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## Using Latent Class Analysis to Support the *ICD-11* Complex Posttraumatic Stress Disorder Diagnosis in a Sample of Homeless Adults

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### Abstract

The 11th revision of the *International Classification of Diseases (ICD-11)*, ratified at the World Health Assembly in May 2019, introduced revised diagnostic guidelines for posttraumatic stress disorder (PTSD) as well as a separate diagnosis of complex PTSD (CPTSD). We aimed to test the new *ICD-11* symptom structure for PTSD and CPTSD in a sample of individuals who have experienced homelessness. Experiences of trauma exposure and the associated mental health outcomes have been underresearched in this population. A

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sample of adults experiencing homelessness ( $N = 206$ ) completed structured and semi-structured interviews that collected information about trauma exposure and symptoms of PTSD and CPTSD. We conducted a latent class analysis (LCA) using six symptom clusters (three PTSD symptom clusters that are components of CPTSD and three CPTSD symptom clusters). All participants reported trauma exposure, with 88.6% having experienced at least one event before 16 years of age. Four distinct classes of participants emerged in relation to the potential to meet the diagnosis: LCA CPTSD ( $n = 122$ , 59.8%), LCA no diagnosis ( $n = 27$ ; 13.2%), LCA PTSD ( $n = 33$ ; 16.2%), and LCA disturbance in self-organization (DSO;  $n = 22$ ; 10.8%). Of note, participants with an *ICD-11* CPTSD as well as those with an *ICD-11* PTSD diagnosis fell into the LCA CPTSD class. Our findings provide some support for the distinction between CPTSD and PTSD within this population specifically but potentially have broader implications. Clear diagnoses will allow targeted PTSD and CPTSD treatment development.

### Using Latent Class Analysis to Support the *ICD-11* Complex Posttraumatic Stress Disorder Diagnosis in a Sample of Homeless Adults

Complex posttraumatic stress disorder (Complex PTSD) is a separate diagnosis recently included in the new 11th revision of the *International Classification of Diseases (ICD-11*; World Health Organization [WHO], 2018), which was released in June 2018. The *ICD-11* offers significant changes from 10th revision (*ICD-10*) in the classification of traumatic stress-related pathology. For example, posttraumatic stress disorder (PTSD) was previously categorized with neuroticism, somatoform, and adjustment disorders. “Disorders specifically associated with stress” is the new classification that independently constitutes disorders that are of consequence to experiencing stress. Posttraumatic stress disorder, with a revised item structure, as well as the new inclusion of complex PTSD (CPTSD) are diagnoses

that represent the extreme presentations in this category (World Health Organization [WHO], 2018). A CPTSD diagnosis is made when an individual meets the diagnostic requirements for PTSD and disturbances in self-organization (DSO) are present at any point during the course of the disorder. Previously, DSO symptoms were included in the diagnostic guidelines for “enduring personality change after catastrophic experience” (EPCACE) in the *ICD-10* (WHO, 1993). This new category in the *ICD-11* consolidates trauma-related symptomology and offers the first formalized diagnosis of CPTSD (Cloitre, Garvert, Brewin, Bryant, & Maercker, 2013; Maercker, Brewin, Bryant, Cloitre, Ommeren, et al., 2013; Maercker, Brewin, Bryant, Cloitre, Reed, et al., 2013).

The *ICD-11* PTSD diagnostic guidelines include three symptom clusters: (a) reexperiencing the traumatic event or events in the present (e.g., vivid memories or flashbacks); (b) avoidance of thoughts and memories of the event or events or avoidance of activities, situations, or people reminiscent of the event or events; and (c) persistent perceptions of heightened current threat (e.g., hypervigilance or an enhanced startle reaction to stimuli such as unexpected noises). Symptoms must persist for at least several weeks and cause significant impairment in personal, family, social, educational, occupational, or other important areas of functioning. For a diagnosis of CPTSD, all PTSD core symptoms must be present at some point during the course of CPTSD and three additional symptom clusters specific to CPTSD must also be present: (a) severe and pervasive problems in affect regulation (i.e., affect dysregulation; AD); (b) persistent beliefs about oneself as diminished, defeated or worthless, accompanied by deep and pervasive feelings of shame, guilt or failure related to the traumatic event (i.e., negative self-concept; NSC); and (c) persistent difficulties in sustaining relationships and feeling close to others (i.e., disturbances in relationships; DR). An individual is considered to have met the diagnostic criteria for a symptom cluster when they endorse at least one of two items in the cluster (World Health Organization, 2018).

The development of the CPTSD construct was initially driven by clinicians who recognized the need to adequately care for individuals who presented with persistent and disabling AD, NSC, and DR, collectively identified as DSO. The momentum for recognition of an associated diagnosis has been building for more than 20 years (Beltran, Silove, & Llewellyn, 2009; Courtois & Ford, 2009; Ford, Stockton, Kaltman, & Green, 2006; Herman, 1992). The *ICD-11* Working Group recognized this field of research in developing diagnostic guidelines for CPTSD.

In the time since the *ICD-11* Working Group released their proposed diagnostic guidelines for CPTSD, there has been a growing body of research focused on the theoretical separation of CPTSD from PTSD (Cloitre et al., 2013; Wolf et al., 2015) across samples exposed to different trauma types, such as (e.g. bereavement, sexual victimization, and physical assault: Elklit, Hyland, & Shevlin, 2014; e.g. childhood institutional abuse: Knefel, Garvert, Cloitre, & Lueger-Schuster, 2015) as well as in non-Western samples (Murphy, Elklit, Dokkedahl, & Shevlin, 2016). This research has predominantly used latent profile analyses (LPA) and latent class analyses (LCA). These analytic methods are used to cluster individuals into groups based on patterns of symptom response on continuous measures for LPA and categorical measures for LCA (Muthén & Muthén, 2000). If CPTSD is a separate construct from PTSD, as is described by the new *ICD* definition, then separate CPTSD and PTSD classes would be expected to emerge from clustering. If they are part of the same construct, profiles would likely diverge regarding severity scores or endorsement probability across all items rather than along phenomenology lines.

Cloitre et al. (2013) ran an LPA and found three distinct diagnostic profiles in a sample of 302 individuals seeking treatment for interpersonal trauma exposure: PTSD (31.8%), CPTSD (36.1%), and a low-symptom profile (32.1%). Using LCA, Elklit et al. (2014) demonstrated further support for CPTSD as a separate diagnosis in a mixed-trauma-exposed

community sample of 1,251 participants; this study found a CPTSD class (13.0%), a PTSD class (33.6%), and a class that had a low probability of endorsing either diagnosis (53.4%). In contrast, Wolf et al. (2015) initially replicated the results reported by Cloitre et al. (2013), using LPA with their sample of 323 trauma-exposed, treatment-seeking veterans. However, the authors also investigated the theoretical framework of the clusters, using applied factor mixture modeling (FMM), which is a combination of latent class analysis and standard factor analysis (Lubke & Muthén, 2007) and groups symptoms into classes. Response patterns are then considered in conjunction with the symptom structure of those response patterns (Kramer et al., 2016). An LCA does not include the simultaneous consideration of the latent symptom structure (i.e., the factor-analytic component). In this case, the FMM failed to find differentiation between the PTSD and CPTSD and instead found a model of severity in which the level of symptom endorsement positively increased in line with other symptom severity endorsement across both disorders (Wolf et al., 2015). The authors concluded from their findings that CPTSD was a subtype of PTSD rather than a distinct disorder.

