1.00								
3. AjD: Preoccupation	*.288*	.242	1.00							
4. AjD: Failure to adapt	*.339*	.323	*.739*	1.00						
5. PTSD: Re-experiencing	*.322*	.416	*.385*	*.419*	1.00					
6. PTSD: Avoidance	*.294*	.339	*.355*	*.327*	*.542*	1.00				
7. PTSD: Sense of threat	*.338*	.333	*.370*	*.363*	*.562*	*.581*	1.00			
8. DSO: Affective dysregulation	*.289*	.273	*.477*	*.502*	*.394*	*.381*	*.408*	1.00		
9. DSO: Negative Self Concept	*.263*	.255	*.485*	*.515*	*.364*	*.363*	*.314*	*.590*	1.00	
10. DSO: Disturbed Relationships	*.290*	.251	*.441*	*.474*	*.344*	*.401*	*.374*	*.618*	*.707*	1.00

Note. all correlations were $p < .001$. The correlation values for Ghana are reported in the upper half below the diagonal. The values from Nigeria are reported in the upper half in boldface. Correlation values for Kenya are reported in the bottom half and italicized.

Table 3

Fit statistics for the alternative models of the ICD-11 adjustment disorder, PTSD and DSO symptoms Ghana (n = 500), Kenya (n = 1,006), and Nigeria (n =1,018)

Model		Chi-square (*df*)	RMSEA (90% CI)	CFI	TLI	SRMR	BIC
1. *1 factor model*							
Ghana	MLR	1608.805 (152)*	.139 (.133 - .145)	.645	.600	.103	26855.471
	WLSMV	2575.576 (152)*	.179 (.173- .185)	.826	.804	.121	
Kenya	MLR	3068.283 (152)*	.138 (.134 - .142)	.662	.620	.097	55226.366
	WLSMV	4678.696 (152)*	.172 (.168- .176)	.829	.808	.107	
Nigeria	MLR	2612.571 (152)*	.126 (.122 - .130)	.703	.666	.087	53591.406
	WLSMV	2575.576 (152)*	.179 (.173- .185)	.826	.804	.121	
2. *3 factor model*							
Ghana	MLR	599.449 (167)*	.072 (.066 - .078)	.904	.891	.050	26564.325
	WLSMV	616.314 (167)*	.075 (.068- .080)	.970	.966	.044	
Kenya	MLR	1110.422 (167)*	.075 (.071 -.079)	.899	.885	.049	55043.833
	WLSMV	1128.720 (167)*	.076 (.072- .0.08)	.966	.961	.043	
Nigeria	MLR	1277.017 (167)*	.081 (.077 - .085)	.878	.861	.051	53995.070
	WLSMV	1299.080 (167)*	.082 (.078- .086)	.955	.949	.047	
3. *8 first order*							
Ghana	MLR	242.857 (142)*	.038 (.030 - .046)	.978	.970	.029	26288.681
	WLSMV	297.393 (142)*	.047 (.039- .054)	.990	.986	.027	
Kenya	MLR	399.716 (142)*	.042 (.038 -.047)	.972	.963	.029	54390.877
	WLSMV	518.367 (142)*	.051 (.047- .056)	.987	.982	.026	
Nigeria	MLR	434.701 (142)*	.045 (.040 - .050)	.968	.957	.034	53179.027
	WLSMV	611.520 (142)*	.057 (.052- .062)	.981	.975	.029	
4. *8 first order, 1 second order*							
Ghana	MLR	680.642 (162)*	.080 (.074 - .086)	.885	.865	.081	26685.533
	WLSMV	610.291 (162)*	.134 (.128- .140)	.905	.888	.084	
Kenya	MLR	1195.748 (162)*	.080 (.075 - .084)	.889	.870	.077	55162.835
	WLSMV	2787.743 (162)*	.127 (.123- .131)	.906	.890	.076	

