Title

Examining the discriminant validity of Complex PTSD and Borderline Personality Disorder symptoms Results from a UK population sample

Running Head

ICD-11 PTSD, CPTSD, and BPD

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Abstract

Complex Posttraumatic Stress Disorder (CPTSD) was added to the diagnostic nomenclature tziasin the 11th version of the *International Classification of Diseases* (ICD-11). Although considerable evidence exists supporting the construct validity of CPTSD, the distinguishability of CPTSD symptoms from those of Borderline Personality Disorder (BPD) has been questioned. This study examined the discriminant validity of CPTSD and BPD symptoms among a trauma-exposed population sample from the United Kingdom (N = 546). Participants completed self-report measures of CPTSD and BPD symptoms, and their latent structure was assessed using exploratory structural equation modelling (ESEM). A three-factor model with latent variables reflecting 'PTSD, 'Disturbance in Self-Organization' (DSO), and 'BPD' symptoms provided the best fit of the data (χ^2 (399) = 1650, p < .001; CFI = .944; TLI = .930; RMSEA = .077 [90% CI = .073 - .081]). Multiple symptoms were identified distinguishing each construct (e.g., disturbed relationships and suicidality), as well as symptoms shared across the constructs (e.g., affective dysregulation). The PTSD (β = .24), DSO (β = .23), and BPD (β = .27) latent variables were positively and significantly associated with childhood interpersonal trauma. The current findings support the discriminant validity of CPTSD and BPD symptoms, highlight some of the phenomenological signatures of each construct, but also show how these constructs share important similarities in symptom composition and exogenous correlates.

Keywords: Posttraumatic stress disorder (PTSD); Complex PTSD (CPTSD); Borderline Personality Disorder (BPD); comorbidity; exploratory structural equation modelling (ESEM); ICD-11.

Examining the discriminant validity of Complex PTSD and Borderline Personality Disorder symptoms: Results from a UK population sample

In contrast to the expanded definition of Posttraumatic Stress Disorder (PTSD) presented in the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorder* (*DSM-5*: American Psychiatric Association [APA], 2013), the eleventh version of the *International Classification of Diseases* (*ICD-11*: World Health Organization [WHO], 2018) includes a refined description of PTSD and introduces the diagnosis of Complex Posttraumatic Stress Disorder (CPTSD) to the diagnostic nomenclature for the first time. CPTSD is listed under the parent category 'Disorders specifically associated with stress' (code 6B41), and diagnosis requires traumatic exposure and at least one symptom from six clusters. The first three, shared with PTSD (code 6B40), are 're-experiencing in the here' and now, 'avoidance of traumatic reminders', and 'sense of current threat', while the second three clusters, reflecting 'disturbances in self-organization' (DSO), are 'affective dysregulation', 'negative self-concept', and 'difficulties in forming and maintaining interpersonal relationships'. CPTSD also requires that the PTSD and DSO symptoms cause significant impairment in functioning. The introduction of an operational definition of CPTSD, along with a valid and reliable measure of CPTSD in the form of the International Trauma Questionnaire (ITQ: Cloitre et al., 2018) has allowed researchers to test the construct validity of CPTSD. Considerable data has accrued in support of the factorial, concurrent, convergent, discriminant, incremental, and predictive validity of ICD-11 PTSD and CPTSD (see Brewin et al., 2017), however, a common critique of CPTSD is that it lacks discriminant validity from Borderline Personality Disorder (BPD) due to conceptual overlap in symptom presentation (Resick et al., 2012).

BPD and CPTSD do indeed share conceptual overlap in the type of problems that are included in each diagnosis, namely, difficulties in affect regulation, self-concept, and

interpersonal relationships. However, as Cloitre et al. (2014) noted, there are important phenomenological differences in *how* these symptoms manifest across the disorders. In BPD, self-concept difficulties reflect an unstable sense of self whereas in CPTSD it reflects a persistent negative sense of self. Relational difficulties in BPD are characterised by volatile patterns of interactions whereas in CPTSD it reflects a persistent tendency to avoid relationships. Affect dysregulation in BPD is characterised by fears of abandonment and self-harming/suicidal behaviour whereas in CPTSD it reflects difficulties in maintaining emotional equilibrium. There are other relevant features which differentiate CPTSD from BPD, most notably that CPTSD requires trauma-exposure for diagnosis and the presence of trauma-specific PTSD symptoms.