More recently, Murphy et al. (2016) compared two samples of young Northern Ugandan adults ( $N = 314$ ;  $n = 124$  former child soldiers,  $n = 190$  civilians) using LCA to test the *ICD-11* diagnostic algorithm. Their results also separated participants into three classes: a CPTSD class (40.3%), a PTSD class (43.1%), and a low-symptom class (16.6%). The former child soldiers were five times more likely to be grouped into the CPTSD class than in the low-symptom class, odds ratio ( $OR$ ) = 5.43, 95% CI [2.44, 12.09].

Knefel and colleagues (2015) found a variation of the three-class solution in a sample of 229 Austrian adult survivors of childhood institutional abuse, which included physical, sexual, and emotional maltreatment. The authors identified a four-class LPA solution that included a group with elevated symptoms of CPTSD (20.1%), a PTSD group (17.5%), a group with elevated DSO symptoms and some elevated PTSD symptoms (19.2%), and a

group with low levels of symptoms (43.2%). Although the authors demonstrated a similar separation of PTSD and CPTSD as was shown in the other investigations, the third class (i.e., elevated DSO with some elevated PTSD symptoms) represented a substantial minority of the sample. The authors argued that the most likely reason for this deviation from the three-class solutions found in similar studies rested in the characteristics of the sample, as participants had universally experienced repetitive childhood trauma exposure and there was the possible presence of other mental health illnesses. More recently, Perkonigg et al. (2016) also found a four-class solution, in a large community sample of young Caucasian participants in Germany. As with Knefel et al. (2015), the fourth class of individuals identified were highly symptomatic but did not meet diagnostic definitions of either PTSD or CPTSD. A further study found an alternative five-class solution, with an “anxiety” class and a “dissociative PTSD-subtype” class in a sample of individuals of mixed ethnicity and geographic regions who had experienced prolonged interpersonal trauma (Palic et al., 2016).

To our knowledge, prior to the present study, the new diagnostic guidelines for PTSD and CPTSD have not been tested in a sample of individuals experiencing long-term homelessness. It is understood that this population report high levels of trauma exposure (Buhrich, Hodder, & Teesson, 2000), experience social exclusion, and have challenging comorbid mental health presentations (Robinson, 2005). We aimed to understand how the new *ICD-11* PTSD and CPTSD diagnoses would capture individuals’ profiles from this population. Currently, there are no published prevalence rates for these diagnoses in this population. Although, in an Australian sample ( $N = 56$ ) of adults accessing homeless services, 79% of participants met lifetime (41% for the past 12 months) PTSD criteria according to the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)*; (Taylor & Sharpe, 2008).

We tested the *ICD-11* diagnostic algorithm for PTSD and CPTSD in a novel, highly trauma-exposed population: people experiencing homelessness. Our decision to test the *ICD-11* diagnostic algorithms for PTSD and CPTSD in a sample of people experiencing homelessness was based on the findings that this population has been exposed to very high levels of trauma when compared to the general population (Mills et al., 2011; Taylor & Sharpe, 2008). There is evidence that trauma exposure in this population occurs prior to becoming homeless (e.g., during childhood: Tsai, Edens, & Rosenheck, 2011) as well as after becoming homeless (Kim, Bender, Ferguson, Begun, & DiNitto, 2018).

We extended the existing *ICD-11* CPTSD diagnostic research in two ways. First, we identified participants who met the *ICD-11* diagnostic definition for PTSD and CPTSD. We compared these groups, with classes identified through an LCA to see whether the LCA PTSD and CPTSD classes identified the same people as the *ICD-11* diagnostic guidelines. Second, for instances in which there was a lack of overlap between the diagnostic guidelines and LCA classes, we examined where the discrepancy was at a symptom-cluster level. This methodology has been used to help understand how the provisional diagnosis of CPTSD fits this unique sample of participants.

## Method

### Participants and Procedure

Participants were recruited from drop-in centers attached to one of four homelessness agencies in Melbourne, Australia ( $N = 206$ ;  $M$  age = 45.17 years,  $SD = 11.37$ , range: 18–86 years; see Table 1). These centers offer a wide range of services, including cooked meals, showers, and facilities for washing clothes. Convenience sampling was used, considering the following inclusion rules: (a) age over 18 years, as required for ethics approval; (b) competent in speaking English; and (c) experiencing long-term homelessness. Exclusion criteria were based on clinical judgment and included being actively psychotic, intoxicated at

the time of the interview, or otherwise cognitively impaired. For practical reasons, participants were required to be competent in English as the interview was in English. Similarly, if participants were actively psychotic, intoxicated, or otherwise cognitively impaired, the interviews would not be valid. The latter was determined by judging whether the potential participant was able to actively engage in the interview. A person met criteria for long-term homelessness if they were sleeping outside, in an abandoned or unoccupied building, or in insecure housing, such as a rooming house (Chamberlain & Johnson, 2001) for a period of 3 years or more. To avoid study inclusion of poorer members of the community who may have accessed free meals from the drop-in centers but were not actually experiencing homelessness, long-term homelessness was defined as living for 3 years in the aforementioned circumstances. Participants were identified through a stratified randomization procedure (Rosenberger & Lachin, 2015) conducted at each drop-in service (see Supplementary Materials S1). People who were randomly selected and met inclusion criteria were invited to participate in the current study. One interviewer, who was supervised by a senior researcher, completed all interviews. The study was approved by the ethics committee at the University of Melbourne, and all participants provided written, informed consent. Each participant was given an information sheet containing various levels of local support contacts, including a staff member of the referring service who was named by the participant and written on the sheet. Participants were given a \$20 (AUD) food voucher or payment as reimbursement for their participation in the study, determined by the policy of the relevant agency.

## Measures

**Demographic and participant characteristics.** The interview was structured to first gather demographic information, including age, gender (male, female, transgender), marital status (single, separated-divorced, widowed, or partnered), and ethnicity (Anglo-Euro-

Australian, Indigenous, Torres Strait Islander-Pacific Islander, Asian-Australian, other, unknown). Duration of homelessness was also determined through targeted questions to ensure that the sample only included people who had slept outside, in an abandoned or unoccupied building, or in insecure housing, such as a rooming house, for a total period of 3 years or more.

**PTSD diagnosis and symptoms.** The *ICD-11* PTSD symptom clusters of reexperiencing, avoidance, and arousal were assessed using items from the PTSD Symptom Scale Interview (PSS-I; Foa, Riggs, Dancu, & Rothbaum, 1993). The PSS-I is a structured clinical interview that consists of 17 semistructured items, which correspond to *DSM-IV* PTSD symptoms. Respondents are asked to rate items on a scale ranging from 0 (*not at all*) to 3 (*5 times a week or more/very much*), with higher scores reflecting more symptom severity. Participants were asked to rate items based on past-year symptoms. The measure has demonstrated a high level of reliability, with Cronbach's alpha coefficients ranging from .69 to .85, test-retest reliability over 1 month ranging from .66 to .77, and intraclass correlation coefficients ranging from .73 to .92 ( $p < .001$ ; Foa et al., 1993). Table 2 presents the items that were selected from the PSS-I for the relevant *ICD-11* PTSD symptom clusters. These items were then used to make the *ICD-11* diagnosis of PTSD. Given that the *ICD-11* was yet to be ratified at the time of writing, these diagnoses should be considered provisional.