Nigeria	MLR	978.774 (162)*	.070 (.066 - .075)	.910	.894	.066	53675.383
	WLSMV	2049.806 (162)*	.107 (.103- .111)	.925	.912	.066	
5. *8 first order, 3 second order*							
Ghana	MLR	270.259 (159)*	.037 (.030 - .045)	.975	.970	.035	26216.387
	WLSMV	325.292 (159)*	.046 (.039- .053)	.989	.987	.032	
Kenya	MLR	479.214 (159)*	.045 (.040 - .049)	.966	.959	.035	54364.174
	WLSMV	588.261 (159)*	.052 (.047- .056)	.985	.982	.031	
Nigeria	MLR	496.231 (159)*	.046 (.041 - .050)	.963	.956	.038	53132.408
	WLSMV	627.389 (159)*	.054 (.049- .058)	.981	.978	.033	
6. *8 first order, 3 second order with predictors*							
Ghana	MLR	339.559 (193)*	.039 (.032 - .046)	.970	.964	.035	30314.148
	WLSMV	382.641 (193)	.044 (.038- .051)	.988	.985	.032	
Kenya	MLR	556.917 (193)*	.043 (.039 - .048)	.964	.957	.034	62273.838
	WLSMV	667.270 (193)*	.049 (.045- .054)	.983	.980	.030	
Nigeria	MLR	566.200 (193)*	.044 (.039 - .048)	.962	.954	.036	61287.045
	WLSMV	696.658 (193)*	.051 (.047-.055)	.980	.976	.032	

