

**A Validation of the PCL-5 Questionnaire for PTSD in Primary and Secondary Care**

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**Funding:**

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Title Page

**Declarations of Interest:** None

## **1. Abstract**

This paper investigated the factor structure of the PCL-5 within a sample of UK primary and secondary care mental health service users. Much of the previous investigations into the PCL-5 have been conducted on military or emergency service personnel, therefore it is important to understand the validity of this tool within a broader sample. In addition to this concerns have been raised over the statistical validity of much of the previous research. The results of this study suggest that several items of the PCL-5 should be removed, and this presents a 3-factor structure whereby the factors are Anhedonia, Intrusion and Negative alterations in Mood and Cognition. This challenges much of the previous literature which suggested 4, 6 and 7 factor models. The implications of this are discussed in detail in this paper.

## **2. Clinical Impact Statement**

This study has explored whether the PCL-5 remains valid when used within a community mental health sample within the NHS and with multiple traumas. Clinically this is important as much of the previous work has focussed on veterans and emergency service personnel, therefore it is necessary to ensure that the PCL-5, which is currently suggested as the most appropriate measure of assessing PTSD is reliable and valid within this population. The investigation of the factor structure suggested that there may be an overlap between depression and PTSD within this sample, however this needs further investigation.

## **3. Key Words**

Trauma; PCL-5; Exploratory Factor Analysis; PTSD

4.

Post-Traumatic Stress Disorder (PTSD) is an anxiety disorder that can occur following exposure to a traumatic event. The DSM-V characterises PTSD with 4 criteria: Intrusive Symptoms, Persistent Avoidance of Stimuli, Negative alterations in mood and cognition, and Hyperarousal. These symptoms must have been present for longer than 1 month, cause significant impact on functioning and not be due to any substances one may be taking (American Psychiatric Association, 2013). Previous studies that have investigated rates of PTSD following exposure to a traumatic event found that 11.8% of participants met the criteria for PTSD (Shalev et al., 2019).

The Post-Traumatic Stress Disorder Checklist (PCL-5; Weathers et al., 2013a) was developed to combine three previous versions that covered military (PCL-M), civilian (PCL-C) and specific trauma (PCL-S) populations. Since then there has been several studies that have investigated the validity, reliability and factor structure of the PCL-5. Consistently the PCL-5 is found to have excellent internal consistency. However much of this research has been conducted in military or first responder samples and therefore the generalisability to other populations is unclear.

In a recent study of a sample of UK mental health service users the PCL-5 was again found to be psychometrically sound and the authors of this study suggested that it is appropriate for use within this population (Roberts et al., 2021). However, this study did not investigate the factor structure of the PCL-5 within this population.

During its initial development it was suggested that the PCL-5 has a factor structure best represented by the 6 factor anhedonia model (Liu et al., 2014); Intrusion, Avoidance, Negative Affect, Anhedonia, Dysphoric Arousal and Anxious Arousal. This challenged the initial assumption that the PCL-5 matched directly onto the 4-factor DSM-5 criteria,

Intrusion, Avoidance, Negative alterations in Cognition and Mood and Hyper-arousal. However there have also been several other factor structures suggested with Schmitt et al. (2018) reporting 15 potential models. Many of the studies that have investigated the factor structure of the PCL-5 are statistically inappropriate (Schmitt et al., 2018) and this may contribute to the wide number of models suggested. A common issue found in these studies is the use of the  $\chi^2$  statistic which can influence factor overextraction (Asparouhov & Muthén, 2009). In addition to this it is suggested by Schmitt et al. (2018) that many of the factor models suggested for the PCL-5 have a small number of items per factor which can influence model identification, replication and construct underrepresentation. To correct the statistical errors observed Schmitt and colleagues (Schmitt et al., 2018) investigated the factor structure of the PCL-5 using a large military sample and found evidence for a one-factor model.

Therefore, the current study aimed to investigate the validity and reliability of the PCL-5 within a UK sample of mental health service users. It also investigated the factor structure of the PCL-5 using factor analysis combining both a primary care sample and a secondary care sample.

## **5. Method**

Data was collected from Primary and Secondary care NHS community mental health teams for adults. Existing completed PCL-5s used as part of routine clinical practice to screen for PTSD symptoms or as a pre therapy outcome measure were collated. Any service users who had opted out of their medical records being used for service evaluation or research were excluded.

Approval from the NHS trust for use of secondary data was approved on the 21/12/2021. It was granted ethical approval by the University of Southampton on the 27/01/2021 (Submission ID: 62867).

### 5.1. Measures

The demographic information collected was, age, gender, ethnic identity, and type of trauma. This study has used the five factors of trauma identified by Benjet et al. (2016) to classify traumatic events reported in this study. These are, Exposure to collective violence, Causing or Witnessing harm to others, Exposure to interpersonal violence, Exposure to intimate partner violence or sexual violence and Accidents or injuries. As reported by Benjet, trauma events relating to the unexpected death of a loved one, being mugged or threatened with a weapon and man-made disasters were classified separately.