**Complex PTSD symptoms and diagnosis.** Past-year symptoms of *ICD-11* CPTSD were assessed using items from the Structured Interview for Disorders of Extreme Stress—Revised (SIDES-R; Ford & Kidd, 1998; Pelcovitz et al., 1997). The interviewer-rated items are scored using a range of 0 (*normal presentation*) to 4 (*severe symptom presentation*). The SIDES-R has demonstrated acceptable internal consistency (Cronbach's  $\alpha s = .74-.93$ ) and interrater reliability ( $\kappa = .87, p < .001$ ; Ford & Kidd, 1998). At the time the current study

began, the SIDES-R was the most established measure of symptoms that occur after the experience of prolonged and severe trauma (Pelcovitz et al., 1997; Scoboria, Ford, Lin, & Frisman, 2008). Table 2 presents the items from the SIDES-R that were selected for assessment of the *ICD-11* CPTSD symptom clusters of AD, DR, and NSC in the present study. Acceptable levels of reliability and validity have been reported, with convergence demonstrated by a significant correlation with measures of PTSD (Scoboria et al., 2008). As with PTSD, these diagnoses should be considered provisional.

**Lifetime trauma exposure.** In the current study, we differentiated between Type I and Type II trauma exposure. Type I trauma was defined as single-incident events, including serious motor vehicle accidents, natural disasters, and one-time interpersonal events (e.g., assault or terrorist attack perpetrated by a person or persons unknown; Terr, 1991). Type II trauma was defined as interpersonal, prolonged, or repetitive trauma that was perpetrated by a primary caregiver or other ostensibly responsible adult or by a person one could reasonably expect to be safe with (e.g., sibling or intimate partner; (Terr, 1991). Examples of Type II trauma include childhood sexual abuse as well as captivity and torture as a consequence of totalitarian regimes. We used the Composite International Diagnostic Interview Traumatic Events Questionnaire (CIDI; World Health Organization, 1996) to record exposure to traumatic events. Participants were also asked the age at which a traumatic event occurred and whether it was repetitive or prolonged.

### **Data Analysis**

Descriptive statistics and frequency of trauma exposure were calculated using SPSS (Version 25; Muthén & Muthén, 2017). The frequency of PTSD and CPTSD diagnoses was determined depending on whether participants met the *ICD-11* diagnostic definitions. We conducted LCA using Mplus (Version 7.4; Muthén & Muthén, 2012).

A latent class analysis was used to determine the number of classes that best represented how individuals grouped together into clusters based on having similar responses to items related to the indicative measures, which, for this study, were the six *ICD-11* PTSD and CPTSD symptom clusters. Analyses were conducted in a step-wise manner using six dichotomous (i.e. *yes* or *no*) items. Three items reflected the *ICD-11* PTSD symptom clusters of reexperiencing, avoidance, and arousal, and three items represented the additional CPTSD symptom clusters of AD, DR, and NSC. In the first step, the most parsimonious (one-class) model was fitted. Next, successive models with increasing numbers of classes (up to five) were investigated to determine which model demonstrated the best fit for the data.

Model fit was assessed using a variety of criteria, including Bayesian information criterion (BIC: Schwarz, 1978), sample-size-adjusted Bayesian information criterion (SS-BIC), and Akaike's information criterion (AIC: Akaike, 1973). Additionally, we investigated entropy, an index of classification quality, with a value of 1.00 indicative of perfect differentiation (Ramaswamy, DeSarbo, Reibstein, & Robinson, 1993). Finally, we used the Lo–Mendell–Rubin likelihood ratio test (LMR-LRT; Lo, Mendell, & Rubin, 2001), which compares the fit of a model solution with  $k$  classes to the previous solution, with  $k-1$  classes; thus, a significant LMR-LRT suggests that the model has a better fit than the previous model.

To get a better understanding of the LCA classes, we examined the degree to which the *ICD-11* PTSD and CPTSD diagnostic groups overlapped with the LCA classes. As the overlap between *ICD-11* diagnostic groups and LCA classes were not exact, we then attempted to understand any discrepancy by looking at the endorsement of each symptom cluster (reexperiencing, arousal, avoidance, AD, DR, NSC); we used crosstabulation to perform this function.

## Results

A total of 206 participants participated in the survey. Two participants did not complete all measures and were, therefore, removed from all analyses. All participants who completed the survey had been homeless for many years ( $M = 18.20$  years,  $SD = 14.92$ ). Participants reported high levels of trauma exposure and high frequencies of trauma exposure across multiple traumatic events (see Table 1). Most participants experienced their first traumatic event early in life ( $M = 8.36$  years,  $SD = 6.58$ ) and met the criteria for experiencing Type II trauma ( $n = 187$ , 90.8%). The age at which the first traumatic experience occurred was most often earlier than the first experience of homelessness; the first experience of homelessness most often occurred during late teens and early adulthood ( $M$  age = 22.75 years,  $SD = 13.30$ ). In 38.3% of participants, childhood trauma exposure and the disintegration or absence of a family unit were the reasons given for first experiencing homelessness.

Functional impairment was not explicitly measured as specified by the *ICD-11* guidelines; therefore, PTSD or CPTSD classes mentioned in the text refer to probable diagnoses. In the sample, 12.6% ( $n = 26$ ) of participants met the *ICD-11* PTSD diagnostic definition, and 35.0% ( $n = 72$ ) also met the diagnostic definition consistent with the guidelines for CPTSD, in addition to the core PTSD symptoms. Of participants who did not meet the diagnostic definition for either PTSD or CPTSD, there was a group of participants who endorsed all of the DSO symptoms but did not meet the diagnostic definition of CPTSD because the core symptom pattern, shared by PTSD and CPTSD, was either not met or not fully met ( $n = 39$ , 19.0%). In order to compare membership of these diagnostic groups to the classes found through the LCA, we named these groups, respectively, the *ICD* PTSD and *ICD* CPTSD groups. We also identified an *ICD* DSO group, which comprised participants who were quite different in symptom presentation from those with no diagnosis, by virtue of

high levels of DSO symptom endorsement. As such, we identified four *ICD* diagnostic groups, which we labeled *ICD* PTSD, *ICD* CPTSD, *ICD* DSO, and *ICD* no diagnosis.

### Latent Class Analysis

Table 3 shows the results of the LCA, which demonstrated evidence for a four-class solution. The decreases in all goodness-of-fit indices, log-likelihood values, and AIC, BIC, and SS-BIC values were consistent from the three-class to four-class model. Entropy increased from the three-class (.809) to the four-class (.827) solution, and the LMR-LRT was significant to the four-class solution,  $p = .048$ . Further, each class size contained a reasonable proportion of participants for investigation, with the smallest class representing more than 10% of the sample. The five-class solution resulted in substantial increases in the values across all methods of significance, and, therefore, was rejected as a valid solution.

Figure 1 shows the item endorsement probability for members of each LCA class. Values .60 or above represent high probabilities that the symptom was present in the class, and probabilities of .15 or less represent a low probability that the symptom was present in the class. Accordingly, we considered values of .15 to .59 as representative of moderate probability that the symptom was present in the class (Burstein et al., 2012). In the selected model, Class 2 and Class 4 had item endorsement profiles that were subclinical in that they would not meet *ICD-11* guidelines for either a PTSD or CPTSD diagnosis. The four classes that emerged were identified as LCA CPTSD ( $n = 122$ , 59.8%), LCA no diagnosis ( $n = 27$ , 13.2%), LCA PTSD ( $n = 33$ , 16.2%), and LCA DSO ( $n = 22$ , 10.8%).

