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Performance characteristics of the Posttraumatic Stress Disorder Checklist and SPAN in Veterans Affairs primary care settings

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Abstract

Background: Posttraumatic stress disorder (PTSD) is a treatable disorder, and individuals with this condition may benefit from early detection. Many people with PTSD are not aware of its symptoms and do not seek treatment, making a brief and targeted screening program a worthwhile endeavor. For this reason, research aimed at improving screening instruments could yield substantial benefits.
Objectives: The primary objective of this research was to assess the diagnostic performance of two popular PTSD screening assessments, the PTSD Checklist (PCL) and the SPAN, in a Veterans Affairs (VA) primary care setting. Additionally, we compared the screening performance of these two assessments by sex and race.
Methods: The PCL and SPAN were compared with a gold standard, the Clinician-Administered PTSD Scale. Receiver operating characteristic curves were used in conjunction with sensitivity and specificity measures to assess the performance of each screening assessment. These analyses are based on a large database ($n=1076$) that was derived from a multisite cross-sectional study conducted at four southeastern VA medical centers.
Results: Results for the PCL support cutoff scores lower than those previously published, whereas results for the SPAN support the previously recommended cutoff score of 5 (sensitivity of 73.68% and specificity of 81.99%). We found no significant difference in areas under the curve (AUCs) by sex and by race between the PCL and SPAN. We did find that there was a highly significant difference ($P<.0006$) in overall diagnostic ability (as measured by the AUC) between the PCL (AUC=0.882) and SPAN (AUC=0.837), making the PCL the preferred screening tool, unless brevity is essential.
Conclusions: Clinicians and researchers should consider lower cutoff scores for the PCL, but the originally suggested cutoff score for the SPAN is appropriate.
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Keywords: PCL; Posttraumatic stress disorder; SPAN; Screening; Primary care

1. Introduction

The American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (*DSM-IV*) defines posttraumatic stress disorder (PTSD) as the development of specific symptoms following exposure to a traumatic event to which a person responded with intense fear, helplessness or horror [1]. PTSD is a relatively common disorder affecting men and women of all ages and racial backgrounds, with lifetime prevalence rates ranging from 8% to 14% in the general population [1–3]. The National Comorbidity Survey found the lifetime prevalence rate of PTSD to be twice as high for women as compared with men [3], with greater conditional risk for female than male trauma survivors. In fact, "most people will experience a traumatic event at some point in their life, and up to 25% of them will develop posttraumatic stress disorder" [4].

The prevalence rate of PTSD among veterans is higher than that among the general population, with estimates as high as 15% and 31% for lifetime prevalence rates among veterans exposed to war zone trauma [5–7]. The prevalence

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rate is also significant among Veterans Affairs (VA) clinical populations, with one study suggesting that 20% of patients in VA primary care clinics (Northeastern United States) have positive PTSD screens [8]. A recent study [9] on patients in VA primary care estimated that 11.5% of attendees meet *DSM-IV* criteria for current PTSD, with only 46.5% of them so noted by their providers in the previous 12 months. In 2001, Spiro et al. [10] found that only 7% of VA patients carry a *DSM-IV* clinical diagnosis in their administrative record and that the prevalence rates vary from 4% to 10% depending on geographic region. This body of literature suggests that millions of traumatized Americans (veterans and civilians) suffer from PTSD and that there is considerable discrepancy between prevalence rates determined by clinical diagnosis and those determined by research diagnosis.

Although the symptoms of PTSD generally decrease over time [11], longitudinal research had shown that PTSD can become a chronic psychiatric disorder that could persist for many decades and sometimes for a lifetime with occasional remissions and relapses. The course of PTSD is highly variable and may be influenced by the nature of the trauma and personal characteristics, such as age. Given that there are over 5 million surviving American veterans of foreign wars, the potential number of veterans with current PTSD is well over half a million. Many veterans still suffer from severe symptoms from wars fought 30 (e.g., Vietnam) or 50 (World War II) years ago [12,13]. A striking example of this is that the PTSD prevalence among World War II veterans some 50 years after the combat has ended remains high, with many veterans still suffering in their late 70s [14].

Many treatment modalities, both behavioral and pharmacological, are currently available to treat PTSD, and they are ever improving [15]. As treatments are becoming more effective, the importance of capturing undiagnosed PTSD becomes more important. Screening for PTSD in primary care is a key component of improving PTSD detection and treatment rates, especially in VA settings. A first step is determining the performance characteristics of screening instruments in primary care settings.

