



Examining the disconnect between psychometric models and clinical reality of posttraumatic stress disorder



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ABSTRACT

There have been many factor analytic studies aimed at testing alternative latent structures of DSM-IV and DSM-5 posttraumatic stress disorder (PTSD) symptoms. The primary rationale for such studies is that determining the 'best' factor analytic model will result in better diagnoses if that structure is the basis for diagnostic decisions. However, there appears to be a disconnect between the factor analytic modelling and the diagnostic implications. In this study, we derived prevalence rates based on commonly reported models of PTSD, based on data from two clinical samples ($N=434$), and also assessed if the different models generated consistent risk estimates in relation to the effects of childhood maltreatment. We found that the different models produced different prevalence rates, ranging from 64.5% to 83.9%. Furthermore, we found that the relationship between childhood maltreatment and 'diagnosis' varied considerably depending upon which latent symptom profile was adopted. It is argued that, given the maturity of this area of research, factor analytic studies of PTSD should now include information on the diagnostic implications of their findings.

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1. Examining the disconnect between psychometric models and clinical reality

There has been a plethora of factor analytic studies aimed at testing alternative latent structures of posttraumatic stress disorder (PTSD) symptoms. In a recent review [Armour, Müllerová, & Elhai \(2016\)](#) identified 112 research papers published since 1994 that used confirmatory factor analysis (CFA) to test alternative models based on DSM-IV and DSM-5 symptoms. An additional 70 studies were not included as they did not meet certain exclusion criteria such as failing to test alternative models, not using DSM based measures, or using data from children. It was concluded that a five-factor Dysphoric Arousal model ([Elhai et al., 2011](#)) was the best representation of DSM-IV symptoms and a seven-factor Hybrid model ([Armour et al., 2015](#)) was the best representation of DSM-5 symptoms.

This plethora of factor analytic studies is predicated on the assertion that the determination of the most accurate and parsimonious account of the latent structure of PTSD symptoms is a necessary prerequisite for successful diagnosis, accurate estimates of prevalence, identification of key etiological variables for the development and maintenance of PTSD, and precise assessments of treatment response (e.g., [Armour et al., 2016](#); [Elhai & Palmieri, 2011](#)). Despite such arguments for the importance of identifying the optimal symptom profile, none of the existing DSM-5 studies that have tested alternative symptom structures have provided a corresponding diagnostic algorithm for diagnosis (e.g., number of symptoms required from each cluster). The link between the psychometric structure of symptoms and diagnostic criteria has not been made. Consequently, it is currently unknown how the adoption of any of the alternative models of PTSD as diagnostic systems would influence diagnostic rates relative to the existing DSM-5 criteria. Furthermore, it also remains unknown whether adoption of any of the alternative PTSD models will affect the nature of the relationship between etiological variables and the likelihood of a PTSD diagnosis.

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The overall aims of this study are to provide the first examination of the diagnostic rates generated from the various existing factor analytically derived models of DSM-5 PTSD and determine if a specific traumatic event, namely childhood maltreatment, was differentially associated with PTSD depending on the model used to derive the diagnosis. Childhood maltreatment has been consistently shown to predict, and confer susceptibility, to subsequent PTSD. In order to meet the aims of this study we (1) tested seven alternative factor analytic models of DSM-5 PTSD symptoms (using both commonly employed methods of estimation), (2) proposed and applied diagnostic criteria for establishing symptom-based diagnoses in-line with the DSM-5 standards, and (3) assessed differential risk of 'diagnosis' according to each PTSD symptom profile based on childhood traumatic exposure.

2. Method

2.1. Participants and procedures

The participant group ($N=434$) was comprised of two clinical samples from the United Kingdom (UK). One group ($n=195$) were attendees of a National Health Service (NHS) trauma centre in Scotland who had been referred by a general practitioner, psychiatrist, or psychologist for psychological therapy. The second group ($n=239$) were recruited via Wales' National Centre for Mental Health (NCMH), a research centre investigating a number of mental health conditions. NCMH participants were recruited through primary and secondary health services, and social media. Individuals who reported that they had previously been given a diagnosis of PTSD, or those who had screened positively for PTSD, and were aged 18 or over, were invited to join the 'All Wales PTSD Registry'. All individuals in the current study from the two research samples reported exposure to a traumatic event(s) fulfilling the DSM-5's 'Criterion A' requirement for diagnosis of PTSD, and experienced these symptoms for a period greater than one month fulfilling the DSM-5's 'Criterion F' requirement. Ethical approvals for data collection were separately provided by University and National Health Service ethical review boards.