Because both the *ICD* diagnostic guidelines and the LCA grouped participants into four groups, comparing those groups for similarities and differences allowed us to test whether the intent of the guidelines was captured in this sample. To get a better understanding of the LCA classes, we examined the overlap between the *ICD-11* diagnostic groups (*ICD* PTSD, *ICD* CPTSD, *ICD* DSO, and *ICD* no diagnosis) and the LCA classes

(LCA PTSD, LCA CPTSD, LCA DSO, and LCA no diagnosis). The LCA CPTSD class included all 72 of the participants who fell into the *ICD* CPTSD diagnostic group. However, this left an additional 50 participants who fell into the LCA CPTSD class who were not identified by the *ICD-11* diagnosis of CPTSD. Most members of the LCA CPTSD class who did not meet the *ICD-11* diagnostic definition for CPTSD fell into *ICD-11* PTSD ( $n = 18$ ) or the *ICD* DSO groups ( $n = 22$ ). To understand why this was the case, crosstabulation was conducted with each of the endorsed symptom clusters. In Table 4, the endorsement frequencies of these *ICD-11* symptom clusters are reported for the four *ICD* diagnostic groups as they were distributed within the four LCA classes. Participants in the LCA CPTSD class who received a PTSD diagnosis did not receive a CPTSD diagnosis mainly because they did not meet the criteria for the symptom cluster concerning interpersonal difficulties. Individuals who scored high on DSO symptoms tended not to reach a CPTSD diagnosis because they did not meet the criteria for the reexperiencing symptom cluster, and to a lesser extent, the avoidance cluster. Participants in the LCA PTSD class either met the *ICD-11* diagnostic definition for PTSD ( $n = 8$ ) or fell into the *ICD* no diagnosis group ( $n = 24$ ). Generally, individuals who failed to meet the PTSD diagnostic definition did so because they did not meet the reexperiencing or avoidance symptom cluster requirements. We were interested to examine the diagnostic overlap with the LCA DSO class. Participants who fell into this class did not meet the diagnostic definition for PTSD or CPTSD but instead were equally divided between the *ICD* DSO group ( $n = 11$ ) and the *ICD* no diagnosis group ( $n = 11$ ).

## Discussion

Empirical evidence that recognizes CPTSD as a disorder distinct from PTSD is building (Cloitre et al., 2013; Courtois & Ford, 2009). To date, seven studies have used LCA or LPA to investigate the construct (Cloitre et al., 2013; Elklit et al., 2014; Knefel et al.,

2015; Murphy et al., 2016; Palic et al., 2016; Perkonig et al., 2016; Wolf et al., 2015), with each offering differing levels of support for the *ICD-11* CPTSD diagnosis. Our study, in a sample of people experiencing homelessness, also provided mixed support for the construct as defined in *ICD-11*. Our LCA identified a four-class model that was characterized by a CPTSD class, a PTSD class, a “no disorder” class, and a class that demonstrated a high level of DSO symptoms. Individuals in the CPTSD class had a high probability of endorsing the three PTSD symptom clusters and the DSO symptom clusters. Individuals in the PTSD class had a high probability of endorsing the reexperiencing and avoidance clusters as well as a moderate probability of endorsing the arousal cluster. They also had a lower probability of endorsing the DSO symptom clusters. These distinct classes provide support for the argument that PTSD and CPTSD are separate disorders.

We extended recent findings by comparing the LCA classes with the grouping patterns we identified from the *ICD-11* diagnostic algorithm. We found that of individuals who were classed in the LCA CPTSD class, nearly 60% met the *ICD-11* CPTSD diagnostic guidelines; this included all individuals who met the criteria for an *ICD-11* CPTSD diagnosis. The other 41.0% of participants in this class fell into three groups. The largest of these groups (i.e., 22.1% of those in the CPTSD class) met criteria for the AD, DR, and NSC symptom clusters but not criteria for the PTSD symptom clusters. In general, it was the lack of endorsement of the reexperiencing symptom cluster that prevented individuals in this group from meeting the *ICD-11* CPTSD diagnostic criteria. Another group (14.8% of participants in the CPTSD class) met the definition for PTSD but did not endorse the DR symptom cluster. Finally, 4.1% did not meet the guidelines for either diagnosis in this class.

Further to this, there was not an LCA diagnostic class that predominantly represented the *ICD-11* PTSD group. In fact, 69.2% of participants who met the *ICD-11* PTSD diagnostic guidelines were members of the LCA CPTSD class. Thus, although the LCA

identified two qualitatively distinct classes that could be described as a CPTSD class and a PTSD class, individuals who met the *ICD-11* diagnostic definition for CPTSD and PTSD did not necessarily fall into the appropriate class, especially those with an *ICD-11* diagnosis of PTSD.

In keeping with the outcomes of the study by Knefel et al. (2015), our LCA identified a class that was high in DSO symptoms but low in the endorsement of PTSD symptoms. This was a small (11.0% of the whole sample) but interesting group. It could be that these symptom clusters make up another part of a different psychiatric disorder. For example, borderline personality disorder (BPD) presents with a pervasive pattern of instability in relationships, self-image, and affect (American Psychiatric Association, 2013), and recent research suggests that BPD prevalence rates are high in homeless samples (Whitbeck, Armenta, & Welch-Lazoritz, 2015). Furthermore, childhood abuse has been associated with personality disorders (Bandelow et al., 2005) and Axis I disorders (Galatzer-Levy, Nickerson, Litz, & Marmar, 2013). Like participants in the study by Knefel et al. (2015), participants in the present study reported high levels of Type II trauma in childhood, which may explain the finding of this class.

The number of participants classified in the LCA CPTSD class (59.8%) was exceptionally high in the current study. In other similar studies, authors have reported CPTSD estimates of 36% (treatment seeking interpersonal trauma survivors: Cloitre et al., 2013), 0.6% in a community sample, 13% (veteran sample: Wolf et al., 2015), 10% (mixed trauma sample: Elklit et al., 2014), and 40% (adults from North Uganda: Murphy et al., 2016). It is most likely that the high levels of trauma exposure combined with the ongoing threat of reoccurring exposure in the present sample contributed to our finding. Most participants in the present study had experienced prolonged and repetitive trauma (i.e., Type II trauma), and, for most participants, this had occurred in childhood. In addition to this, all

participants had experienced numerous Type I traumas, especially after becoming homeless.

Ongoing trauma exposure in childhood increases the risk for CPTSD because of the developmental periods in which the trauma occurs (Cloitre et al., 2009). Finally, these participants were likely to remain at high risk for interpersonal trauma exposure due to ongoing homelessness, thus arresting opportunities for symptom extinction.

The present study was limited by the high levels of trauma exposure in the sample. All participants had exceptionally high levels of both Type I and Type II trauma exposure, and this homogeneity could have impacted our findings. For example, the finding that individuals in the LCA PTSD class also had a moderate probability of reporting DSO symptoms is likely a function of the highly trauma-exposed sample. In addition to this, the inclusion of a small, homogenous sample of highly traumatized participants does limit the generalizability of our findings. The trauma exposure profile of this sample far exceeds those of other trauma groups and, in this way, may represent a unique representation of the measure when compared to other trauma samples. Our study was also limited because we did not use a psychometrically valid scale to measure *ICD-11* PTSD and CPTSD. At the time of study development, no scale was available; however, this is no longer the case as the *ICD-11* Trauma Questionnaire (ICD-TQ; Karatzias et al., 2016) has since been published. Further, we did not assess the presence of other disorders, particularly BPD, that are characterized by high levels of DSO (Cloitre, Garvert, Weiss, Carlson, & Bryant, 2014).

A diagnosis of CPTSD according to *ICD-11* criteria specifically requires that the symptoms are associated with significant functional impairment. Functional impairment was not explicitly measured in the current study but was inferred from the fact that all participants had experienced homelessness for at least 3 years, did not have stable accommodations at the time of the interview, and were all unemployed and accessing

support services. However, it is possible that such an inference is inaccurate, as the observed disabilities may have other causes.