To date, three studies have tested the discriminant validity of *ICD-11* CPTSD and BPD symptoms. Two of these studies, based on predominately female trauma-exposed samples, employed latent class analysis and identified four (Cloitre, Garvert, Weiss, Carlson, & Bryant, 2014) and five (Frost, Hyland, Shevlin, & Murphy, 2018) distinct classes of trauma survivors. Distinct *ICD-11* PTSD and CPTSD classes emerged in both samples (along with a non-symptomatic class), and Cloitre et al. (2014) identified a distinct BPD class, while Frost et al. (2018) identified comorbid PTSD/ BPD and CPTSD/ BPD classes. These studies showed that although DSO and BPD symptoms are conceptually similar, one set of symptoms can occur independently of the other. A similar result was reported by Knefel, Tran, and Lueger-Schuster (2016) who employed network analysis among a sample of adult survivors of childhood abuse (N = 219). Their results showed that PTSD and DSO symptoms formed a strongly connected network of symptoms, with BPD symptoms weakly connected to this network. Collectively, these studies indicate that CPTSD and BPD symptoms are related to one another but that they are also meaningfully distinguishable from each other.

This picture of CPTSD and BPD symptoms being related and distinct from one another is inconsistent with a traditional categorical (or 'diagnostic') model of psychopathology. In the traditional categorical model of psychopathology, psychiatric disorders (and their constituent symptoms) are described as entirely discrete constructs. However, dimensional models of psychopathology such as the Hierarchical Taxonomy of Psychopathology (HiTOP: Kotov et al., 2017) represent psychiatric disorders (and their constituent symptoms) as highly correlated constructs. These correlations exist because the disorders and their symptoms are manifestations of a small number of underlying latent dimensions of psychopathology. Specifically, HiTOP describes PTSD and DSO symptoms as observable indicators of 'Internalizing' psychopathology, and BPD symptoms as indicators of 'Internalizing' and 'Antagonistic Externalizing' psychopathology. Furthermore, the HiTOP model predicts that these purportedly discrete disorders (e.g., PTSD, CPTSD, and BPD) will share similar risk factors because of their common latent structure (Kotov et al., 2017). Consistent with the predictions of the HiTOP model, childhood interpersonal trauma has been identified as a common risk factor for both BPD and *DSM-IV* PTSD (Zanarini et al., 2011).

The existing empirical (Cloitre et al., 2014; Frost et al., 2018; Knefel et al., 2016) and theoretical (Kotov et al., 2017) literature means that it is unreasonable to expect PTSD, DSO, and BPD symptoms to be entirely distinct from one another. This poses a methodological challenge when attempting to test the discriminant validity of *ICD-11* CPTSD and BPD symptoms. Confirmatory factor analysis (CFA) is typically used to assess discriminant validity, however, in a traditional CFA model, variation in an observable symptom (e.g., 'flashbacks') is attributable to one latent variable ('Re-experiencing') with the remaining variation attributable to (systematic or random) measurement error. Traditional CFA models do not permit cross-factor loadings and this restriction is especially pertinent when testing the discriminant validity of conceptually similar constructs (e.g., CPTSD and BPD). This is

because symptom indicators are recognised to be fallible representations of their underlying latent variable and, therefore, in circumstances where conceptually similar constructs are being modelled it is highly probable that some degree of variation in a given indicator will be due to a non-specified latent variable. The presence of unacknowledged cross-factor loadings, even of an extremely small magnitude (e.g., .10), has been shown to bias model fit results and inflate the true correlation between latent variables in a model (Asparouhov, Muthén, & Morin, 2015; Marsh, Morin, Parker, & Kaur, 2014). Asparouhov and Muthén (2009) developed a framework called Exploratory Structural Equation Modelling (ESEM) in order to overcome this limitation of CFA. ESEM combines key elements of CFA (model falsification), EFA (inclusion of cross-factor loadings), and SEM (inclusion of exogenous and/ or endogenous variables) within a single approach and thus permits complex models to be accurately represented and empirically tested in an unbiased manner (Marsh et al., 2014). The ability to recognise the conceptually overlapping nature of CPTSD and BPD symptoms (via the inclusion of cross-factor loadings) while simultaneously recognising their phenomenological distinctiveness, and their independent associations with exogenous variables makes ESEM an ideal statistical framework to test the discriminant validity of these symptoms.

