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BRIEF REPORT

Operating Characteristics of the PTSD Checklist in a Military Primary Care Setting

Kristie L. Gore
DoD Deployment Health Clinical Center, Bethesda, Maryland, and Uniformed Services University of the Health Sciences

Phoebe K. McCutchan
DoD Deployment Health Clinical Center, Bethesda, Maryland

Annabel Prins
San José State University and Veterans Affairs Palo Alto Health Care System, Palo Alto, California

Michael C. Freed and Xian Liu
DoD Deployment Health Clinical Center, Bethesda, Maryland, and Uniformed Services University of the Health Sciences

Jennifer M. Weil
DoD Deployment Health Clinical Center, Bethesda, Maryland

Charles C. Engel
DoD Deployment Health Clinical Center, Bethesda, Maryland, and Uniformed Services University of the Health Sciences

The Department of Defense (DoD) is implementing universal behavioral health screening for all DoD health-care beneficiaries presenting to military primary care clinics. The PTSD Checklist–Civilian Version (PCL-C; Weathers, Litz, Herman, Huska, & Keane, 1993) is used for the identification of posttraumatic stress disorder (PTSD); however, the operating characteristics of the PCL-C remain unstudied in this population. This study examined the operating characteristics of the PCL-C in a sample of 213 patients from 3 Washington, D.C., area military primary care clinics. Blinded raters independently assessed PTSD using the PTSD Symptom Scale Interview (Foa, Riggs, Dancu, & Rothbaum, 1993) as the diagnostic criterion standard. The receiver operating characteristic curve revealed that PCL-C scores accounted for 92% of the area under the curve. A PCL-C score of 31 optimized sensitivity (0.93) and specificity (0.90), and the multilevel likelihood ratio was 5.50 (95% confidence interval [2.26, 13.37]). Internal consistency (0.97) and test–retest reliability (0.87 after a median 13 days) were strong. Results suggest that a PCL-C score of 31 is the optimal cutoff score for use in a military primary care setting serving active duty service members, dependents, and retirees. These findings offer military primary care providers preliminary data to interpret PCL-C scores and to inform treatment decisions as part of routine clinical practice.

Keywords: PTSD, screening, primary care, military health, psychometrics

Kristie L. Gore, DoD Deployment Health Clinical Center, Walter Reed National Military Medical Center, Bethesda, Maryland, and Center for the Study of Traumatic Stress and Department of Psychiatry, Uniformed Services University of the Health Sciences; Phoebe K. McCutchan, DoD Deployment Health Clinical Center, Walter Reed National Military Medical Center; Annabel Prins, Department of Psychology, San José State University, and National Center for Posttraumatic Stress Disorder, Veterans Affairs Palo Alto Health Care System, Palo Alto, California; Michael C. Freed and Xian Liu, DoD Deployment Health Clinical Center, Walter Reed National Military Medical Center, and Center for the Study of Traumatic Stress and Department of Psychiatry, Uniformed Services University of the Health Sciences; Jennifer M. Weil, DoD Deployment Health Clinical Center, Walter Reed National Military Medical Center; Charles C. Engel, DoD Deployment Health Clinical Center, Walter Reed National Military Medical Center, and Center for the Study of Traumatic Stress and Department of Psychiatry, Uniformed Services University of the Health Sciences.

Kristie L. Gore is now at the RAND Corporation, Arlington, Virginia. Jennifer M. Weil is now at the Data Networks Corporation, Reston, Virginia.

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Correspondence concerning this article should be addressed to Kristie L. Gore, RAND Corporation, 1200 South Hayes Street, Arlington, VA 22202. E-mail: Kristie_Gore@rand.org

The Veterans Health Administration (VHA) and Department of Defense (DoD) clinical practice guidelines encourage screening for common psychiatric disorders (e.g., depression, substance abuse, bipolar disorder, and posttraumatic stress disorder [PTSD]) as a routine part of clinical practice (U. S. Department of Veterans Affairs, Office of Quality and Performance, n.d.). Consistent with these guidelines, the DoD is implementing universal behavioral health screening for all DoD health-care beneficiaries presenting to primary care as part of the Patient-Centered Medical Home (PCMH; Assistant Secretary of Defense [Health Affairs], 2009). The PCMH behavioral health screening process utilizes a two-stage approach in which patients visiting primary care complete a battery of brief screens, with positive screens prompting the administration of a more detailed secondary diagnostic aid. For the identification of PTSD, the Primary Care PTSD Screen (PC-PTSD; Prins et al., 2003) is used as the initial brief screen, followed by the PTSD Checklist–Civilian version (PCL-C; Weathers, Litz, Herman, Huska, & Keane, 1993). The PCL-C is a 17-item self-report measure that assesses the presence and severity of PTSD symptoms corresponding to the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM–IV*; American Psychiatric Association, 1994) and has been found to be a strong diagnostic tool in primary care settings (Freedy et al., 2010).