The new revision of the *ICD* has introduced the distinct disorder of CPTSD and reconfigured the related disorder, PTSD. Our study in a sample of highly traumatized people with experience of homelessness provides some support for these new diagnoses in that two distinct groups, defined as a PTSD class and a CPTSD class, were identified. However, the high levels of AD, DR, and NSC in this sample made this distinction less clear, which has raised questions about the diagnostic fit of the new guidelines in this sample. What was clear in our findings was the complexity of trauma-related symptoms in this sample of people experiencing homelessness. Clinically, CPTSD is a highly useful diagnosis in this population that will help clinicians deliver appropriate and targeted mental health care. Future studies need to be conducted in larger samples to further test this construct, particularly in samples of individuals who have experienced long-term homelessness. Further investigations should also consider what influence, if any, various comorbid presentations have on the *ICD-11* diagnoses of PTSD and CPTSD. Finally, an extension of the examination of the diagnostic groups might include defining a probability cut-off that determines an individual's group membership to investigate associations between the diagnostic groups and the most probable members of the class.

## References

- Akaike, H. (1973). Maximum likelihood identification of Gaussian autoregressive moving average models. *Biometrika*, 60(2), 255-265. <https://doi.org/10.1093/biomet/60.2.255>
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (DSM-5®)*: American Psychiatric Pub.

- Bandelow, B., Krause, J., Wedekind, D., Broocks, A., Hajak, G., & Rüther, E. (2005). Early traumatic life events, parental attitudes, family history, and birth risk factors in patients with borderline personality disorder and healthy controls. *Psychiatry Research, 134*(2), 169-179. <https://doi.org/10.1016/j.psychres.2003.07.008>
- Beltran, R. O., Silove, D., & Llewellyn, G. M. (2009). Comparison of ICD-10 diagnostic guidelines and research criteria for enduring personality change after catastrophic experience. *Psychopathology, 42*(2), 113-118. <https://doi.org/10.1159/000204761>
- Buhrich, N., Hodder, T., & Teesson, M. (2000). Lifetime prevalence of trauma among homeless people in Sydney. *Australian & New Zealand Journal of Psychiatry, 34*(6), 963-966. <https://doi.org/10.1080/000486700270>
- Burstein, M., Georgiades, K., Lamers, F., Swanson, S. A., Cui, L., He, J.-P., . . . Merikangas, K. R. (2012). Empirically derived subtypes of lifetime anxiety disorders: Developmental and clinical correlates in US Adolescents. *Journal of Consulting and Clinical Psychology, 80*(1), 102. <https://doi.org/10.1037/a0026069>
- Chamberlain, C., & Johnson, G. (2001). The debate about homelessness. *Australian Journal of Social Issues, 36*(1), 35-50. <https://doi.org/10.1002/j.1839-4655.2001.tb01312.x>
- Cloitre, M., Garvert, D. W., Brewin, C. R., Bryant, R. A., & Maercker, A. (2013). Evidence for proposed ICD-11 PTSD and complex PTSD: A latent profile analysis. *European Journal of Psychotraumatology, 4*. <https://doi.org/10.3402/ejpt.v4i0.20706>
- Cloitre, M., Garvert, D. W., Weiss, B., Carlson, E. B., & Bryant, R. A. (2014). Distinguishing PTSD, complex PTSD, and borderline personality disorder: A latent class analysis. *European journal of psychotraumatology, 5*. <https://doi.org/10.3402/ejpt.v5.25097>
- Cloitre, M., Stolbach, B. C., Herman, J. L., van der Kolk, B., Pynoos, R., Wang, J., & Petkova, E. (2009). A developmental approach to complex PTSD: Childhood and

- adult cumulative trauma as predictors of symptom complexity. *Journal of Traumatic Stress*, 22(5), 399-408. <https://doi.org/10.1002/jts.20444>
- Courtois, C. A., & Ford, J. D. (Eds.). (2009). *Treating Complex Traumatic Stress Disorders: An evidence-based guide*. New York: Guilford Press.
- Elklit, A., Hyland, P., & Shevlin, M. (2014). Evidence of symptom profiles consistent with posttraumatic stress disorder and complex posttraumatic stress disorder in different trauma samples. *European Journal of Psychotraumatology*, 5. <https://doi.org/doi.org/10.3402/ejpt.v5.24221>
- Foa, E. B., Riggs, D. S., Dancu, C. V., & Rothbaum, B. O. (1993). Reliability and validity of a brief instrument for assessing Post-Traumatic Stress Disorder. *Journal of Traumatic Stress*, 6(4), 459-473. <https://doi.org/10.1002/jts.2490060405>
- Ford, J. D., & Kidd, P. (1998). Early childhood trauma and disorders of extreme stress as predictors of treatment outcome with chronic posttraumatic stress disorder. *Journal of Traumatic Stress*, 11(4), 743. <https://doi.org/10.1023/A:1024497400891>
- Ford, J. D., Stockton, P., Kaltman, S., & Green, B. L. (2006). Disorders of extreme stress (DESNOS) symptoms are associated with type and severity of interpersonal trauma exposure in a sample of healthy young women. *Journal of Interpersonal Violence*, 21(11), 1399-1416. <https://doi.org/10.1177/0886260506292992>
- Galatzer-Levy, I. R., Nickerson, A., Litz, B. T., & Marmar, C. R. (2013). Patterns of lifetime PTSD comorbidity: A Latent Class Analysis. *Depression & Anxiety*, 30(5), 489-496. <https://doi.org/10.1002/da.22048>
- Herman, J. (1992). *Trauma and recovery: The aftermath of violence-from domestic abuse to political terror*. New York: Basic Books.
- Karatzias, T., Shevlin, M., Fyvie, C., Hyland, P., Efthymiadou, E., Wilson, D., . . . Cloitre, M. (2016). An initial psychometric assessment of an ICD-11 based measure of PTSD

- and complex PTSD (ICD-TQ): Evidence of construct validity. *Journal of Anxiety Disorders*, 44, 73-79. <https://doi.org/10.1016/j.janxdis.2016.10.009>
- Kim, Y., Bender, K., Ferguson, K. M., Begun, S., & DiNitto, D. M. (2018). Trauma and Posttraumatic Stress Disorder Among Homeless Young Adults: The Importance of Victimization Experiences in Childhood and Once Homeless (Vol. 26, pp. 131-142).
- Knefel, M., Garvert, D. W., Cloitre, M., & Lueger-Schuster, B. (2015). Update to an evaluation of ICD-11 PTSD and complex PTSD criteria in a sample of adult survivors of childhood institutional abuse by Knefel & Lueger-Schuster (2013): A latent profile analysis. *European Journal of Psychotraumatology*, 6, 1-6. <https://doi.org/10.3402/ejpt.v6.25290>
- Kramer, M. D., Arbisi, P. A., Thuras, P. D., Krueger, R. F., Erbes, C. R., & Polusny, M. A. (2016). The class-dimensional structure of PTSD before and after deployment to Iraq: Evidence from direct comparison of dimensional, categorical, and hybrid models. *Journal of Anxiety Disorders*, 39, 1-9. <https://doi.org/10.1016/j.janxdis.2016.02.004>
- Lo, Y., Mendell, N. R., & Rubin, D. B. (2001). Testing the number of components in a normal mixture. *Biometrika*, 88(3), 767-778. <https://doi.org/10.1093/biomet/88.3.767>
- Lubke, G., & Muthén, B. O. (2007). Performance of factor mixture models as a function of model size, covariate effects, and class-specific parameters. *Structural Equation Modeling*, 14(1), 26-47.
- Maercker, A., Brewin, C. R., Bryant, R. A., Cloitre, M., Ommeren, M., Jones, L. M., . . . Rousseau, C. (2013). Diagnosis and classification of disorders specifically associated with stress: Proposals for ICD-11. *World Psychiatry*, 12(3), 198-206.
- Maercker, A., Brewin, C. R., Bryant, R. A., Cloitre, M., Reed, G. M., van Ommeren, M., . . . Llosa, A. E. (2013). Proposals for mental disorders specifically associated with stress