Note. $^{*}p < .001$

Figure 1

Factor analytic models of ICD-11 AjD, PTSD and DSO symptoms

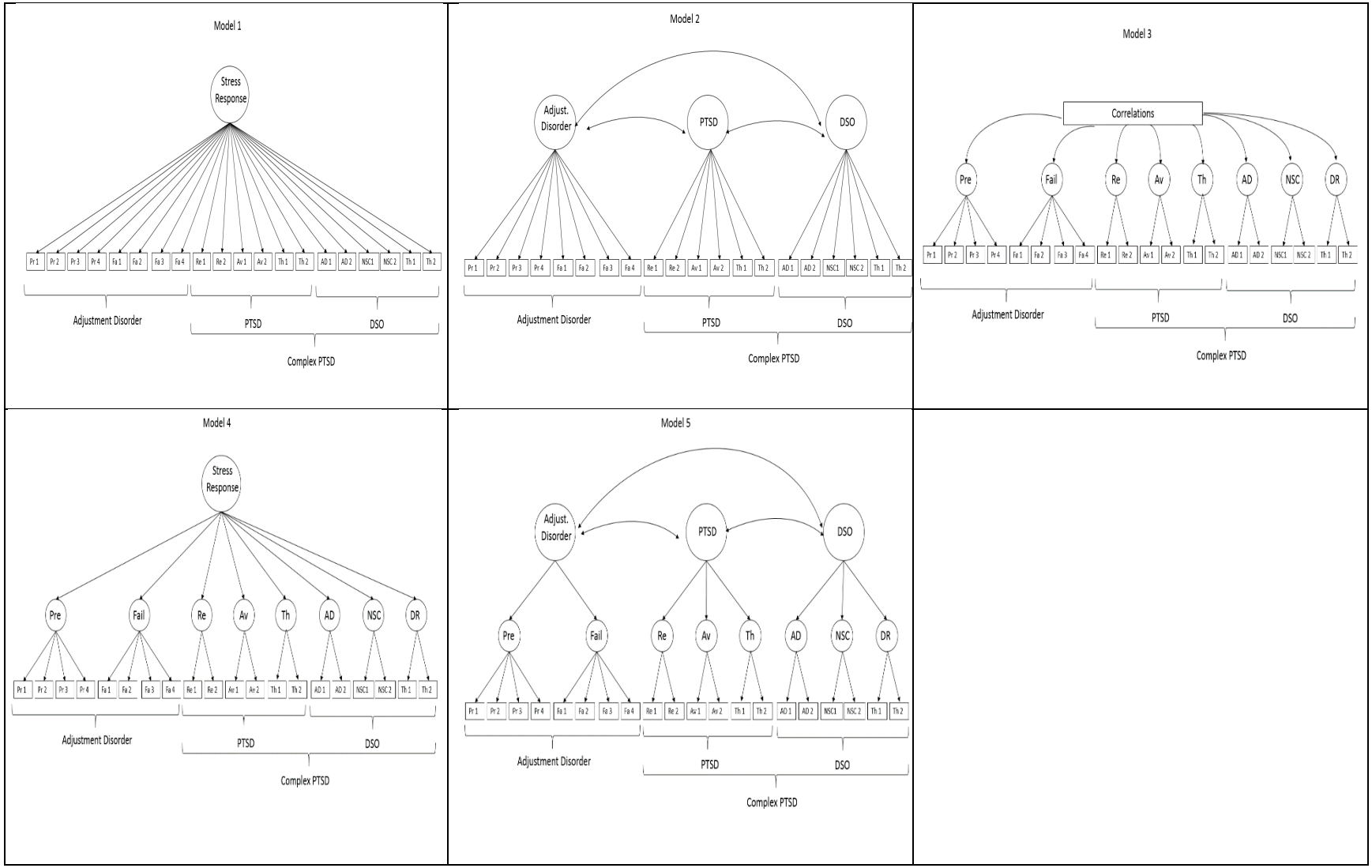
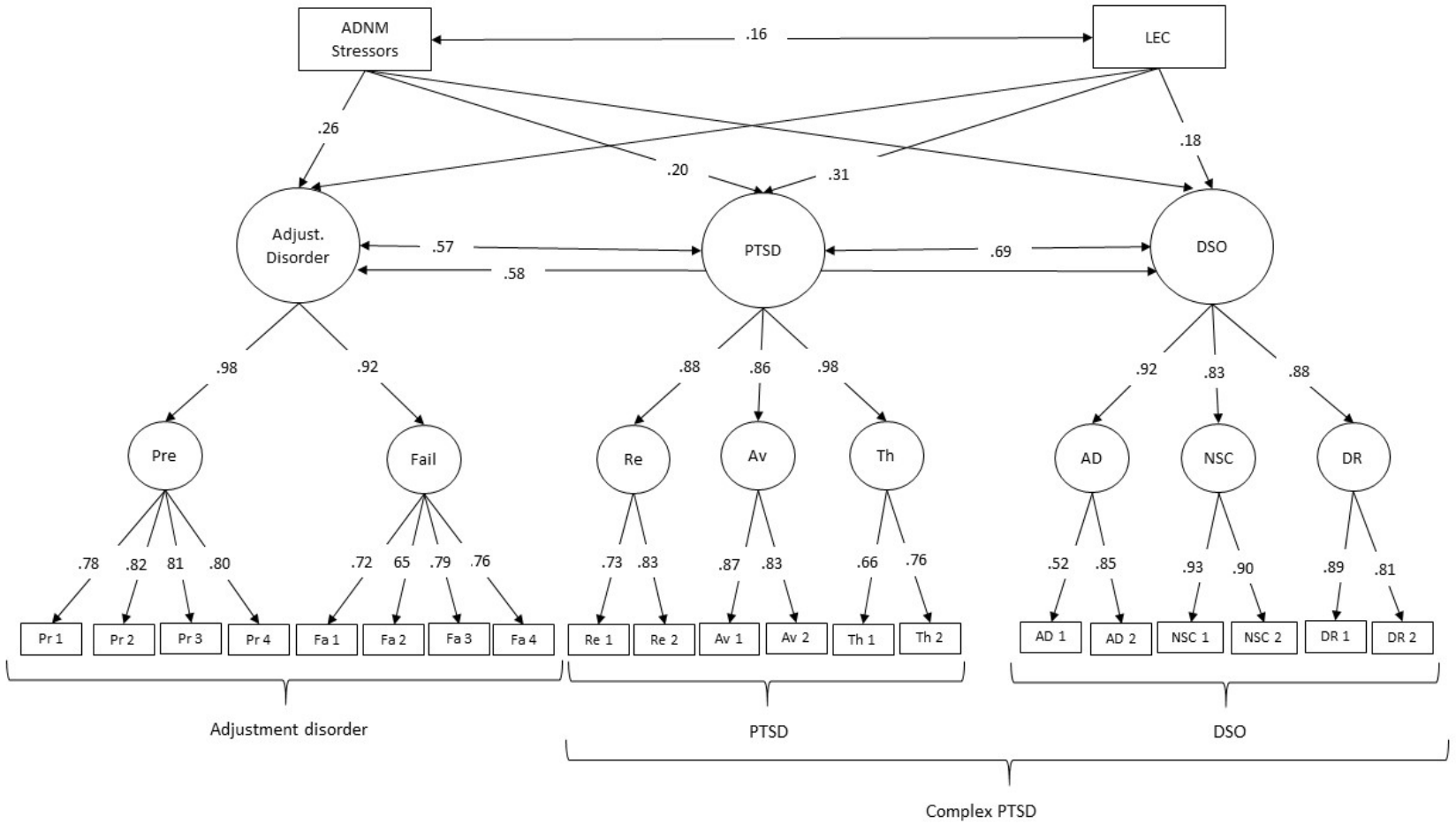