The PCL-5 is a 20-item screen tool where participants are asked to rate the severity symptoms on a 5-point Likert scale of 0-4 over the last two weeks, with a possible total score of 80. The symptoms covered by the PCL-5 are designed to cover the 4 domains of PTSD (Intrusive Symptoms, Avoidance of Stimuli, Negative changes in affect and Hyperarousal). It is suggested by Roberts et al. (2021) that an optimal cut-off of 43-44 should be used within a sample of primary and secondary mental health care service users, indicating that scores higher than 44 would be consistent with the criteria for PTSD being met. Previously cut-off scores of 28, 31 and 37 have been suggested (Blevins et al., 2015).

## 6. Results

### 6.1. Descriptive Statistics

This sample contained a total of 215 participants (72.6% female,  $M$  age =33.35, age range =18-69). Of this 159 (74%; 76.1% female,  $M$  age =32.14, age range = 18-69) were from Primary Care and 56 (26%; 62.5% female,  $M$  age = 36.96, age range = 19-64) from Secondary Care. The majority of the sample identified as British ( $n=148$ , 68.8%) with 72.6% also identifying as white.

Table 1 displays the trauma types reported by this sample. 68.8% of the total sample reported multiple traumatic incidents, therefore when categorising the data, if more than one incident was reported the category that represented the greatest number of incidents was selected.

The mean total score on the PCL-5 was  $M=52.98$  (6-80). The scores were normally distributed. When looking at the spread of scores, there was only one participant that scored the highest score of 80 (0.5% of the sample), indicating limited ceiling effects.

Prior to investigation of the factor structure the reliability for the total scale was investigated for this sample using Cronbach's alpha. Using all 20 items of the PCL-5 the scale scored  $\alpha=.901$  indicating excellent internal validity. The inter-item correlations were checked to ensure all items were above 0.3, there were significant issues with item 8 whereby all 7 of the inter-item correlations were below 0.3 (0.09-0.29). The corrected total item correlations were also checked to ensure all correlations were above 0.3, with no issues found (0.35-0.67). If item 8 were removed the Cronbach's alpha would rise to  $\alpha=.903$ , given the high reliability this is not required however may indicate issues to be explored further within the exploratory factor analysis.

## 6.2. Solution

An exploratory factor analysis using maximum-likelihood method with direct oblimin rotation, specifying three factors with items 6, 7, 8, 15, 16, 17, 18 and 20 removed, was conducted to identify the best factor structure for the PCL-5 within a population of primary and secondary care mental health service users. This analysis was based on  $N=215$  participants with some missing data, the use of a maximum likelihood method is considered robust enough to manage a small amount of missing data. The KMO revealed a score of .872 consistent with the initial investigations reported above. The Bartlett's test of Sphericity

again confirmed that the relationship between variables is significant enough for EFA ( $\chi^2=1162.351$ ,  $df=66$ ,  $p=<.0001$ ). The determinant for this analysis was 0.004 which remains above the suggested 0.00001 to indicate no extreme multicollinearity or singularity. The anti-image correlations were checked to ensure that all individual items had a KMO above .5 and partial correlations below .5 with no issues found.

Three factors were suggested to account for 67.16% of the variation together. The first factor explained 44.07% of the variance and had 4 items (items 12, 13, 14 and 19). From the content of these items, it is suggested that this factor most closely represents anhedonia, the inability to experience pleasure in normal pleasurable activities. The second factor explained 14.14% of the variance and had 5 items (items 1, 2, 3, 4 and 5). The content of these items suggests that this factor most closely represents symptoms of intrusion. The third factor explained 8.95% of the variance and had 3 items (items 9, 10 and 11). The content of these items suggested that this factor most closely represents negative alterations in mood and cognition. The factor correlation matrix indicated that there was medium effect size for the correlations between factors as all correlations were above .3 (-.422 - .558).

### 6.3. Reliability

The reliability of each factor was investigated using Cronbach's alpha. Factor 1, Anhedonia was found to have a good internal consistency ( $\alpha=.823$ ) within this sample. Factor 2, Intrusion was found to have a good internal consistency ( $\alpha=.838$ ) within this sample. Factor 3, Negative alterations in mood and cognition was found to have good internal consistency ( $\alpha=.784$ ) within this sample.

## **Discussion**

The results of this paper suggest that the PCL-5 is a reliable measure that can be used within a sample of primary and secondary care mental health service users, supporting much



of the previous literature that has found it to have excellent internal reliability. It suggests that 8 items could be removed to identify a 3-factor structure. The three suggested factors are Anhedonia, the inability to experience pleasure in normal pleasurable activities; Intrusion, whereby the individual suffers from intrusive memories and bodily symptoms related to the stressful experience; and Negative alterations in Mood and Cognition, whereby the individual suffers from strong negative thoughts and emotions about themselves and the world. This challenges much of the previous literature on the suggested factor structure for the PCL-5 (Armour et al., 2015; Bovin et al., 2016; Liu et al., 2014; Morrison et al., 2021; Roberts et al., 2021; Wortmann et al., 2016).