- in the International Classification of Diseases-11. *The Lancet*, 381(9878), 1683-1685.  
[https://doi.org/10.1016/S0140-6736\(12\)62191-6](https://doi.org/10.1016/S0140-6736(12)62191-6)
- Mills, K. L., McFarlane, A. C., Slade, T., Creamer, M., Silove, D., Teesson, M., & Bryant, R. (2011). Assessing the prevalence of trauma exposure in epidemiological surveys. *Australian and New Zealand Journal of Psychiatry*.
- Murphy, S., Elklit, A., Dokkedahl, S., & Shevlin, M. (2016). Testing the validity of the proposed ICD-11 PTSD and complex PTSD criteria using a sample from Northern Uganda. *European Journal of Psychotraumatology*, 7.  
<https://doi.org/http://dx.doi.org/10.3402/ejpt.v7.32678>.
- Muthén, B., & Muthén, L. K. (2000). Integrating person-centered and variable-centered analyses: Growth mixture modeling with latent trajectory classes. *Alcoholism: Clinical and experimental research*, 24(6), 882-891.
- Muthén, L. K., & Muthén, B. O. (2012). Mplus (Version 7): Muthén and Muthén Los Angeles, CA.
- Muthén, L. K., & Muthén, B. O. (2017). Mplus (Version 25.0): Muthén and Muthén Los Angeles, CA.
- Palic, S., Zerach, G., Shevlin, M., Zeligman, Z., Elklit, A., & Solomon, Z. (2016). Evidence of complex posttraumatic stress disorder (CPTSD) across populations with prolonged trauma of varying interpersonal intensity and ages of exposure. *Psychiatry Research*, 246, 692-699.
- Pelcovitz, D., van der Kolk, B. A., Roth, S., Mandel, F., Kaplan, S., & Resick, P. (1997). Development of a criteria set and a structured interview for disorders of extreme stress (SIDES). *Journal of Traumatic Stress*, 10(1), 3-16.
- Perkonig, A., Höfler, M., Cloitre, M., Wittchen, H.-U., Trautmann, S., & Maercker, A. (2016). Evidence for two different ICD-11 posttraumatic stress disorders in a

- community sample of adolescents and young adults. *European Archives Of Psychiatry And Clinical Neuroscience*, 266(4), 317-328.
- Ramaswamy, V., DeSarbo, W. S., Reibstein, D. J., & Robinson, W. T. (1993). An empirical pooling approach for estimating marketing mix elasticities with PIMS data. *Marketing Science*, 12(1), 103-124.
- Robinson, C. (2005). Persistent homelessness/persistent trauma. *Parity*, 18(7), 4.
- Rosenberger, W. F., & Lachin, J. M. (2015). *Randomization in Clinical Trials: Theory and Practice*: John Wiley & Sons.
- Schwarz, G. (1978). Estimating the dimension of a model. *The Annals of Statistics*, 6(2), 461-464.
- Scoboria, A., Ford, J., Lin, H., & Frisman, L. (2008). Exploratory and confirmatory factor analyses of the Structured Interview for Disorders of Extreme Stress. *Assessment*, 15(4), 404-425. <https://doi.org/10.1177/1073191108319005>
- Taylor, K. M., & Sharpe, L. (2008). Trauma and post-traumatic stress disorder among homeless adults in Sydney. *The Australian and New Zealand Journal of Psychiatry*, 42(3), 206-213. <https://doi.org/10.1080/00048670701827218>
- Terr, L. C. (1991). Childhood traumas: An outline and overview. *The American Journal of Psychiatry*, 148(1), 10-20. <https://doi.org/10.1176/foc.1.3.322>
- Tsai, J., Edens, E. L., & Rosenheck, R. A. (2011). A typology of childhood problems among chronically homeless adults and its association with housing and clinical outcomes. *Journal of Health Care for the Poor and Underserved*, 22(3), 853-870. <https://doi.org/10.1353/hpu.2011.0081>
- Whitbeck, L. B., Armenta, B. E., & Welch-Lazoritz, M. L. (2015). Borderline personality disorder and Axis I psychiatric and substance use disorders among women

experiencing homelessness in three US cities. *Social Psychiatry and Psychiatric*

*Epidemiology*, 50(8), 1285-1291. <https://doi.org/10.1007/s00127-015-1066-6>

Wolf, E. J., Miller, M. W., Kilpatrick, D., Resnick, H. S., Badour, C. L., Marx, B. P., . . .

Friedman, M. J. (2015). ICD-11 Complex PTSD in US national and veteran samples prevalence and structural associations with PTSD. *Clinical Psychological Science*, 3(2), 215-229.

World Health Organization. (1993). *The ICD-10 Classification of Mental and Behavioural Disorders: Diagnostic Criteria for Research*: World Health Organization.

World Health Organization. (1996). *Composite International Diagnostic Interview (CIDI): Traumatic Events List* (Vol. CIDI 2.0). Geneva: World Health Organization.

World Health Organization. (2018). International Classification of Diseases 11th Revision: The global standard for diagnostic health information Retrieved 17 July 2018, from <https://icd.who.int/>

Table 1

*Demographic Characteristics*

|        |        | <i>M</i> | <i>SD</i> | Range | <i>n</i> | %    |
|--------|--------|----------|-----------|-------|----------|------|
| Gender |        |          |           |       |          |      |
|        | Male   |          |           |       | 144      | 69.9 |
|        | Female |          |           |       | 55       | 26.7 |

|                |                                 |      |      |       |     |      |
|----------------|---------------------------------|------|------|-------|-----|------|
|                | Transgender                     |      |      |       | 7   | 3.4  |
| Age (years)    |                                 |      |      |       |     |      |
|                | Male                            | 45.9 | 11.6 | 19–86 |     |      |
|                | Female                          | 43.1 | 10.7 | 18–63 |     |      |
|                | Transgender                     | 46.3 | 11.0 | 39–70 |     |      |
| Ethnicity      |                                 |      |      |       |     |      |
|                | Anglo–Euro–Australian           |      |      |       | 142 | 69   |
|                | Indigenous/TSI/Pacific Islander |      |      |       | 29  | 14.1 |
|                | Asian–Australian                |      |      |       | 7   | 3.4  |
|                | Other                           |      |      |       | 23  | 11.1 |
|                | Participant did not know        |      |      |       | 5   | 2.4  |
| Marital status |                                 |      |      |       |     |      |
|                | Single                          |      |      |       | 138 | 67   |
|                | Separated/divorced/widowed      |      |      |       | 54  | 26.2 |
|                | Partnered                       |      |      |       | 14  | 6.8  |
| Trauma history |                                 |      |      |       |     |      |
|                | Type I exposure <sup>a</sup>    |      |      |       | 206 | 100  |
|                | Type II exposure <sup>b</sup>   |      |      |       | 187 | 90.8 |