We hypothesised that an ESEM model with three latent variables would provide an optimal representation of the latent structure of CPTSD and BPD symptoms, and that the three latent variables would reflect the symptom clusters of 'PTSD', 'DSO', and 'BPD'. We also expected non-trivial cross-factor loadings for symptoms on each latent variable, reflecting the conceptual overlap between many of these symptoms. In line with the predictions of the HiTOP model, we hypothesised that more frequent trauma exposure would be associated higher scores on each latent variable; that interpersonal and non-interpersonal trauma would be positively associated with 'PTSD' (see Ben-Ezra et al., 2018; Shevlin et al.,

2018); and that childhood interpersonal trauma would be related to all latent variables but would be most strongly associated with 'DSO' (Cloitre et al., 2013; Karatzias et al., 2017).

Method

Participants and procedure

Participants were recruited from an online research panel that is representative of the entire United Kingdom (U.K.) adult population. Panel members were randomly recruited through probability-based sampling to ensure representativeness to the U.K. population. Several inclusion criteria were used to recruit participants for the current study including that (a) participants were born in the U.K., (b) were aged 18 years or older, and (c) screened positive for at least one traumatic life event (assessed using the Life Events Checklist-Revised which is described below). Ethical approval was granted by the Research Ethics committee of the institution to which the lead author was affiliated at the time of the survey. No inducements or incentives were offered for participation. In total, 2,653 panel members were assessed and 1,051 met the inclusion criteria (participation rate = 39.6%). The sample participants in this study were a random half of these 1,051 participants (N = 546) who completed the measure of BPD symptoms using a Likert-scale response format (additional details are provided in the Measures section below). The mean age of the sample was 47.21 years (SD = 14.94, Range = 18-83 years). The majority of participants were female (69.0%, n = 377), currently in a committed relationship (67.8%, n = 370), completed university (62.1%, n = 339), and currently employed (56.0%, n = 306). Nearly half grew up in an urban area (47.6%, n = 260), and 18.3% (n = 187) emigrated at some point in their lifetime. The random half of the sample selected for this study did not differ from the random half of the sample excluded from this study on any demographic factor.

Measures

BPD symptoms were measured using 14 items, and these were based on the BPD screening module of the Structured Clinical Interview for DSM-IV Axis II disorders (SCID-II; First, Gibbon, Spitzer, Williams, & Benjamin, 1997). As BPD symptoms are not typically measured using self-report scales, we were interested in determining if these symptoms were better assessed using a binary response format (0 = *No*, 1 = *Yes*) or a five-point Likert-scale response format (0 = *Never*, 1 = *Rarely*, 2 = *Sometimes*, 3 = *Often*, 4 = *Always*). In the binary format, participants were asked to indicate if each of the 14 statements was true or not of them. In the Likert-scale response format, participants were asked to indicate how often each statement was true of them. When responses to the items were compared across the two response formats, the proportion of individuals that responded positively in the binary response condition was approximately equal to the proportion of individuals who responded '*Rarely*' or above in the Likert-scale response conditions. In other words, when individuals were asked if a particular BPD symptoms was true of them in a 'Yes/ No' manner, they appeared to respond affirmatively even if they rarely experienced such an event. We thus concluded that the responses to the binary items were not useable given that the endorsement of features of a personality disorder demands that they be experienced on a more common basis. Consequently, we focused the analyses for the current study on the Likert-scale items only. As the primary objective of the current study was to model the latent structure of CPTSD and BPD symptoms, operating the analyses as the 'trait' level was advantageous in preserving variation in responses. The internal reliability of the 14 BPD (Likert-scale) items among the current sample was excellent (α = .90).

CPTSD symptoms were measured using the ITQ (Cloitre et al., 2018) which is a self-report measure of the *ICD-11* diagnoses of CPTSD and PTSD. The ITQ first screens for one's index traumatic event, and how long ago this event occurred. There are six items measuring PTSD symptoms (α = .91) and six items measuring DSO symptoms (α = .92).

Additionally, three items measure functional impairment (social, occupational, and other important areas of life) associated with both sets of symptoms. Individuals respond to the PTSD items in terms of how much they have been bothered by that symptom over the past month, and to the DSO items in terms of how they typically feel, think about themselves, and relate to others. The PTSD and DSO items are measured using a five-point Likert scale ranging from 0 (*Not at all*) to 4 (*Extremely*) and the analyses were based on these Likert-scale responses.

