



## Diagnostic accuracy of brief PTSD screening instruments in military veterans

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### ABSTRACT

Post-traumatic stress disorder (PTSD) is prevalent but is under-detected and under-treated, despite available efficacious treatments. To improve detection rates, screening instruments such as the PTSD Checklist (PCL) and the Primary Care–PTSD (PC-PTSD) screen have been widely used. However, validation of these screening instruments among patients seeking treatment in substance use disorder (SUD) specialty treatment clinics and general mental health (MH) treatment clinics is limited. Therefore, this study assessed the area under the ROC curve (AUC), sensitivity, specificity, efficiency, and positive and negative predictive values of the PCL, PC-PTSD, and five abbreviated versions of the PCL in detecting PTSD among samples of patients seeking treatment in SUD specialty treatment ( $n = 158$ ) and general MH treatment settings ( $n = 242$ ). A computer-assisted structured diagnostic interview (C-DIS-IV) was used to ascertain patient *DSM-IV* PTSD diagnostic status. Based on the C-DIS-IV, prevalence of PTSD was found to be 36.7 and 52.9% in the SUD and MH samples, respectively. The PCL, PC-PTSD, and five abbreviated versions of the PCL were found to have adequate psychometric properties for screening patients in SUD (AUC ranged from 0.80 to 0.86) and MH (AUC ranged from 0.77 to 0.80) outpatient treatment settings.

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### 1. Validation of brief PTSD screening instruments

PTSD is common in the general population and among military veterans. In a national representative sample of 8098 Americans, the National Comorbidity Survey (NCS) found that 7.8% of individuals (5% of men and 10.4% of women) had a lifetime PTSD diagnosis (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). The National Comorbidity Survey Replication Study found comparable rates (Kessler et al., 2005, Kessler, Chiu, Demler, Merikangas, & Walters, 2005; <http://www.hcp.med.harvard.edu/ncs/publications.php>). Higher rates have been found among veterans. The National Vietnam Veterans Readjustment Study (NVVRS) interviewed a representative sample of 3016 veterans who served during the Vietnam War, and estimated a prevalence of 18.7% for a lifetime diagnosis and 9.1% for a current PTSD diagnosis (Dohrenwend et al., 2006). A recent review study (Ramchand et al., 2010) found estimates between 5 and 20% among non-treatment seeking previously deployed personnel. Among VA SUD patients, a prevalence between 20 and 35% have been reported (Dalton & McKellar, 2007; McKellar & Saweikis, 2005; Tiet, Byrnes, Barnett, & Finney, 2006), but prevalence of PTSD in VA mental health clinics is lacking.

Despite its high prevalence and the existence of efficacious treatments (Foa, Keane, Friedman, & Cohen, 2008; Institute of Medicine, 2007), PTSD is under-detected (Liebschutz et al., 2007; Magruder et al., 2005) and undertreated, which may lead to increased health care cost (Davidson, Stein, Shalev, & Yehuda, 2004; Kessler et al., 1995; Schnurr, Friedman, Sengupta, Jankowski, & Holmes, 2000). For example, Kimerling, Trafton, and Nguyen (2006) found that 75% of individuals in a sample of SUD patients identified as meeting diagnostic criteria for PTSD did not have a PTSD diagnosis documented in their patient record. The consequences of untreated PTSD can be grave and can include medical morbidity (Beckham et al., 2003), worse mental health, substance abuse, and decreased quality of life outcomes, including marital problems and unemployment, as well as increased risk for suicide (Tanielian & Jaycox, 2008), and premature mortality (Johnson, Fontana, Lubin, Corn, & Rosenheck, 2004).

Efforts have been made to improve detection of PTSD through the development of brief screening instruments that are practical for clinical settings. However, although PTSD has been found to be prevalent among patients seeking services at substance use disorder (SUD) and general mental health (MH) specialty clinics (e.g., Grubaugh, Elhai, Cusack, Wells, & Frueh, 2007; Kimerling et al., 2006), no study has validated the PCL among patients receiving outpatient services at SUD clinics and only one study has evaluated it among patients at general MH treatment settings (Grubaugh et al., 2007).