| Traumatic event frequency |                                                                                               |      |      |  |     |      |
|---------------------------|-----------------------------------------------------------------------------------------------|------|------|--|-----|------|
| Lifetime                  |                                                                                               |      |      |  |     |      |
|                           | Life-threatening accident                                                                     | 18.2 | 10.8 |  | 93  | 45.1 |
|                           | Fire, flood, or natural disaster                                                              | 18.2 | 12.2 |  | 47  | 22.8 |
|                           | Witnessed someone being badly injured or killed                                               | 17.8 | 11.2 |  | 131 | 63.6 |
|                           | Suffered a great shock because one of the events on the list happened to someone close to you | 21.0 | 13.2 |  | 148 | 71.8 |
|                           | Any other extremely stressful or upsetting event at any age                                   | 18.7 | 13.2 |  | 88  | 42.7 |
| Adult (interpersonal)     |                                                                                               |      |      |  |     |      |
|                           | Rape                                                                                          | 20.9 | 7.3  |  | 17  | 8.3  |
|                           | Sexual molestation                                                                            | 20.6 | 6.2  |  | 22  | 10.7 |
|                           | Physical assault                                                                              | 21.6 | 8.7  |  | 114 | 55.3 |
|                           | Threatened with a weapon, held captive or kidnapped                                           | 22.0 | 9.0  |  | 82  | 39.8 |
|                           | Tortured or the victim of                                                                     | 22.3 | 9.0  |  | 32  | 15.5 |

|                                                 |                                                        |     |     |  |    |      |
|-------------------------------------------------|--------------------------------------------------------|-----|-----|--|----|------|
|                                                 | terrorism                                              |     |     |  |    |      |
| Childhood (interpersonal under 16 years of age) |                                                        |     |     |  |    |      |
|                                                 | Rape                                                   | 8.7 | 4.4 |  | 19 | 9.2  |
|                                                 | Sexual molestation                                     | 8.4 | 4.0 |  | 24 | 11.7 |
|                                                 | Physical assault                                       | 8.0 | 4.4 |  | 76 | 36.9 |
|                                                 | Threatened with a weapon,<br>held captive or kidnapped | 9.4 | 4.1 |  | 51 | 24.8 |
|                                                 | Tortured or the victim of<br>terrorism                 | 8.1 | 4.2 |  | 45 | 21.8 |

*Note.*  $N = 206$ . TSI = Torres Strait Islander.

<sup>a</sup>Events were classified as Type I trauma events if they were single incidents. These included noninterpersonal events (e.g., a serious motor vehicle accident), natural disasters, or one-time interpersonal events (e.g., assault). <sup>b</sup>Events were classified as Type II traumatic events if they were repetitive and prolonged or cumulative traumatic events, especially those in which escape was not possible. Such events included interpersonal abuse perpetrated by significant persons (e.g., childhood abuse by a primary caregiver or another ostensibly responsible adult), genocide, or prolonged torture from which the survivor could not escape from their captor.

Table 2

*Corresponding Items for Complex Posttraumatic Stress Disorder (CPTSD)**Algorithm<sup>a</sup>*

| Disorder type and symptom cluster | Measure            | Number of PSS-I/SIDES-R items required for endorsement | Corresponding test items <sup>b</sup>                                                                                                                                                                                      |
|-----------------------------------|--------------------|--------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PTSD                              |                    |                                                        |                                                                                                                                                                                                                            |
| Reexperiencing                    | PSS-I <sup>b</sup> | 1 of 2                                                 | <p>2. Have you been having recurrent bad dreams or nightmares about the trauma?</p> <p>3. Have you had the experience of suddenly reliving the trauma, flashbacks of it, acting or feeling as if it were re-occurring?</p> |

|                      |                      |        |                                                                                                                                                                                                                                             |
|----------------------|----------------------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Avoidance            |                      | 1 of 2 | <p>6. Have you persistently been making efforts to avoid thoughts or feelings associated with the trauma?</p> <p>7. Have you persistently been making efforts to avoid activities, situations, or places that remind you of the trauma?</p> |
| Arousal              |                      | 1 of 2 | <p>16. Are you overly alert (e.g., check to see who is around you, etc.) since the trauma?</p> <p>17. Have you been jumpier, more easily startled, since the trauma?</p>                                                                    |
| PTSD                 |                      |        |                                                                                                                                                                                                                                             |
| Affect dysregulation | SIDES-R <sup>c</sup> | 1 of 2 | <p>1. Did small problems get you really upset? Like getting angry at small things or crying really easily?</p> <p>2. If you got upset did you have trouble letting go of things that upset you?</p>                                         |

|                              |  |        |                                                                                                                     |
|------------------------------|--|--------|---------------------------------------------------------------------------------------------------------------------|
| Negative self-concept        |  | 1 of 2 | 13. Did you feel like you were all messed up (somehow wounded, damaged, or broken)?<br><br>14. Did you feel guilty? |
| Disturbance in relationships |  | 1 of 2 | 19. Did you have any conflicts with other people?<br><br>17. Did you trust people?                                  |

*Note.* PTSD = posttraumatic stress disorder; CPTSD = complex PTSD; PSS-I = PTSD

Symptom Scale–Interview version; SIDES-R= Structured Interview for Disorders of Extreme Stress–Revised.

<sup>a</sup>The algorithm is based on the *ICD-11* Working Group’s model (Cloitre et al., 2013).

<sup>b</sup>Two items per cluster were included; all questions relate to the past 12 months.

Table 3

*Goodness-of-Fit Statistics for Unconditional Latent Class Analysis Models*

| Model    | Log-likelihood | AIC       | BIC       | Adjusted BIC | Entropy | LMR-LRT |
|----------|----------------|-----------|-----------|--------------|---------|---------|
| Baseline |                |           |           |              |         |         |
| 1 class  | –              | –         | –         | –            | –       | –       |
| 2 class  | -627.944       | 1,281.887 | 1,325.023 | 1,283.835    | .779    | < .0001 |

|         |          |           |           |           |      |       |
|---------|----------|-----------|-----------|-----------|------|-------|
| 3 class | -613.858 | 1,267.716 | 1,334.078 | 1,270.712 | .809 | .0023 |
| 4 class | -603.257 | 1,260.515 | 1,350.104 | 1,264.560 | .827 | .0482 |
| 5 class | -597.632 | 1,263.263 | 1,376.079 | 1,268.357 | .932 | .3709 |

Note. AIC = Akaike information criterion; BIC = Bayesian information criterion; LMR-LRT = Lo-Mendell-Rubin adjusted likelihood ratio test.

Table 4

*Endorsement of ICD-11 Symptom Clusters in the Four ICD Diagnostic Groups, Within Each of the Four Latent Class Analysis (LCA) Classes*

| ICD-11 diagnosis group | n   | Symptom clusters for ICD-11 CPTSD <sup>a</sup> |      |           |      |         |      |    |      |    |      |     |      |
|------------------------|-----|------------------------------------------------|------|-----------|------|---------|------|----|------|----|------|-----|------|
|                        |     | Reexperiencing                                 |      | Avoidance |      | Arousal |      | AD |      | DR |      | NSC |      |
| LCA CPTSD              | 122 | n                                              | %    | n         | %    | n       | %    | n  | %    | n  | %    | n   | %    |
| ICD no diagnosis       | 5   | 1                                              | 20.0 | 4         | 80.0 | 5       | 100  | 5  | 100  | 1  | 20.0 | 4   | 80.0 |
| ICD PTSD               | 18  | 18                                             | 100  | 18        | 100  | 18      | 100  | 15 | 83.3 | 7  | 39.0 | 14  | 78.0 |
| ICD CPTSD              | 72  | 72                                             | 100  | 72        | 100  | 72      | 100  | 72 | 100  | 72 | 100  | 72  | 100  |
| ICD DSO <sup>b</sup>   | 27  | 8                                              | 26.0 | 25        | 93.0 | 18      | 67.0 | 27 | 100  | 27 | 100  | 27  | 100  |
| LCA No diagnosis       | 27  |                                                |      |           |      |         |      |    |      |    |      |     |      |
| ICD no diagnosis       | 27  | 0                                              |      | 0         |      | 10      | 37.0 | 4  | 14.8 | 14 | 52.0 | 4   | 14.8 |
| ICD PTSD               | 0   | 0                                              |      | 0         |      | 0       |      | 0  |      | 0  |      | 0   |      |