Figure 2

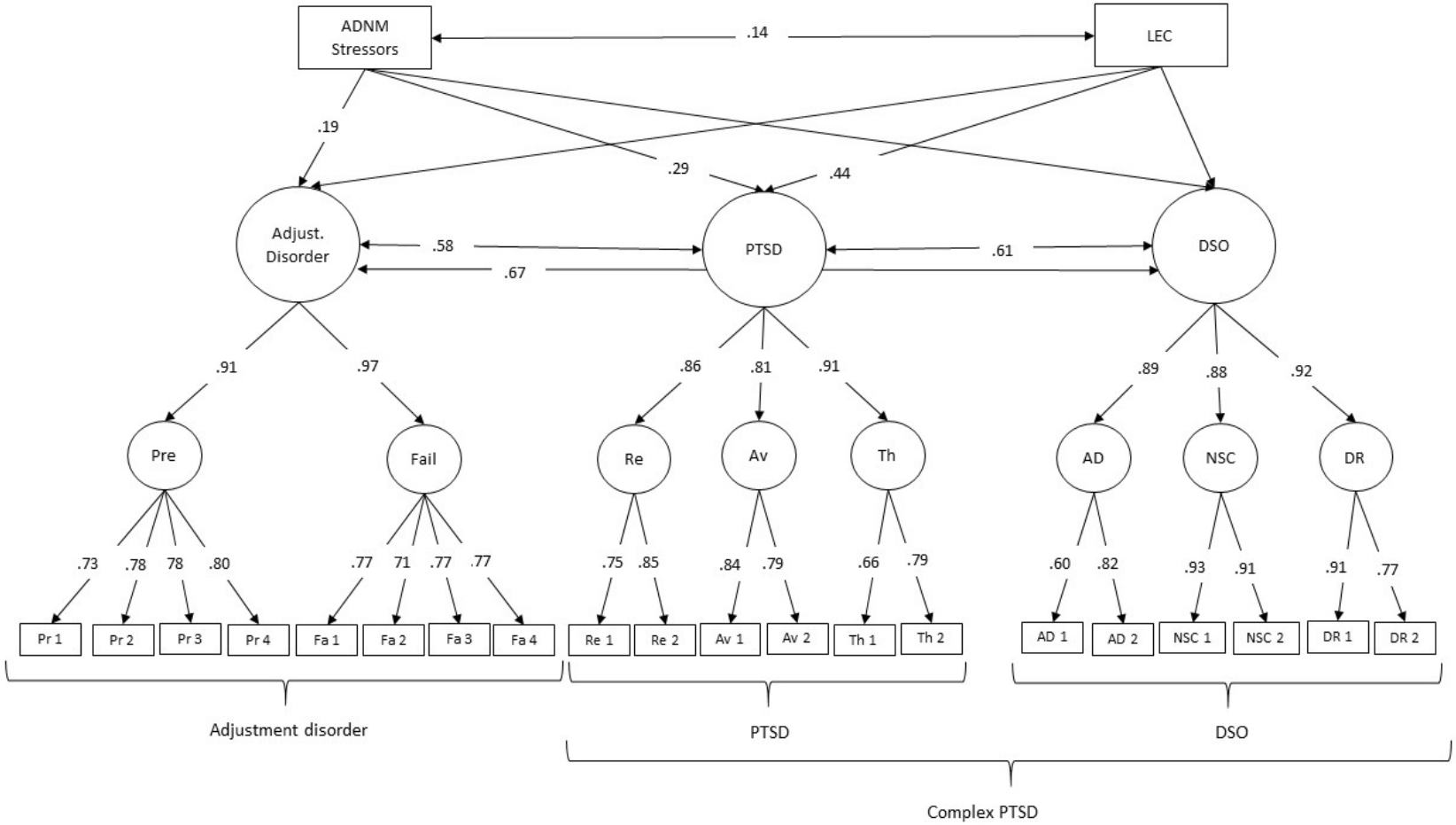
Estimates from factor analytic model of ICD-11 adjustment disorder, PTSD and DSO symptoms with predictors (Ghana).



