



Validation of a brief PTSD screener for underserved patients in federally qualified health centers



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ARTICLE INFO

Article history:

Received 22 July 2014

Revised 27 July 2015

Accepted 27 July 2015

Keywords:

PTSD

PCL-6

Screening

Validation

ABSTRACT

Objective: The objective was to validate the reliability and efficiency of alternative cutoff values on the abbreviated six-item Posttraumatic Stress Disorder (PTSD) Checklist (PCL-6) [1] for underserved, largely minority patients in primary care settings of Federally Qualified Health Centers (FQHCs).

Method: Using a sample of 760 patients recruited from six FQHCs in the New York City and New Jersey metropolitan area from June 2010 to April 2013, we compared the PCL-6 with the Clinician Administered PTSD Scale (CAPS) for the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*. We used reliability statistics for single cutoff values on PCL-6 scores. We examined the relationship between probabilities of meeting CAPS diagnostic criteria and PCL-6 scores by nonparametric regression.

Results: PCL-6 scores range between 6 and 30. Reliability and efficiency statistics for cutoff between 12 and 26 were reported. There is a strong monotonic relationship between PCL-6 scores and the probability of meeting CAPS diagnostic criteria.

Conclusion: No single cutoff on PCL-6 scores has acceptable reliability on both false positive and false negative simultaneously. An ordinal decision rule (low risk: 12 or less, medium risk: 13 to 16, high risk: 17 to 25 and very high risk: 26 and above) can differentiate the risk of PTSD. A single cutoff (17 or higher as positive) may be suitable for identifying those with the greatest need for care given limited mental health capacity in FQHC settings.

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1. Introduction

An important component of implementing primary care interventions for posttraumatic stress disorder (PTSD) is the development of validated, reliable and efficient brief screening instruments that can be used by a range of staff in different clinical settings. Time constraints and the underidentification of patients who are at risk for PTSD are key barriers to facilitating mental health treatment in primary care [2]. Although a number of PTSD screening instruments have been created and tested [1,3,4], none has been validated for underserved multiethnic and low-income populations, such as those served by Federally Qualified Health Centers (FQHCs) [5].

FQHCs are in a prime position to facilitate access to needed mental health treatment given the high prevalence of psychiatric disorders in primary care settings [6,7]. It is estimated that up to 30% of primary care patients have a diagnosable psychiatric disorder, most commonly mood or anxiety disorders [7]. Estimates of the prevalence of PTSD in

primary care settings have ranged between 9% and 23% [8–14]. Although one study indicates that nearly 90% of FQHCs routinely screen for depression [15], primary care clinicians in FQHCs tend not to screen for PTSD [2]. A potential way to promote screening for PTSD by primary care clinicians in FQHCs would be to have a brief screener that is reliable and efficient for use in those settings.

Thus, the purpose of this study is to validate a brief PTSD screening instrument, the abbreviated six-item Posttraumatic Stress Disorder Checklist (PCL-6) [1], with a sample of underserved, largely minority patients recruited from FQHCs and to investigate the reliability and efficiency of screening decision rules. The PCL-6 is a subset of the original PCL, where two items which had the highest correlation with the symptom cluster score were selected from each of the three symptom clusters. The six items in PCL-6 are as follows: (a) cluster B: memories, thoughts or images; upset when reminded; (b) cluster C: avoid activities or situations; feeling distance or cutoff; and (c) cluster D: irritable or angry; difficulty concentrating. PCL scores range between 6 and 30. The reliability of PCL-6 had been previously examined among military veteran populations [1]. In a subsequent study, Lang et al. [16] investigated the utility of the PCL-6 to measure treatment-related symptom changes among PTSD patients in primary care settings. However, the

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screening performance of the PCL-6 in civilian primary care settings, particularly in FQHCs with predominantly underserved patients, has not been explored. Furthermore, examining various cutoff scores for the PCL-6 is also needed so that the use of a brief PTSD screener can be appropriately calibrated according to the differing needs of FQHCs (e.g., maximizing efficiency, adjusting to center resources).

2. Material and methods

2.1. Setting

This study was conducted in seven FQHCs across the New York City and New Jersey metropolitan area from May 2011 to April 2013. These FQHCs were members of Clinical Directors Network (CDN; www.CDNetwork.org), an established Practice-Based Research Network that works with FQHCs. This study was part of a parent study, which tested in a randomized controlled trial a primary care collaborative care intervention for PTSD. For additional details of the parent study, see Meredith et al. [17,18].

2.2. Participants and procedures

Study procedures were approved by institutional review boards in the organizations of all authors. Participants were approached in the waiting rooms of the FQHCs and assessed for study eligibility. Eligible participants had to receive care from a primary care clinician, be either English or Spanish speaking, be between the ages of 18 and 65 years old, and be able to provide informed consent. A total of 760 participants who had a history of trauma were recruited by a case-control design, including 595 cases and 165 controls. The case patients scored 14 points or higher in PCL-6 and were recruited by the parent study [18]. The control patients scored less than 14 points and were recruited by this study. The sample size for case patients was determined by the parent study for detecting a medium standardized effect size for the intervention of the parent study. The additional sample size for control patients was based on another power calculation to ensure the accuracy of estimating the statistical reliability measure (the one-sample z -type 95% confidence interval for a proportion will be no wider than 0.16). All power calculations were conducted in the computing environment R.