The primary aim of this secondary analysis was to assess the diagnostic accuracy of two commonly used screening tools, the PTSD Checklist (PCL) and the SPAN, in screening for the presence of PTSD in VA primary care settings. An additional aim was to investigate the performance of these screening tools across sex and racial groups.

2. Methods

2.1. Study population

This analysis was based on data gathered from patients in four VA medical centers in the southeastern region of the United States [9]. Eligible patients were identified from among 229,780 veterans who had made a health care visit during Fiscal Year 1999. Patients with known dementia, octogenarians and nonagenarians were excluded due to concerns over their ability to recall information critical to the study.

Two study samples were recruited. Patients in Group 1 were randomly selected from those who made an outpatient visit in Fiscal Year 1999 at one of the four hospitals. We created a master list of these eligible patients. Stratifying per hospital, we assigned each patient a random number and ordered the patient list by the random numbers assigned. According to this ordered list, we sent lists of blocks of 200 patients to each hospital (we sent new blocks when each list of 200 was exhausted). Research assistants then checked primary care appointment lists. When the randomly selected patients scheduled a primary care visit, we sent them a letter of invitation in advance of their visit to explain the study. (See the work of Magruder et al. [9,16] for an explanation on the sampling strategy.)

Patients in Group 2 consisted of an oversample of female patients only. These women came from the same primary care clinics. We randomly identified additional female veterans from the abovementioned ordered master list and approached them during their visit to one of the four VA primary care clinics. We did not send these women a letter in advance of their visit; we instead approached and directly invited them to participate. (See the work of Grubaugh et al. [17] for details on the oversampling procedure.) Study procedures were otherwise identical for the two groups of patients.

At the time of the clinic visit, we provided further explanations on the study, including the fact that this was a study on stress-related disorders in primary care. We obtained written informed consent from each patient before study commencement. At the clinic visit, sociodemographic data were collected and PTSD screening tools were administered. Patients were told that they would be called by telephone for a follow-up interview.

The telephone interview took place within 2 months of the clinic interviews. Clinicians, trained at the master's level or higher, administered a trauma assessment form (to assess for PTSD criterion A), the Clinician-Administered PTSD Scale (CAPS) and the Mini International Neuropsychiatric Interview for other common psychiatric diagnoses. CAPS interviewers were blinded to the PCL and SPAN screening results. Telephone interviewers were the same for patients in Groups 1 and 2, and they were not informed as to which subjects had been identified by the oversampling procedure. Telephone interviewers were also not privy to the PTSD screening tool information collected at the clinic visit.

2.2. Measures

2.2.1. Gold standard

The CAPS was developed at the National Center of Posttraumatic Stress Disorder in 1990 [18] to serve as a structured clinical interview tool for assessing adults on the 17 symptoms of PTSD as outlined in *DSM-IV* along with

Table 1
PTSD prevalence rates and demographic characteristics of the analytical sample

Demographic variable	Race		P	Sex		P	Total sample (N=840)
	Caucasian (n=529)	African Amer. (n=311)		Male (n=664)	Female (n=176)		
PTSD (CAPS definition; %)	10.0	13.5	–	11.9	9.1	–	11.3
Age (years)							
Mean	62.7	54.3	.000*	62.2	49.6	.000*	59.6
Range	25–81	21–80	–	27–81	21–80	–	21–81
Sex (% male)	82.1	73.7	.005**	–	–	–	79.0
Race (% Caucasian)	–	–	–	65.5	53.8	.005**	63.0
Marital status (% married)	71.3	53.5	.000**	70.7	42.5	.000**	64.9
Education (% with at least a high school diploma)	78.4	85.9	.008**	76.9	97.7	.000**	81.3

* Based on two-sample t test.
** Based on χ^2 analysis.

five associated features (guilt, dissociation, derealization, depersonalization and reduction in awareness of surroundings). Early versions of the CAPS were designed to assess current or lifetime PTSD status (CAPS-1) and PTSD symptoms over the previous week (CAPS-2). The current version of the CAPS incorporates both of the previous versions' features. The CAPS provides a means to evaluate current and/or lifetime *DSM-IV* diagnosis of PTSD, frequency and intensity of symptoms, impact of the 17 PTSD symptoms on social and occupational functioning and overall severity of PTSD. The CAPS consists of standardized prompt questions, supplementary follow-up questions and five-point rating scales that correspond to the frequency and intensity of each symptom assessed.

Magruder et al. [9] conducted a random sample of interviews (8%) by speaker phone to assess interrater reliability with the CAPS and found that the raters were 100% concordant for PTSD diagnosis on the CAPS.