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Two of the most widely used measures are the PTSD Checklist (PCL; Weathers, Litz, Herman, Huska, & Keane, 1993) and the Primary Care–PTSD screen (PC-PTSD; Prins et al., 2003). The PCL assesses the 17 PTSD *DSM-IV* symptoms using 17 self-report items, in which each item is scored on a five-point scale ranging from 0 (not at all) to 5 (extremely), yielding total scores between 0 and 68 (Weathers et al., 1993). The PC-PTSD is a four-item screen that has been mandated by the United States Department of Defense (DoD) to be used during post-deployment health assessments (Hoge, Auchterlonie, & Milliken, 2005) and by the Veterans Health Administration within the Department of Veterans Affairs (VA) to be used during routine primary care visits (Department of Veterans Affairs and Administration, 2004). It comprises four dichotomous (yes/no) items assessing the presence of nightmares, avoidance, being on guard, and feeling numb with total scores ranging from zero to four.

Having brief, validated screening instruments reduces respondent burden and may lead to reduced health care cost. In addition to the four-item PC-PTSD, abbreviated two- to six-item versions of the PCL have been developed. In addition to assessing the psychometric properties of the PCL and PC-PTSD, the current study evaluated five alternative, abbreviated versions of the PCL: Bliese et al. (2008) four-item PCL as well as Lang and Stein's (2005) two-, three-, four- and six-item PCLs.

The PCL was developed using a sample of military veterans and a cut-point equal to or greater than (referred to from this point forward as “cut-point”) 50 was recommended (Weathers et al., 1993). However, with a cut-point of 50, Stein, McQuaid, Pedrelli, Lenox, and McCahill (2000) and Widows, Jacobsen, and Fields (2000) reported poor psychometric properties of the PCL, with a sensitivity = 0.32 and 0.20–0.40, respectively. For a review, see McDonald and Calhoun (2010). As summarized in Table 1, different cut-points have been suggested for different samples by subsequent validation studies, including the highest recommended cut-point of 60 on a sample of male veterans (Keen, Kutter, Niles, & Krinsley, 2008), to the lowest recommended cut-points of between 28 and 30 for primary care female veterans (Lang, Laffaye, Satz, Dresselhaus, & Stein, 2003). When positive and negative predictive values and estimated population prevalence were not reported in original study reports, they were derived using the techniques specified by McDonald and Calhoun. Psychometric properties of abbreviated versions of the PCL are provided in Table 2.

As compared to the PCL, fewer validation studies have been conducted on the PC-PTSD (see Table 2). The PC-PTSD was developed on a primary care patient sample (Prins et al., 2003), and has been validated on military primary care patients (Gore, Engel, Freed, Liu, & Armstrong, 2008), substance use disorder patients (Kimerling et al.,