For the purposes of calculating diagnostic rates, PTSD and DSO symptoms were deemed to be 'present' based on scores ≥ 2 (*Moderately*). Diagnosis of PTSD requires the presence of at least one symptom from each PTSD cluster (re-experiencing, avoidance, and sense of threat), and endorsement of at least one indicator of functional impairment associated with these symptoms. Diagnosis of CPTSD requires the presence of at least one symptom from each of the six PTSD and DSO clusters (re-experiencing, avoidance, sense of threat, affective dysregulation, negative self-concept, and disturbances in relationships), and endorsement of at least one indicator of functional impairment associated with the PTSD and DSO symptoms, respectively. The validity and reliability of the ITQ has been demonstrated within the full sample (Cloitre et al., 2018), half of whom are included in this study. The prevalence rates of PTSD and CPTSD in the full sample were 5.3% and 12.9%, respectively, and the prevalence rates among the random half of the sample used in this study were 5.1% and 13.0%, respectively.

Traumatic exposure was measured using a revised version of the Life Events Checklist for DSM-5 (LEC-5; Weathers et al., 2013). In this study, we assessed childhood ('before the age of 18') and adulthood ('at or after the age of 18') exposure to the 16 different traumatic events in the LEC-5. Participants indicated on a 'Yes' (1) or 'No' (0) basis if they had directly experienced each traumatic event during both developmental periods. The mean

number of lifetime traumatic events experienced was 3.77 (*SD* = 4.09), and 37% of respondents reported four or more traumas in their lifetime. Following Ehring and Quack's (2010) scoring guidelines, we developed summed scores for non-interpersonal (natural disaster, fire or explosion, transportation accident, serious accident at work or home or during recreational activity, exposure to toxic substance, life-threatening illness or injury, severe human suffering, sudden and violent death, sudden and unexpected death of someone close to you), and interpersonal (physical assault, assault with a weapon, sexual assault, other unwanted or uncomfortable sexual experiences, combat or exposure to a war-zone, captivity, serious injury and/or harm and/or death you caused to someone else) trauma in childhood and in adulthood. Scores for non-interpersonal trauma (in childhood and in adulthood) ranged from 0-9, and scores for interpersonal trauma (in childhood and in adulthood) ranged from 0-7.

Data analysis

Descriptive statistics for interpersonal and non-interpersonal trauma exposure, and PTSD, DSO, and BPD symptom were calculated first. Sex differences in PTSD, DSO, and BPD symptoms were assessed by means of independent samples t-tests, and bivariate associations between age and PTSD, DSO, and BPD symptoms were assessed using Pearson correlation tests. These analyses were conducted using SPSS version 25.

The ESEM analyses were conducted in Mplus 7.4 (Muthén & Muthén, 2013) and the models were estimated using the mean and variance-adjusted weighted least squares (WLSMV) estimator which is appropriate for ordered categorical indicators (Flora & Curran, 2004). The geomin rotation method was used and the extracted factors were allowed to correlate. Six ESEM models were tested (with 1-6 latent factors extracted) in order to determine the optimal number of latent variables required to explain the covariation between the 26 PTSD, DSO, and BPD symptoms. As is standard in an ESEM framework, the models

were estimated with, in this case six, exogenous covariates: sex (0 = male, 1 = female), age, and cumulative scores for childhood non-interpersonal trauma, childhood interpersonal trauma, adulthood non-interpersonal trauma, and adulthood interpersonal trauma, respectively (and all covariates were treated as observed variables).

The adequacy of each model was assessed in relation to a number of goodness-of-fit indices (Hu & Bentler, 1999): a non-significant chi-square (χ^2) result indicates excellent model fit, however, this test is positively related to sample size therefore a significant result should not lead to the rejection of a model (Tanaka, 1987). Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) values $\geq$ .90 and $\geq$ .95 indicate adequate and excellent fit, respectively. Additionally, Root Mean Square Error of Approximation (RMSEA) values $\leq$ .08 and $\leq$ .06 indicate adequate and excellent model fit, respectively. ESEM models, like EFA models, will always produce improved model fit as more latent variables are extracted. Therefore, it is recommend that models are compared using an indicator of fit that includes a correction for model parsimony (see Morin, 2016). Following standard guidelines (Marsh et al., 2009, 2014), we relied on changes in the RMSEA (*ΔRMSEA*) to determine the optimal number of latent variables that should be extracted. *ΔRMSEA* $\geq$ .015 indicates significant improvement in model fit compared to a model with one less factor (Chen, Curran, Bollen, Kirby, & Paxton, 2008). There were no missing data present in these analyses.