2.3. Screening assessments

The PCL is a brief self-report inventory that assesses the 17 symptoms of PTSD. It was developed in 1993 by a research team from the National Center of Posttraumatic Stress Disorder [19]. Initial psychometric data showed that the PCL correlates well with the CAPS [18,20]. The PCL was tailored specifically for veterans with combat-related trauma. It includes a series of 17 questions about symptoms or signs of PTSD resulting from military experiences taking place within the past month. Each positive response is worth 5 points (maximum score of 85). A score of 50, the current recommended cutoff score [19], does not confirm a positive diagnosis but does indicate that the present symptoms are suggestive of PTSD. A diagnosis of PTSD requires assessment of these symptoms, severity and other circumstances [21].

SPAN is a mnemonic for Startle, Physiological arousal, Anger and Numbness, as these represent the assessment's top four items. First published in 1999, the SPAN was developed at the Duke University Department of Psychiatry and Behavioral Sciences as a shorter and better diagnostic tool than the Davidson Trauma Scale [22]. Initial studies revealed respectable efficiency, sensitivity, specificity and positive likelihood ratios. Meltzer-Brody et al. [22] found that this four-item scale "supports a good degree of confidence in the interpretation of a positive score as indicating the diagnosis of PTSD." Based on a sample of 243 patients, they determined that a cutoff score of 5 was adequate in terms of efficiency. According to their data, a cutoff score of 5 corresponds to a sensitivity of 84% and a specificity of 91%.

2.4. Statistical analysis

Sensitivity, specificity, positive predictive, negative predictive and likelihood ratio values were all derived for PCL and SPAN cutoff scores. Additionally, receiver operating characteristic (ROC) curves were plotted for the PCL and SPAN, and corresponding nonparametric estimates of areas under the curve (AUCs) were estimated using the STATA [22] commands *rocss* and *rocplot*. The STATA [23] command *roccomp* was used to test the equality of the PCL and SPAN by comparing their areas under the ROC curves using a nonparametric algorithm based on χ^2 distribution [24]. All procedures described were repeated for subsamples based on patient sex and race. ROC curves were compared

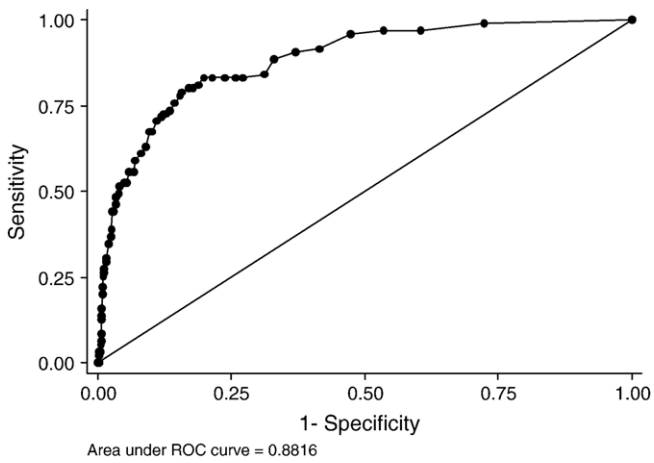

Fig. 1. ROC curve for the PCL.