**Table 1**  
Psychometrics properties and recommended cut-points of the PTSD Checklist (PCL) from previous studies.

Study	Sample	Sample size (n)	PTSD BR (%)	Criterion measure	Cut-point	SN	SP	PPV	NPV	Efficiency	Prevalence
Weathers et al., 1993	Vietnam veterans	123	54	SCID	≥ 50	0.82	0.83	0.83	0.82	0.83	.52
Blanchard et al., 1996	MV and sexual abuse patients	40	68	CAPS	≥ 44	0.94	0.86	0.85	0.95	0.90	.50
					≥ 50	0.78	0.86	0.82	0.83	0.83	.43
					≥ 50	0.75	0.89	0.30	0.98	0.88	.15
Manne et al., 1998	Mothers of cancer survivors	65	6	SCID	≥ 50	0.75	0.89	0.30	0.98	0.88	.15
					≥ 45	0.75	0.82	0.21	0.98	0.82	.21
					≥ 40	1.00	0.77	0.22	1.00	0.79	.28
Dobie et al., 2002	Women receiving VA services	282	36	CAPS	≥ 50	0.58	0.92	0.80	0.80	0.80	.26
					≥ 38	0.79	0.79	0.68	0.87	0.79	.42
					≥ 30	0.85	0.64	0.57	0.88	0.72	.54
Bliese et al., 2008	Combat returnees	352	< 1	MINI	≥ 50	0.24	0.98	0.56	0.93	0.98	.02
					≥ 34	0.71	0.91	0.43	0.97	0.91	.09
					≥ 30	0.78	0.88	0.38	0.98	0.88	.12
Andrykowski et al., 1998	Breast cancer patients	82	6	SCID	≥ 50	0.60	0.99	0.79	0.97	0.96	.05
					≥ 30	1.00	0.83	0.27	1.00	0.84	.22
					≥ 30	0.36	0.95	0.46	0.93	0.89	.08
Walker et al., 2002	Women in HMO	261	11	CAPS	≥ 45	0.82	0.76	0.29	0.97	0.78	.30
					≥ 30	0.39	0.94	0.74	0.77	0.77	.16
					≥ 30	0.78	0.71	0.55	0.88	0.73	.44
Lang & Stein, 2005	Primary care female patients	221	31	CIDI	≥ 50	0.54	0.94	0.63	0.91	0.88	.14
					≥ 30	0.96	0.59	0.31	0.99	0.65	.51
					≥ 30	0.32	0.94	0.42	0.91	0.87	.09
Stein et al., 2000	Primary care patients	132	12	CIDI	≥ 50	0.53	0.95	0.57	0.94	0.90	.11
					≥ 31	0.81	0.81	0.35	0.97	0.81	.26
					≥ 31	0.39	0.94	0.74	0.77	0.77	.16
Yeager et al., 2007	VA primary care patients	840	11	CAPS	≥ 50	0.39	0.94	0.74	0.77	0.77	.16
					≥ 30	0.78	0.71	0.55	0.88	0.73	.44
					≥ 30	0.54	0.94	0.63	0.91	0.88	.14
Lang et al., 2003	Primary care female veterans	49	31	CIDI	≥ 50	0.96	0.59	0.31	0.99	0.65	.51
					≥ 30	0.32	0.94	0.42	0.91	0.87	.09
					≥ 30	0.53	0.95	0.57	0.94	0.90	.11
Hudson et al., 2008	Older adults in hospitals	100	10	SCID	≥ 31	0.81	0.81	0.35	0.97	0.81	.26
					≥ 50	0.39	0.94	0.74	0.77	0.77	.16
					≥ 30	0.78	0.71	0.55	0.88	0.73	.44
Widows et al., 2000	BMT recipients	102	5	SCID	≥ 28	0.94	0.68	0.57	0.96	0.76	.51
					≥ 50	0.40	0.97	0.60	0.94	0.91	.07
					≥ 36	0.90	0.87	0.43	0.99	0.87	.21
Harrington & Newman, 2007	Female substance users	44	39	CAPS	≥ 50	0.20	0.95	0.17	0.96	0.91	.06
					SCS	0.40	0.93	0.22	0.97	0.90	.09
					≥ 44	0.76	0.79	0.69	0.84	0.78	.42
Keen et al., 2008	Male veterans	114	22	CAPS	≥ 38	0.82	0.60	0.57	0.84	0.69	.56
					≥ 35	1.00	0.52	0.57	1.00	0.71	.68
					≥ 60	0.56	0.92	0.66	0.88	0.84	.19
Grubaugh et al., 2007	Mental health patients	44	59	CAPS	SCS	0.72	0.79	0.49	0.91	0.77	.32
					≥ 54	0.69	0.78	0.82	0.64	0.73	.50
					≥ 50	0.86	0.79	0.36	0.98	0.80	.29
Bollinger et al., 2008	HIV-seropositive patients	57	12	CAPS	≥ 52	0.71	0.84	0.38	0.96	0.82	.23
					≥ 52	0.71	0.84	0.38	0.96	0.82	.23

Note: BR = base rate; PR = positive rate; SN = sensitivity; SP = specificity; PPV = positive predictive value; NPV = negative predictive value; Prevalence = estimated population prevalence; BMT = bone marrow transplant; MV = motor vehicle; VA = Department of Veteran Affairs; HMO = Health Maintenance Organization; HIV = human immunodeficiency virus; CAPS = Clinician-Administered PTSD Scale; SCID = Structured Clinical Interview for *DSM*; MINI = Mini International Neuropsychiatric Interview; SCS = symptom cluster scoring.

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