Note. only significant values ($p < .05$) are reported.

Figure 3

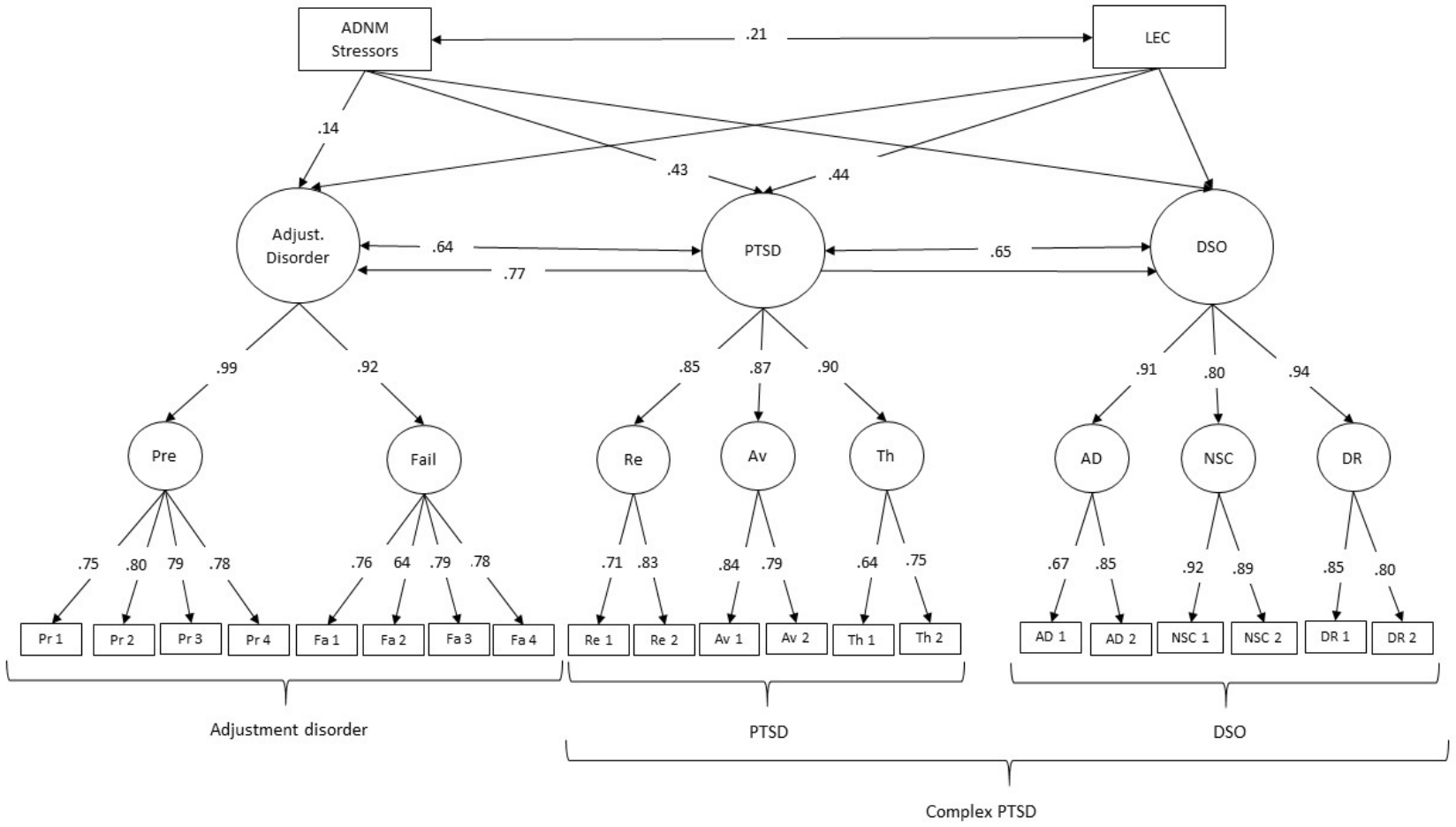
Estimates from factor analytic model of ICD-11 adjustment disorder, PTSD and DSO symptoms with predictors (Kenya).



Note. only significant values ($p < .05$) are reported.

Figure 4

Estimates from factor analytic model of ICD-11 adjustment disorder, PTSD and DSO symptoms with predictors (Nigeria).



Note. only significant values ($p < .05$) are reported.