Results

Descriptive statistics

Table 1 presents the descriptive statistics for interpersonal and non-interpersonal trauma in childhood and adulthood, and the total symptom scores for the PTSD, DSO, and BPD clusters. Females had significantly higher symptoms levels of PTSD ($t(544) = 4.27$, $p < .001$, $d = .40$), DSO ($t(544) = 2.22$, $p = .027$, $d = .21$), and BPD ($t(544) = 2.95$, $p = .003$, $d =$

.27) than males. Age was significantly, negatively, and moderately correlated with symptoms of PTSD (r = -.31, p < .001), DSO (r = -.40, p < .001), and BPD (r = -.42, p < .001).

ESEM results

The ESEM model fit results are presented in Table 2. The one- and two-factor models were rejected as they yielded unsatisfactory model fit results. The three-factor model had acceptable fit according to the CFI, TLI, and RMSEA indices, and this model was statistically superior to the two-factor model ($\Delta RMSEA$ = .017). The extraction of a fourth factor was not supported as the $\Delta RMSEA$ (.013) was below the critical threshold for the acceptance of improved model fit. We therefore concluded that an ESEM model with three latent variables was the optimal representation of the latent structure of the 26 PTSD, DSO, and BPD symptoms. The factor loadings, and factor correlations, derived from this model are presented in Table 3.

The six PTSD items loaded significantly (p < .001) and strongly on Factor 1 (mean λ = .70). Additionally, four items from the DSO cluster and one item from the BPD cluster cross-loaded significantly, and weakly, on this factor (all λ < .20). This factor was therefore labelled ‘PTSD’. The six DSO items loaded positively and significantly (p < .001) on Factor 2. All of the DSO items loaded on this factor robustly with the exception of item ‘AD1’ (emotional reactivity) (mean λ = .74). Four PTSD items and nine BPD items cross-loaded significantly on this factor and the majority of these loadings were weak, except for item ‘BPD11’ (feeling empty inside) which had a moderate sized factor loading. This factor was therefore labelled ‘DSO’. Finally, the 14 BPD items loaded significantly (p < .001) and moderately-to-strongly on Factor 3 (mean λ = .71). The two ‘Sense of Threat’ items from the PTSD cluster, and the two ‘Affective Dysregulation’ items from the DSO cluster, cross-loaded significantly, positively, and robustly onto this factor. This factor was therefore labelled ‘BPD’. The three factors were significantly (ps < .001) and positively correlated with

one another. The PTSD factor correlated weakly with the DSO (r = .24) and BPD (r = .23) factors, and the BPD and DSO factors were strongly correlated (r = .63)

The standardized regression coefficients between each covariate and the PTSD, DSO, and BPD latent variables are presented in Table 4. Childhood interpersonal trauma was positively associated with 'PTSD', 'DSO', and 'BPD', and the effects were of a similar magnitude. Adulthood non-interpersonal trauma was positively associated with 'DSO' and 'BPD', and the effect sizes were similar. Adulthood interpersonal trauma was positively associated with 'BPD'. Younger age was associated with higher scores on each latent variable and the effect was strongest for 'BPD', followed by 'DSO', and then 'PTSD'. Gender was significantly associated with 'PTSD' with females scoring higher than males.

Discussion

This study examined the phenomenological similarities and differences between *ICD-11* CPTSD symptoms and BPD symptoms. Based on the existing evidence regarding the nature of the relationship between these symptoms (Cloitre et al., 2014; Frost et al., 2018; Knefel et al., 2016), and guided by empirically supported dimensional models of psychopathology (Andrews et al., 2009; Goodkind et al., 2015; Kotov et al., 2017; Taylor et al., 2018), we hypothesised that CPTSD and BPD symptoms would be related to one another while also possessing satisfactory discriminant validity. Consistent with our primary study hypothesis, the ESEM results demonstrated that the latent structure of these symptoms was best explained by three factors that predominantly, but not exclusively, captured the shared variance between the symptom clusters of PTSD, DSO, and BPD.