There have been several published studies reporting on the operating characteristics of the PCL-C in a variety of populations, demonstrating considerable variability in PCL-C utility due to population-level factors such as prevalence and spectrum effects (McDonald & Calhoun, 2010; Wilkins, Lang, & Norman, 2011). Consequently, in order to effectively use the PCL-C as a clinical screening instrument, it is critical to understand its operating characteristics in the target population. To date, there are no published reports on the performance of the PCL-C in military primary care patients, made up of active duty service members, retirees, and family members. In light of DoD behavioral health screening initiatives, the purpose of this article is to describe the psychometric properties of the PCL-C in a military primary care sample and to estimate the most appropriate cutoff score in this population.

Method

The current study is a secondary analysis of data collected to test the psychometric properties of a single-item PTSD screener in a military primary care sample. Detailed methods are described in the original study (Gore, Engel, Freed, Liu, & Armstrong, 2008). The study was reviewed and approved by the Walter Reed Army Medical Center's Institutional Review Board.

A total of 3,234 patients from three military primary care clinics participated in a brief survey that screened for the likelihood of PTSD. Upon survey completion, patients were selected to participate in the original study based on their screening scores. Those likely to meet diagnostic criteria for PTSD were oversampled. Approximately 13% of those asked to complete the brief survey declined, and approximately 57% of those asked to consent to interview declined, citing lack of time as the primary reason. A sample of 213 patients composed of 68% active duty service members, 14% retirees, and 18% dependents consented and were asked to complete a diagnostic interview, the PTSD Symptom Scale Interview (PSS-I; Foa, Riggs, Dancu, & Rothbaum, 1993), the Life Events Checklist (LEC) from the Clinician-Administered PTSD Scale (CAPS; Blake et al., 1995), and the PCL-C.

Measures

The PTSD Checklist–Civilian Version (PCL-C; Weathers et al., 1993) asks respondents to rate how bothered they have been in the past month (1 = *not at all;* 5 = *extremely*) by each of the 17 *DSM–IV* symptoms of PTSD. Scores on the PCL-C have shown high internal consistency (0.91–0.94), strong convergent validity with other measures of PTSD (Adkins, Weathers, McDevitt-Murphy, & Daniels, 2008; Blanchard, Jones-Alexander, Buckley, & Forneris, 1996), and excellent test–retest reliability (0.92–0.96; Ruggiero, Del Ben, Scotti, & Rabalais, 2003; Weathers et al., 1993).

A modified version of the Life Events Checklist (LEC) was used to identify the participants' index trauma. Although the LEC was originally developed for use with the CAPS to assess exposure to potentially traumatic events (Blake et al., 1995; Gray, Litz, Hsu, & Lombardo, 2004), in the current study, interviewers used LEC responses to isolate the most salient experiences, determine the index trauma(s), and determine if PTSD Criteria A1 and A2 were met prior to administering the PSS-I.

The PTSD Symptom Scale Interview (PSS-I; Foa et al., 1993) is a 17-item semistructured interview that assesses the existence and severity of *DSM–IV* PTSD symptoms in the last month using a 4-point Likert scale. PSS-I scores have high concurrent validity with other widely used diagnostic PTSD interviews, including the CAPS (Blake et al., 1995) and the Structured Clinical Interview for *DSM–IV* (SCID; Foa et al., 1993; Foa & Tolin, 2000; Spitzer & Williams, 1988) in a number of traumatized samples. It can be administered by a trained interviewer in approximately 20 min (Foa et al., 1993) and is therefore well suited to studies of PTSD in fast-paced primary care settings. PSS-I scores demonstrate sound psychometric properties, with high test–retest reliability (0.80) and interrater reliability ($\kappa = 0.91$; Foa et al., 1993) and good internal consistency (0.65–0.86; Foa & Tolin, 2000). All PSS-I assessments were performed by master's or doctoral level psychologists blinded to patients' PCL-C status.