As this study has not completed a CFA analysis to test whether the 3-factor structure is accurate the results of this study should be interpreted with caution. Prior to the DSM-V release the DSM-IV suggested that there was a 3-factor model of PTSD, whereby Criterion B was re-living, Criterion C was avoidance and negative alterations in mood and cognition and Criterion D was alterations in arousal and reactivity (Krüger-Gottschalk et al., 2017). Since the introduction of the DSM-V there has been limited empirical support for the 3-factor model, however empirical support for the 4-factor structure proposed by DSM-V is also limited. When comparing the current results against the previous 3-factor model it can be seen that there are substantial differences. The most prominent of which is that the current study did not support items that related to alterations in arousal and reactivity, particularly items related to increased risk, being irritable and angry and being jumpy or easily startled. The second difference is that in the current study factor 1 appears to be more closely related to anhedonia rather than avoidance.

There are several possible reasons for this difference between our findings and the previous research. Firstly, this study has used a civilian population in comparison with much of the previous research that has used military or emergency personnel populations (Bovin et

al., 2016; Morrison et al., 2021; Roberts et al., 2021; Wortmann et al., 2016), which is likely to result in different traumas faced by these populations. The military samples are more likely to have been exposed to collective violence and causing/witnessing violence (Benjet et al., 2016), whereas a civilian sample is unlikely to have experienced this. Within our sample many had experienced multiple traumas often including both interpersonal violence and intimate partner/sexual violence. The authors of this study suggest that further research is needed to draw out whether experiencing different trauma types results in a different presentation of PTSD as suggested by our current results.

Secondly, it has been frequently reported that there is a high co-morbidity between PTSD and Depression (Contractor et al., 2014). In previous research looking at the symptom clusters that may explain the link between PTSD and depression Contractor and colleagues (2014) found that somatic depression may be associated with dysphoric arousal clusters and non-somatic depression may be associated with negative alterations in mood and cognition. This has implications for the current study, suggesting that our proposed factor structure could be identifying high co-morbidities with depression within our sample.

An implication of the current study is that this contributes to the evidence that the PCL-5 can be used as an outcome measure within services, as there is no ceiling effect, and the questionnaire has been found to be highly reliable in a diverse clinical population with multiple traumas and differing trauma types.

There are several limitations identified within this study, the primary issue being sample size. Despite the sample being suitable for an EFA, there remain concerns that as the sample size was below 300 (Comrey & Lee, 1992) the results should be interpreted with caution. A second limitation is that we were unable to perform a ROC analysis to identify a cut-off score for this sample due to not having available information on diagnosis.

It is suggested that future research replicates this study design with a larger sample size and collects information on diagnosis using a reliable diagnostic tool such as the Clinician-Administered PTSD Scale for DSM-V (CAPS-5; Weathers et al., 2018) within a sample of primary and secondary care mental health users. This would allow for further examination of the possible factor structure and ideal cut-off scores. In addition to this a larger sample size would allow for a comparison between Primary and Secondary care services, which this study was unable to do due to small sample size.

To conclude, the current study has provided further evidence that the PCL-5 is a reliable measure and can be used in the assessment of PTSD within primary and secondary mental health care with a range of differing and multiple traumas. However further research is required to identify whether the 3-factor model suggested within this paper is reliable.

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**Table 1.***Types of Trauma*

	<b>Total</b>		<b>Primary Care</b>		<b>Secondary Care</b>	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Caused/Witnessed bodily harm	34	15.8	28	17.6	6	10.7
Interpersonal violence	48	22.3	31	19.5	17	30.4
Intimate partner/Sexual violence	76	35.3	62	39	14	25
Accidents/Injuries	31	14.4	27	17	4	7.1
Not Reported	26	12.1	11	6.9	15	26.8

**Table 2***Pattern Matrix*

Item	Factor 1 Anhedonia	Factor 2 Intrusion	Factor 3 Alterations in mood and cognitions
Item 12 Loss of interest in activities you used to enjoy	.819		
Item 13 Feeling distant or cut off from other people	.744		
Item 14 Trouble experiencing positive feelings (for example being unable to feel happiness or have loving feelings for people close to you)	.642		
Item 19 Having difficulty concentrating	.504		
Item 1 Repeated, distressing and unwanted memories of the stressful experience		-.913	
Item 2 Repeated disturbing dreams of the stressful experience		-.689	
Item 3 Suddenly feeling or acting as if the stressful experience were actually happening again (as if you were actually back there reliving it)		-.668	
Item 4 Feeling very upset when something reminded you of the stressful experience		-.612	
Item 5 Having strong physical reactions when something reminded you of the stressful experiences (for example, heart pounding, trouble breathing, sweating)?		-.583	
Item 10 Blaming yourself or someone else for the stressful experience or what happened after it?			.754
Item 11 Having strong negative feelings such as fear, horror, anger, guilt, or shame?			.694



Item 9

.644

Having strong negative beliefs about yourself, other people, or the world (for example, having thoughts such as: I am bad, there is something seriously wrong with me, no one can be trusted, the world is completely dangerous)?

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Extraction method: Maximum Likelihood

Rotation method: Oblimin with Kaiser Normalisation