The pattern of factor loadings across the three latent variables revealed much about the symptom level similarities and differences between CPTSD and BPD. Overall, the symptoms unique to the DSO factor included emotional avoidance and interpersonal withdrawal while those for the BPD factor included emotional and interpersonal reactivity.

The DSO affective dysregulation symptoms - emotional reactivity and emotional numbing - loaded strongly on the BPD factor although numbing was stronger for DSO while reactivity was stronger for BPD. In the DSO factor, the relationship difficulty symptoms of feeling cut-off from others and difficulty staying close to others did not load on the BPD factor, while conversely, fears of abandonment and relationship ups and downs loaded on the BPD factor but not the DSO factor. Unique symptoms to the BPD factor were suicidal and self-injurious behaviours, as well as anger to the point of losing control. These findings replicate results reported by Cloitre et al. (2014) and give some confidence in what may be emerging as the 'phenomenological signatures' that distinguish CPTSD and BPD. Such discoveries can advance clinical knowledge. For example, BPD symptoms such as sudden changes in self-image and in mood loaded on the DSO factor, albeit weakly, suggesting that this type of reactivity may be present in those with CPTSD but this is not likely to be a salient feature of the disorder. The BPD factor included the two DSO items of emotional reactivity and numbing but other items such as suicidal and self-harming behaviours loaded very strongly only on the BPD factor suggesting these latter items are central to BPD, not CPTSD.

The associations between the PTSD, DSO, and BPD latent variables and the six covariates indicated additional areas of similarity and difference between the constructs. Consistent with an extensive literature (e.g., Jonas et al., 2011), we found that exposure to a greater number of different childhood interpersonal traumas was similarly strongly associated with the 'PTSD', 'DSO', and 'BPD' latent variables. This finding was inconsistent with our hypothesis that childhood interpersonal traumas would be most strongly associated with the DSO latent variable. Increased 'DSO' scores were also associated with elevated levels of adulthood non-interpersonal trauma while increased 'BPD' scores were associated with elevated levels of adulthood non-interpersonal *and* adulthood interpersonal trauma. Both *ICD-11* CPTSD and BPD have been shown to be more impairing and severe forms of

psychopathology than *ICD-11* PTSD (Cloitre et al., 2014). Given that these data are cross-sectional, it is unknown whether adulthood trauma is a cause or consequence of these disorders. It has been consistently found that PTSD symptoms, as well as disturbances in self-regulation, create risk for additional traumas (e.g., Iverson et al., 2013; Messman-Moore, Brown & Koelsch, 2005). It may be that DSO and BPD symptoms reflect the more extreme end of an underlying continuum of disturbance, and additionally, may create greater risk in adulthood for additional traumas. Our multivariate results suggest that childhood interpersonal trauma is the dominant risk factor for all indicators of psychopathology, and that the occurrence of trauma during adulthood is associated with more severe indicators of psychopathology (DSO and BPD symptoms).

These data have implications for considering different types of trauma as potential differential risk factors for the diagnoses of PTSD, CPTSD and BPD. Several studies have found that cumulative childhood trauma is a better predictor of CPTSD than PTSD (e.g., Cloitre et al., 2013; Cloitre et al., this volume; Karatzias et al., 2016, Palic et al., 2016). The current data are not necessarily in contradiction with these findings. It may very well be that when the naturally occurring latent variables are forced into categorical designations representing the diagnostic constructs of CPTSD (PTSD plus DSO symptoms) versus PTSD (PTSD symptoms alone), the former will include a greater number of individuals with childhood trauma. This provides useful information from a diagnostic, and potentially from a treatment, perspective. On the other hand, the strong association of trauma with the BPD latent variable might suggest that BPD as a diagnosis is not most strongly differentiated from CPTSD or PTSD by trauma history. Nevertheless, CPTSD and PTSD not only require a traumatic experience but also a specific set of trauma-related consequences, namely the symptoms of re-experiencing, avoidance, and sense of threat, which strongly distinguish the disorders from BPD. The BPD latent variable is associated with trauma but not symptoms of

re-experiencing, avoidance, and sense of threat. This suggests that there are many pathways by which childhood trauma can influence adult symptom expression and that there may be some, as yet to be identified, developmental trajectories that distinguish the development of BPD from CPTSD and PTSD.