Protocol and procedure of recruiting case patients were reported in Meredith et al. [17]. Recruitments for the control patients followed the same protocol. In total, 8422 patients in the seven participating FQHCs were approached in the parent study. Among all patients we approached, 4863 passed eligibility criteria and agreed to take the PCL-6 screener by a recruitment coordinator in the waiting room, wherein 965 were considered as at risk in the parent study (scored 14 points or higher on PCL-6). A part of the at-risk patients (62%, $n=595$) further agreed to take the Clinician Administered PTSD Scale (CAPS).

Following the administration of the PCL-6, research assistants administered the CAPS for *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* [19]. All research assistants had a bachelor's or master's degree, had experience in conducting practice-based research studies and were trained to administer CAPS for *DSM-IV*. A subsample of the CAPS interviews (15%) was audio-recorded, and co-ratings by a clinical psychologist and a doctoral student in clinical psychology indicated a high reliability (efficiency=0.92, correlation=0.93, Cohen's κ =0.79). Among the 760 participants, 51.8% (394) met the CAPS diagnosis criteria.

2.3. Measures

The PCL-6 contains six items from the Posttraumatic Stress Disorder Checklist Civilian Version, a 17-item self-report measure that is keyed to the *DSM-IV* criteria for PTSD [19]. The dichotomous diagnosis from the CAPS structured diagnostic interview [20,21] was used as the "gold standard." The CAPS has been established as a psychometrically

sound, reliable and valid measure of PTSD diagnosis and a useful and sensitive indicator of clinical change [21].

2.4. Analyses

We first conducted a categorical data analysis between the diagnostic status established by the CAPS and single cutoff values based on the total sum score of the PCL-6. We define the true positive (TP), the false positive (FP), the true negative (TN) and the false negative (FN). The positive/negative conditions are based on the PCL-6 cutoff, and the true/false conditions are based on the CAPS diagnosis. For example, a true-positive case is a patient who scored higher than the cutoff on the PCL-6 and met the diagnostic criteria in CAPS.

For each potential cutoff value between 6 and 30 on the PCL-6 scores, we estimated the standard reliability and efficiency measures [22]: positive predictive value (PPV)= $TP/(TP+FP)$, negative predictive value (NPV)= $TN/(TN+FN)$, sensitivity= $TP/(TP+FN)$, specificity= $TN/(TN+FP)$ and efficiency= $(TP+TN)/N$, where N is the total sample size, as well as the 95% confidence intervals. To further remove estimation errors among adjacent cutoff values, we fitted smooth nonparametric regression of the reliability measures versus the cutoff values. We performed the receiver operating characteristic (ROC) analysis and calculated the area under the ROC curve (AUC).

Next, we estimated the probabilities of positive CAPS diagnosis versus the PCL-6 scores. For simplicity in presentation, we denote the conditional probability of positive CAPS given a PCL-6 score as $P(\text{PTSD})$ hereafter. We estimated $P(\text{PTSD})$ at each observed level of PCL-6 scores by one-sample proportion estimates: for a given PCL-6 score value, we subset the patients with the corresponding PCL-6 score and calculated the sample proportion for those with positive CAPS diagnosis.

Given that the sample size at each distinct PCL-6 score was small, we fitted a nonparametric generalized additive model (GAM) [23] to estimate a smooth relationship between $P(\text{PTSD})$ and PCL-6 scores. Based on the relationship between $P(\text{PTSD})$ and the PCL-6 scores, we investigated an ordinal screening decision rule using multiple cutoff values. We considered a P value of .05 (two-tailed) to be significant.

3. Results

The mean PCL-6 score in the study sample was 18.3 (S.D.=6.5, range 6–30). The mean CAPS severity score was 49.4 (S.D.=27.7, range 0–114). Among the 760 participants, 394 met the diagnostic criteria in CAPS. Table 1 lists detailed descriptive statistics of PCL-6 scores, CAPS severity scores and CAPS diagnosis by gender, race/ethnicity and age group. A greater proportion of female participants had a PTSD diagnosis than males. Similarly, rates of PTSD diagnoses were greater among Hispanic participants than other non-Hispanic race groups combined. Older participants (34 and above) had notably higher percentages of positive PTSD diagnosis than younger participants.

Table 1
Characteristics of the study sample ($N=760$).^a

	CAPS diagnosis status		PCL-6 score	
	Negative ($n=366$)	Positive ($n=394$)	<14 ($n=165$)	≥14 ($n=595$)
% Female	73.0	80.7	67.3	79.3
% Hispanic (of any race)	42.4	55.6	40.6	51.5
% Non-Hispanic black	47.5	33.8	50.3	38.2
% Non-Hispanic white	3.6	5.3	3.0	4.9
% Non-Hispanic other races	6.0	4.1	6.0	4.9
Average age (S.D.)	39.0 (13.2)	42.2 (12.1)	38.0 (13.5)	41.4 (12.4)
Average CAPS severity score (S.D.)	24.4 (15.4)	70.6 (15.4)	15.1 (16.3)	57.4 (23.4)
Average PCL-6 score (S.D.)	14.7 (6.0)	21.6 (5.0)	9.1 (2.4)	20.9 (4.7)

^a Some participants were not included in calculating subgroup descriptive statistics due to their nonresponse to demographic questions: 11 participants refused to report race/ethnicity, and 6 refused to provide age information.

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