Results

The demographic distribution of the sample is presented in Table 1. To reduce bias associated with oversampling individuals with the highest score, we created an overall weight variable for each respondent according to the population distribution of responses and then used its normalized form in the analysis (the total of weights equals the sample size; see Gore et al., 2008, for additional details of weighting procedures). The weighted mean (and standard deviation) of PCL-C scores was 48.0 (9.6) for those with PTSD and 22.2 (9.4) for those without PTSD; unweighted values were 50.8 (15.0) and 25.5 (11.3), respectively. For active duty, retiree, and dependent subgroups, weighted means (and standard deviation) of PCL-C scores were 24.8 (12.9), 28.6 (11.1), and 22.2 (9.4), respectively; unweighted values were 31.6 (17.0), 29.8 (14.2), and 26.9 (10.8), respectively. Internal consistency was $\alpha = .97$, and the weighted Pearson correlation between the PCL-C and the PSS-I scores was 0.82 ($n = 212$; $p < .05$).

The weighted receiver operating characteristic (ROC) curve for PCL-C scores against PTSD diagnosis from the criterion

Table 1
Demographic Characteristics of the Consecutive and Interviewed Primary Care Samples

Characteristic	Consecutive (n = 3,234)	Interviewed (n = 213)
Male	60 (1,972)	61 (130)
Age in years		
≤30	21 (686)	24 (52)
31–40	24 (788)	23 (49)
41–50	31 (1,023)	31 (65)
51–60	16 (521)	18 (38)
61 or over	8 (257)	4 (9)
Race		
White	60 (1,951)	60 (128)
Black	28 (909)	25 (53)
Hispanic	3 (102)	3 (6)
Other	9 (287)	12 (26)
Military status		
Active	62 (1,978)	68 (145)
Retired	18 (577)	14 (30)
Family	19 (611)	18 (38)
Rank		
Officer	40 (1,275)*	32 (67)
Enlisted	39 (1,241)	49 (102)

Note. Data are given as percentages, with the number of participants in parentheses.
* $p < .05$.

PSS-I interview revealed that the PCL-C accounted for 92% of the area under the curve (95% confidence interval [0.88, 0.96]; see Figure 1). Table 2 displays the weighted sensitivity, specificity, positive predictive values, negative predictive values, multilevel likelihood ratios, and diagnostic efficiency values in our population. We evaluated the multilevel likelihood ratios for three commonly used PCL-C scores of 31, 44, and 50, which were 5.50, 9.48, and 19.50, respectively. A PCL-C score of 31 optimized sensitivity (0.93) and specificity (0.90) in the full primary care sample. As a point of reference, a score of 2 on the PC-PTSD had an associated multilevel likelihood ratio of 2.89 (95% CI [1.06, 7.86]), sensitivity of 0.91 [0.79, 1.0], and specificity of 0.84 [0.79, 0.90]; a score of 3 on the PC-PTSD had an associated multilevel likelihood ratio of 3.64 [1.36, 9.78], sensitivity of 0.70 [0.50, 0.91], and specificity of 0.92 [0.88, 0.96] (for full details, see Gore et al., 2008).

Some military primary care clinics serve only active duty service members, a subpopulation that has a higher baseline prevalence of PTSD than does the general primary care population and therefore may require a lower optimal cutoff score (Terhakopian, Sinaii, Engel, Schnurr, & Hoge, 2008). Although this study was not powered to analyze this subsample (active duty n = 145) using multilevel likelihood ratios, we were interested in whether the heterogeneity of the sample affected the optimal cutoff score recommendation. We therefore applied the Box–Cox power family of transformations that uses a statistic (λ) based on observed data. Specifically, we used a maximum likelihood estimate of λ in all PCL-C values (Gönen, 2007). The PCL-C score with the lowest log-likelihood ratio value (i.e., 2 × log-likelihood ratio) was 30, indicating that 30 is the optimal cutoff score in the active duty–only subsample. Thus, the optimal PCL-C cutoff score appears to be similar in active duty and nonactive duty (e.g., retiree, family member) primary care patients.

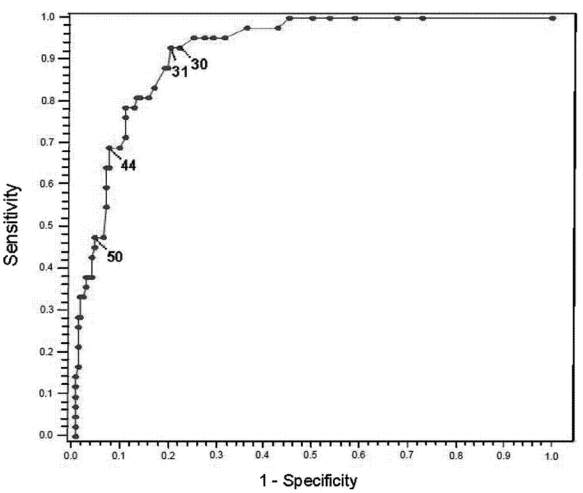

Figure 1. Receiver operating characteristic (ROC) curve for PTSD Checklist–Civilian Version (PCL-C) scores against criterion posttraumatic stress disorder (PTSD) diagnosis.