In addition to the associations with trauma, younger age was associated with higher levels of 'PTSD', 'DSO', and 'BPD'; a result consistent with an extensive literature demonstrating that younger individuals are more likely to experience multiple forms of psychopathology including PTSD (Frueh, Grubaugh, Acierno, Elhai, Cain, & Magruder, 2007) and BPD (Arens et al., 2013). We also found, consistent with much of the trauma literature (Tolin & Foa, 2006), that women had higher levels of 'PTSD' than men.

There were several limitations with this study that should be considered. First, this study was based on a trauma-exposed sample of the general population therefore the generalizability of these results to the entire population is unclear. However, given that 70.4% of the world's population have experienced at least one traumatic life event (Benjet et al., 2016), the current findings are meaningful. Second, future studies should seek to replicate these findings using clinician-administered methods of assessing BPD and CPTSD symptoms. Given that there is no 'gold standard' self-report measure of BPD symptoms available, and that data from the excluded half of the current sample revealed a tendency for respondents to positively endorse these symptoms even when rarely experienced, clinician-administered measures of BPD symptoms would strengthen the confidence in these results. Nonetheless, given the time and resource constraints associated with using clinician-administered measures in large, epidemiological surveys, data obtained from self-reports offer useful information. Third, the generalizability of these results to non-English speaking countries is unknown. As international applicability is a core organizing principle of *ICD-11*, cross-cultural replication will be important.

In conclusion, the current results obtained from a trauma-exposed sample of the general population in the U.K. add to data from the United States (Cloitre et al., 2014; Frost et al., 2018) and Austria (Knefel et al., 2016) supporting the discriminant validity of *ICD-11* CPTSD and BPD symptoms. The picture that is emerging of the relationship between CPTSD and BPD appears to be similar to that which is evident between any other two psychiatric disorders: the constituent symptoms share some conceptual similarity, there is a moderate-to-strong correlation between the constructs at a dimensional level, the constructs share similar associations with external risk variables, and there is a high level of diagnostic comorbidity (see Hyland Shevlin, Fyvie, & Karatzias, 2018). The expectation that CPTSD and BPD should be entirely distinct from one another at a symptomatic, dimensional, or diagnostic level is entirely untenable when considered in light of empirically-supported dimensional models of psychopathology (e.g., HiTOP: Kotov et al., 2017). We believe that clinicians would therefore benefit most from research that identifies the specific symptoms and risk factors that most effectively differentiate these constructs from one another. The current study has highlighted endogenous (e.g., affective dysregulation symptoms) and exogenous (e.g., childhood interpersonal trauma and younger age) variables that are common across the latent variables of PTSD, DSO and BPD; as well as endogenous (e.g., sense of threat, negative self-concepts, disturbed interpersonal relationships, suicidality, and anger/volatility) and exogenous (e.g., sex, interpersonal trauma in adulthood) variables that are unique to each. Future research should continue to clarify the unique phenomenological signatures of each of these disorders.

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Table 1. Descriptive statistics of all continuous variables.

	Mean	95% Confidence Intervals	Median	SD	Range
Posttraumatic stress disorder symptoms	6.59	6.03, 7.15	4.00	6.64	0-24
Disturbance is self-organization symptoms	8.13	7.55, 8.70	6.50	6.84	0-24
Borderline personality disorder symptoms	15.80	14.75, 16.86	13.00	12.29	0-56
Childhood non-interpersonal trauma	0.81	0.70, 0.91	0	1.28	0-9
Childhood interpersonal trauma	0.81	0.70, 0.91	0	1.23	0-7
Adulthood non-interpersonal trauma	1.39	1.26, 1.51	1.00	1.49	0-9
Adulthood interpersonal trauma	0.77	0.67, 0.88	0	1.24	0-7

Table 2. ESEM model fit results for models with 1-6 latent factors (N = 546).