Of the total sample, 56.5% were female ($n=245$) and the average age was 44.85 years ($SD=12.81$). The majority of the sample indicated their marital status to be single (42.2%, $n=182$), 28.3% were married ($n=122$), 12.5% were co-habiting with a partner ($n=54$), and 16.9% were divorced ($n=73$). Just over two-thirds of the current sample reported having been exposed to some form of traumatic exposure during their childhood (68.4%, $n=290$). The mean number of traumatic life exposures was 6.11 ($SD=3.08$) based on an amended version of the Life Events Checklist (Gray, Litz, Hsu, & Lombardo, 2004), which included two additional items inquiring about exposure to childhood sexual abuse and childhood physical abuse.

2.2. Measures

The PTSD Checklist for DSM-5 (PCL-5; Weathers et al., 2013) includes 20 self-report items that capture the DSM-5 PTSD symptoms. Respondents are asked to "...indicate how much you have been bothered by that problem in the past month" and respond using a five-point Likert scale (0 = *Not at all*, 1 = *A little bit*, 2 = *Moderately*, 3 = *Quite a bit*, 4 = *Extremely*). The psychometric properties of the PCL-5 have been assessed across multiple trauma-exposed samples and the scale has demonstrated satisfactory reliability and validity (e.g., Blevins, Weathers, Davis, Witte, & Domino, 2015; Bovin et al., 2015). Among the current sample the internal reliability for the full scale was satisfactory ($\alpha=.92$), as was the reliability for each subscale: intrusions ($\alpha=.88$), avoid-

ance ($\alpha=.69$), negative alterations in cognitions and mood (NACM) ($\alpha=.83$), and hyperarousal ($\alpha=.76$). For the purposes of estimating quasi-diagnostic rates, each symptom was dichotomised to reflect its presence or absence. In-line with standard conventions for estimating the presence or absence of a symptom based on self-report data (e.g., Bovin et al., 2015; Elklit & Shevlin, 2007; Hansen, Hyland, Armour, Elklit, & Shevlin, 2015), a score of 2 (*Moderately*) or greater was used to indicate symptom endorsement.

Exposure to childhood maltreatment was based on the responses to two questions that asked about exposure "...to childhood physical abuse" and exposure "...to childhood sexual abuse or molestation". The questions used a 'Yes/No' response format. If a participant endorsed either, or both, questions they were coded as having experienced childhood maltreatment. Basic sociodemographic variables including age, gender, and marital status were also collected.

2.3. Analysis

First, seven alternative model solutions for the DSM-5's PTSD symptoms were assessed using CFA to determine the fit of each model. The item mapping is presented in Table 1. These analyses were conducted in Mplus 7.0 (Muthén & Muthén, 2013) with robust maximum likelihood estimation (MLR; Yuan & Bentler, 2000) treating the five-point Likert scale scores as being continuous and also using the robust weighted least squares estimator (WLSMV) based on the polychoric correlation matrix of latent continuous response variables. For both methods of estimation standard recommendations were followed to assess model fit (Hu & Bentler, 1998, 1999): a non-significant chi-square (χ^2), Comparative Fit Index (CFI; Bentler, 1990) and Tucker Lewis Index (TLI; Tucker & Lewis, 1973) values above .95 reflect excellent fit, while values above .90 reflect acceptable fit; Root-Mean-Square Error of Approximation with 90% confidence intervals (RMSEA 90% CI; Steiger, 1990) with values of .06 or less reflect excellent fit while values less than .08 reflect acceptable fit. For the models based on MLR estimation the Standardised Root-Mean-Square Residual (SRMR; Jöreskog & Sörbom, 1996) was also used with values of .06 or less indicating excellent fit while values less than .08 indicating acceptable fit. The Bayesian Information Criterion (BIC; Schwarz, 1978) was used to evaluate and compare models, with the smallest value indicating the best fitting model. In relation to the BIC Raftery (1996) suggested that a 2–6 point difference offers evidence of model superiority, a 6–10 point difference indicates strong evidence of model superiority, and a difference greater than 10 points indicates very strong evidence of model superiority. For WLSMV estimation the Weighted Root Mean Square Residual (WRMR) was also used with values less than 1 indicating acceptable model fit.

The second stage of the analysis sought to determine the probable self-report based prevalence rate of PTSD for each model based on a score of 2 (*Moderately*) or greater being used to indicate symptom endorsement. The DSM-5's criteria for PTSD diagnosis requires exposure to a traumatic event (Criterion A), the presence of one of five symptoms of Intrusions (Criterion B), one of two Avoidance symptoms (Criterion C), two of seven NACM symptoms (Criterion D), and two of six Hyperarousal symptoms (Criterion E). In addition, DSM-5 also requires that symptoms persist for more than one month (Criterion F), are associated with functional impairment (Criterion G), and are not due to substance use, medication or any other illness (Criterion H). For the purposes of this study only Criteria A-F were assessed for diagnostic purposes.

Given that the authors who developed the respective alternative symptom models of PTSD did not provide a corresponding symptom-based diagnostic algorithm, it was necessary for us to develop such criteria. In order to develop equitable and logically-derived symptom-based diagnostic criteria for each model we

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