|                             |    |    |      |    |      |   |      |    |      |                |      |                |      |
|-----------------------------|----|----|------|----|------|---|------|----|------|----------------|------|----------------|------|
| <i>ICD</i> CPTSD            | 0  | 0  | 0    | 0  | 0    | 0 | 0    | 0  | 0    | 0              | 0    | 0              | 0    |
| <i>ICD</i> DSO <sup>b</sup> | 0  | 0  | 0    | 0  | 0    | 0 | 0    | 0  | 0    | 0              | 0    | 0              | 0    |
| LCA PTSD                    | 33 |    |      |    |      |   |      |    |      |                |      |                |      |
| <i>ICD</i> no diagnosis     | 24 | 10 | 42.0 | 23 | 96.0 | 6 | 25.0 | 8  | 33.3 | 11             | 46.0 | 11             | 46.0 |
| <i>ICD</i> PTSD             | 8  | 8  | 100  | 8  | 100  | 8 | 100  | 3  | 37.5 | 1 <sup>c</sup> | 12.5 | 2 <sup>c</sup> | 25   |
| <i>ICD</i> CPTSD            | 0  | 0  |      | 0  |      | 0 |      | 0  |      | 0              |      | 0              |      |
| <i>ICD</i> DSO <sup>b</sup> | 1  | 1  | 100  | 1  | 100  | 0 |      | 1  | 100  | 1              | 100  | 1              | 100  |
| LCA DSO                     | 22 |    |      |    |      |   |      |    |      |                |      |                |      |
| <i>ICD</i> no dx            | 11 | 1  | 9.1  | 0  |      | 4 | 36.3 | 1  | 9.1  | 10             | 91.0 | 11             | 100  |
| <i>ICD</i> PTSD             | 0  | 0  |      | 0  |      | 0 |      | 0  |      | 0              |      | 0              |      |
| <i>ICD</i> CPTSD            | 0  | 0  |      | 0  |      | 0 |      | 0  |      | 0              |      | 0              |      |
| <i>ICD</i> DSO <sup>b</sup> | 11 | 0  |      | 0  |      | 7 | 64.0 | 11 | 100  | 11             | 100  | 11             | 100  |

*Note.* PTSD = posttraumatic stress disorder; CPTSD = complex posttraumatic stress disorder; Reexp = reexperiencing; AD = affect dysregulation; DR = disturbances in relationships; NSD = negative self-concept; DSO = disturbances in self-organization.

<sup>a</sup>The value refers to the percentage of people in the class with each type of diagnosis who endorsed that symptom cluster. <sup>b</sup>Comprises three CPTSD symptom clusters (AD, DR, and NSC). <sup>c</sup>The sample size varies in this analysis due to missing values for these measures for one participant.

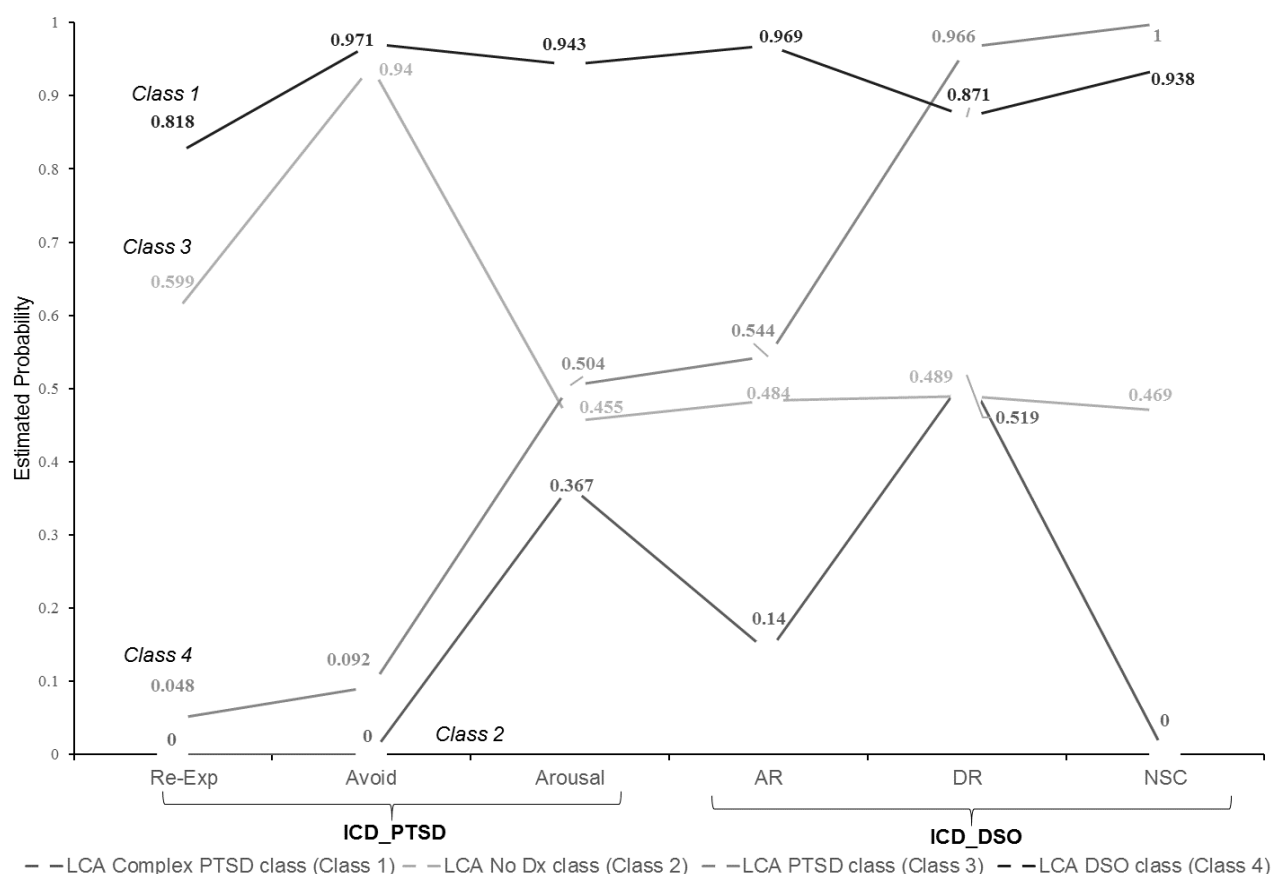


Figure 1. Profile plot of estimates of the four-class solution from the latent class analysis (LCA), based on the endorsement of posttraumatic stress disorder (PTSD) symptom clusters included in the 11th revision of the *International Classification of Diseases (ICD-11)*. Values indicate the estimated probability that the individuals within each class will meet the diagnostic criteria for the indicated symptom indicated, whereby 1 represents symptom endorsement. Re-Exp = reexperiencing; Avoid = avoidance; Dx = diagnosis; DSO = disturbances in self-organization.