Models	χ^2	df	CFI	TLI	RMSEA	90% CI	k-1 factor ΔRMSEA
One factor	4158	449	.835	.823	.123	.120, .126	--
Two factors	2454	418	.909	.896	.094	.091, .098	.029
Three factors	**1650**	**388**	**.944**	**.930**	**.077**	**.073, .081**	**.017**
Four factors	1162	359	.964	.952	.064	.060, .068	.013
Five factors	862	331	.976	.966	.054	.050, .059	.010
Six factors	660	304	.984	.975	.046	.042, .051	.008

Note: χ^2 = chi-square test and all χ^2 results are statistically significant ($p < .001$); df = degrees of freedom for the χ^2; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA (90% CI) = Root Mean Square Error of Approximation with 90% confidence intervals; k-1 ΔRMSEA = change in RMSEA value for each model relative to the model with one fewer factor; Best-fitting model in bold.

Table 3. Factor loadings and factor correlations for the three-factor ESEM model (N = 546).

	Factor 1: PTSD		Factor 2: DSO		Factor 3: BPD	
	λ	SE	λ	SE	λ	SE
PTSD symptoms						
RE1. Upsetting Dreams.	**.64**	.04	**.24**	.06	.08	.06
RE2. Flashback.	**.70**	.03	**.23**	.07	.02	.05
AV1. Avoidance of internal reminders.	**.75**	.04	**.35**	.07	-.05	.05
AV2. Avoidance of external reminders.	**.73**	.03	**.31**	.06	-.01	.02
TH1. Being on guard.	**.70**	.05	-.07	.04	**.42**	.06
TH2. Jumpy/Startled.	**.67**	.05	.00	.01	**.44**	.06
DSO symptoms						
AD1. Emotional reactivity.	**.17**	.05	**.20**	.05	**.46**	.05
AD2. Emotional numbing.	**.12**	.04	**.54**	.04	**.29**	.05
NSC1. Feel like a failure.	**-.11**	.03	**.98**	.02	-.01	.02
NSC2. Feel worthless.	**-.10**	.03	**.99**	.03	.02	.02
DR1. Feel cut-off from others.	.00	.02	**.85**	.04	.05	.05
DR2. Difficulty staying close to others.	.00	.03	**.85**	.04	.01	.05
BPD symptoms						
BPD1. Frantic someone close will leave.	**.16**	.07	.04	.06	**.66**	.04
BPD2. Relationship ups and downs.	.04	.07	.09	.07	**.69**	.05
BPD3. Sudden change of self-image.	.09	.07	**.16**	.06	**.72**	.04
BPD4. Sense of self dramatically changes.	.07	.07	**.19**	.06	**.73**	.04

BPD5. Don't know who you really are.	.07	.06	**.22**	.06	**.64**	.04
BPD6. Sudden changes in your life plans.	.01	.04	**.17**	.06	**.61**	.05
BPD7. Impulsive behaviours.	.01	.04	**.14**	.06	**.61**	.05
BPD8. Tried to hurt or kill yourself.	-.11	.10	-.01	.05	**.89**	.03
BPD9. Self-harm behaviour.	-.06	.10	-.07	.08	**.86**	.05
BPD10. Sudden mood changes.	-.05	.06	**.25**	.06	**.69**	.04
BPD11. Feel empty inside.	-.04	.04	**.52**	.04	**.45**	.04
BPD12. So angry you lose control.	-.04	.09	-.01	.07	**.85**	.04
BPD13. Violent when angry.	-.06	.12	**-.29**	.10	**.93**	.06
BPD14. Paranoia/dissociation.	.10	.07	**.19**	.06	**.65**	.05
Factor correlations						
Factor 1 (PTSD)	1					
Factor 2 (DSO)	**.24**	.07	1			
Factor 3 (BPD)	**.23**	.11	**.63**	.04	1	

Note: λ = standardized factor loading; SE = standard error; Significant ($p < .05$) factor loadings and factor correlations are in bold.

Table 4. Standardized regression coefficients from the three-factor ESEM model (N = 546).

	Factor 1 PTSD		Factor 2 DSO		Factor 3 BPD	
	β	SE	β	SE	β	SE
Sex (Female)	.19***	.05	.01	.04	.05	.04
Age	-.11*	.05	-.32***	.04	-.36***	.04
Child non-interpersonal trauma	.01	.05	.00	.05	.00	.05
Child interpersonal trauma	.24***	.05	.23***	.05	.27***	.05
Adult non-interpersonal trauma	.07	.06	.09*	.05	.11*	.05
Adult interpersonal trauma	.07	.06	.04	.05	.13**	.05

Note: Statistical significance = * $p < .05$, ** $p < .01$, *** $p < .001$.