Table 2
Diagnostic characteristics of the PCL by cutoff score

Cutoff score	Sensitivity (%)	Specificity (%)	Correctly classified (%)	Likelihood ratio		Predictive value (%)	
				+	–	+	–
17	100.00	0.00	11.31	1.000	–	11.31	–
18	98.95	27.65	35.71	1.368	0.038	14.85	99.52
19	96.84	39.46	45.95	1.600	0.080	16.94	98.99
20	96.84	46.44	52.14	1.808	0.068	18.74	99.14
21	95.79	52.62	57.50	2.022	0.080	20.50	98.99
22	91.58	58.39	62.14	2.201	0.144	21.92	98.19
23	90.53	62.82	65.95	2.435	0.151	23.69	98.11
24	88.42	66.98	69.40	2.678	0.173	25.46	97.84
25	84.21	68.72	70.48	2.693	0.230	25.56	97.15
26	83.16	72.75	73.93	3.052	0.232	28.01	97.13
27	83.16	74.23	75.24	3.227	0.227	29.15	97.19
28	83.16	76.11	76.90	3.481	0.221	30.74	97.26
29	83.16	78.52	79.05	3.872	0.215	33.05	97.34
30	83.16	80.13	80.48	4.186	0.210	34.80	97.39
31	**81.05**	**81.21**	**81.19**	**4.313**	**0.233**	**35.49**	**97.11**
32	80.00	82.15	81.90	4.481	0.244	36.37	96.99
33	80.00	82.95	82.62	4.693	0.241	37.44	97.02
34	78.95	84.16	83.57	4.984	0.250	38.86	96.91
35	77.89	84.56	83.81	5.046	0.261	39.15	96.77
36	75.79	85.50	84.40	5.228	0.283	40.00	96.51
37	73.68	86.44	85.00	5.435	0.304	40.93	96.26
38	72.63	87.11	85.48	5.637	0.314	41.81	96.15
39	72.63	87.52	85.83	5.818	0.313	42.60	96.16
40	71.58	88.05	86.19	5.992	0.323	43.31	96.05
41	70.53	88.99	86.90	6.408	0.331	44.96	95.95
42	67.37	89.80	87.26	6.604	0.363	45.72	95.57
43	67.37	90.34	87.74	6.971	0.361	47.07	95.60
44	63.16	91.01	87.86	7.023	0.405	47.26	95.09
45	61.05	91.81	88.33	7.456	0.424	48.73	94.87
46	58.95	92.89	89.05	8.286	0.442	51.39	94.67
47	55.79	93.15	88.93	8.150	0.475	50.95	94.29
48	55.79	94.09	89.76	9.446	0.470	54.62	94.35
49	52.63	94.63	89.88	9.803	0.501	55.55	94.00
50	**52.63**	**94.90**	**90.12**	**10.319**	**0.499**	**56.82**	**94.02**
51	51.58	95.84	90.83	12.396	0.505	61.26	93.95
52	49.47	95.97	90.71	12.286	0.527	61.02	93.71
53	48.42	96.64	91.19	14.430	0.534	64.76	93.63
54	46.32	96.64	90.95	13.802	0.556	63.74	93.39
55	44.21	97.05	91.07	14.971	0.575	65.65	93.17
56	44.21	97.18	91.19	15.684	0.574	66.66	93.18
57	38.95	97.32	90.71	14.508	0.627	64.95	92.59
58	36.84	97.45	90.60	14.446	0.648	64.82	92.37
59	34.74	97.85	90.71	16.174	0.667	67.33	92.16
62	30.53	98.39	90.71	18.952	0.706	70.74	91.74
63	29.47	98.39	90.60	18.298	0.717	70.01	91.62
64	27.37	98.79	90.71	22.655	0.735	74.26	91.43
65	26.32	98.79	90.60	21.784	0.746	73.50	91.32
66	25.26	98.93	90.60	23.526	0.756	75.07	91.21
67	22.11	99.06	90.36	23.526	0.786	75.00	90.89
68	20.00	99.06	90.12	21.286	0.808	73.07	90.66
69	15.79	99.19	89.76	19.605	0.849	71.31	90.23
70	13.68	99.19	89.52	16.991	0.870	68.29	90.01
72	12.63	99.19	89.40	15.684	0.881	66.54	89.90
73	8.42	99.19	88.93	10.456	0.923	57.00	89.47
74	6.32	99.19	88.69	7.842	0.944	49.87	89.25
76	5.26	99.33	88.69	7.842	0.954	50.03	89.16
77	3.16	99.33	88.45	4.705	0.975	37.56	88.94
78	3.16	99.46	88.57	5.882	0.974	42.73	88.96
79	3.16	99.73	88.81	11.763	0.971	59.88	88.98
81	2.11	99.73	88.69	7.842	0.982	49.91	88.88
83	0.00	99.73	88.45	0.000	1.003	0.00	88.66
85	0.00	99.87	88.57	0.000	1.001	0.00	88.68
≥86	0.00	100.00	88.69	–	1.000	–	88.69

statistically to determine whether the overall diagnostic accuracy of the PCL varies by sex and race.

3. Results

In Group 1 (random sample of primary care enrollees), a total of 888 patients (74.1% of 1198 contacted) participated in Visit 1 procedures (e.g., PCL and sociodemographics). Of all Group 1 participants, 728 (82%) completed the CAPS and PCL. Of the 73 women in Group 1 who were approached, 62 participated in Visit 1 procedures (84.9%). Of these women, 79.0% completed the CAPS and PCL. In Group 2 (female oversample), 276 women were invited to participate, 191 (69.2%) participated in Visit 1 procedures and 130 (68.1%) completed the CAPS and PCL).