Table 2
Descriptive Operating Characteristics of the PTSD Checklist–Civilian Version (PCL-C) at a Range of Cutoff Scores

PCL-C cutoff score (and no. with PTSD)	Sensitivity (true positive)	Specificity (true negative)	Likelihood ratio (confidence interval)	Positive predictive value	Negative predictive value	Diagnostic efficiency
≤30 (n = 173)	1.00		0.08 (0.02, 0.42)			
31 (n = 177)	0.93 (0.81, 1.00)	0.90 (0.86, 0.94)	5.50 (2.26, 13.37)	0.47 (0.31, 0.64)	0.99 (0.98, 1.00)	0.90 (0.87, 0.94)
44 (n = 193)	0.62 (0.39, 0.84)	0.96 (0.93, 0.99)	9.48 (2.26, 39.82)	0.59 (0.37, 0.81)	0.96 (0.94, 0.99)	0.93 (0.89, 0.96)
50 (n = 200)	0.44 (0.22, 0.67)	0.98 (0.96, 1.00)	19.50 (6.78, 56.08)	0.65 (0.38, 0.91)	0.95 (0.92, 0.98)	0.93 (0.90, 0.97)

Note. Because analyses are based on weighted data, sample sizes are approximate and rounded up. PTSD = posttraumatic stress disorder.

Discussion

Consistent with previous studies of PCL-C criterion validity in primary care settings, we found the psychometric properties of the PCL-C were excellent and that 31 was the optimal cutoff score in our military primary care sample; multilevel likelihood ratios suggest that 31 is the most parsimonious cutoff score demonstrating acceptable diagnostic accuracy (Jaeschke et al., 1994). For primary care clinics serving active duty patients only, a PCL-C score of 30 appears to be the optimal cutoff.

Normative data on screening instruments are needed for accurate case identification of symptomatic individuals. As the DoD health-care system moves forward in the implementation of universal primary care screening, it will be essential to understand the operating characteristics of instruments specific to this population. The determination of an optimal cutoff score for diagnostic accuracy will improve the primary care treatment of PTSD by providing clinicians with information to interpret PCL-C scores and to identify patients who might be more effectively managed through specialty care or other additional services.

The American Psychiatric Association is scheduled to release the fifth edition of the *Diagnostic and Statistical Manual for Mental Disorders* (*DSM-5*) in 2013; it will introduce revised diagnostic criteria for PTSD and subsequently revised diagnostic measures (to include the PCL-C). However, the current PCL-C form will likely remain in practice for the next several years, as new measures will require extensive psychometric testing and validation before they can be implemented with confidence. Although field trials are under way, they will offer limited information on the utility of revised diagnostic measures in real-world primary care settings (Frances & Widiger, 2012; Jones, 2012). Additionally, the transition from *DSM–IV* to *DSM-5* will require significant organizational practice change, necessitating revised forms, information systems, diagnostic and treatment procedures, and training for medical personnel. Thus, it is likely that implementation of the *DSM-5* model will be an iterative rather than immediate process (Kendler & First, 2010) and that *DSM–IV* measures will remain relevant for the foreseeable future.

One methodological challenge in the PTSD assessment literature is the variability in the measurement tools, making it difficult to draw comparisons across psychometric studies. Different versions of the PCL are often used, and the version is not always clearly reported. Similarly, different scoring rules applied to criterion standard diagnostic interviews are often used. A limitation of our study is that results using the PSS-I criterion standard diagnosis are not easily compared to results from other studies using, for example, the CAPS. Nonetheless, the use of independent, blinded interviewers is important because it bolsters confidence in our findings. A second limitation of this study is the relatively small sample size, which precluded subgroup analyses of optimal PCL-C cutoff scores. Although this study was able to report on the active duty group, separate analyses for the two remaining patient groups could not be meaningfully conducted due to the low proportion of dependents and retirees in the interviewed sample (18% and 14%, respectively) and small number of positive PTSD diagnoses in these subgroups (four and six cases, respectively). This study also lacked sufficient power to examine clinic-level differences in optimal cutoff scores, and because the sampling approach was not stratified by clinic, clinic-level weights could not be generated. Thus, it is unknown if optimal cutoff scores varied across the three sites.

The demographic makeup of this sample is typical of primary care clinics in military treatment facilities; however, there are some military primary care clinics that serve unique demographics (e.g., a battalion aid station serving active duty service members or a family medicine clinic serving a greater proportion of dependents). Future studies should examine the operating characteristics of the PCL-C in a range of military primary care settings to ensure the generalizability of cutoff recommendations.

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