In a study concerning female patients from Groups 1 and 2, comparisons were made between the final sample of women for whom CAPS data were available (from Groups 1 and 2 combined) and women who consented but could not be reached for follow-up interviews ($n=66$) on sociodemographic variables [16]. Completers were significantly older than noncompleters (49.77 vs. 45.15 years) and more likely to be Caucasian than African American (53.5% vs. 46.5%). Magruder et al. [9] (Group 1 patients only) found a similar trend for completers versus noncompleters regarding age.

In a comparison of the final sample of women from Group 1 with that from Group 2, no significant difference on any of the variables tested, including age, race, relationship status, education, employment status, number of primary care visits,

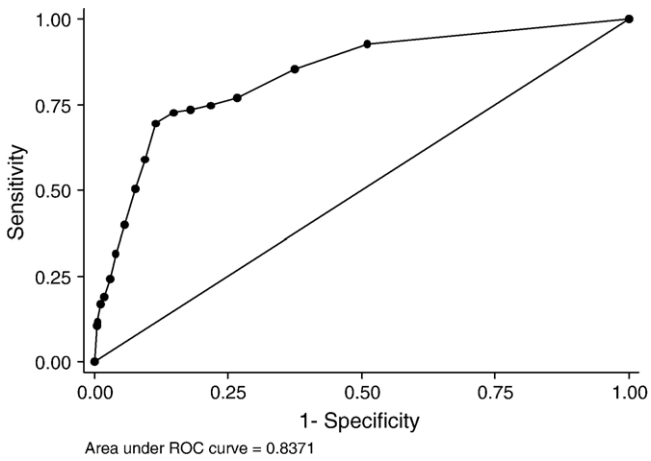

Fig. 2. ROC curve for the SPAN.

Table 3
Diagnostic characteristics of the SPAN by cutoff score

Cutoff score	Sensitivity (%)	Specificity (%)	Correctly classified (%)	Likelihood ratio		Predictive value (%)	
				+	–	+	–
0	100.00	0.00	11.32	1.000	–	11.31	–
1	92.63	48.92	53.87	1.814	0.151	18.78	98.12
2	85.26	62.50	65.08	2.274	0.236	22.48	97.08
3	76.84	73.25	73.66	2.873	0.316	26.81	96.12
4	74.74	78.09	77.71	3.411	0.324	30.31	96.04
5	**73.68**	**81.99**	**81.05**	**4.091**	**0.321**	**34.28**	**96.07**
6	72.63	85.22	83.79	4.913	0.321	38.52	96.07
7	69.47	88.44	86.29	6.010	0.345	43.39	95.78
8	58.95	90.46	86.89	6.177	0.454	44.07	94.53
9	50.53	92.34	87.60	6.595	0.536	45.69	93.61
10	40.00	94.35	88.20	7.086	0.636	47.45	92.50
11	31.58	95.97	88.68	7.832	0.713	49.98	91.67
12	24.21	97.04	88.80	8.188	0.781	51.05	90.94
13	18.95	98.12	89.15	10.069	0.826	56.24	90.47
14	16.84	98.79	89.51	13.923	0.842	63.96	90.31
15	11.58	99.33	89.39	17.230	0.890	68.79	89.81
16	10.53	99.46	89.39	19.579	0.900	71.32	89.71
≥17	0.00	100.00	88.68	–	1.000	–	88.69

VA study site and SF-36 mental and physical health functioning, was found, justifying combining the women in the oversample with the larger sample [16].

Thus, the total primary analytical sample consists of two groups of primary care patients who sought care at any one of four VA hospitals and received a baseline interview at Time 1 ($n=1076$). Of these, 858 (80% of enrollees) completed the PCL at Visit 1 and received a CAPS diagnosis at Visit 2 (728 from Group 1 and 130 from Group 2). There were 18 subjects who identified themselves as being other than Caucasian ($n=529$) and African American ($n=311$). These patients were too few to provide precise estimates and were therefore removed from the analytical sample, leaving 840.

Table 4
AUCs for the PCL and SPAN by sex and race

Demographic characteristic	AUC	S.E.	P (χ^2)
PCL			
Sex			
Male ($n=664$)	0.899	0.018	.494
Female ($n=176$)	0.858	0.057	
Race			
Caucasian ($n=529$)	0.883	0.023	.854
African American ($n=311$)	0.876	0.029	
Total ($N=840$)	0.882	0.018	
SPAN			
Sex			
Male ($n=664$)	0.852	0.024	.495
Female ($n=175$)	0.816	0.058	
Race			
Caucasian ($n=528$)	0.818	0.033	.376
African American ($n=311$)	0.857	0.03	
Total ($n=839$)	0.837	0.023	

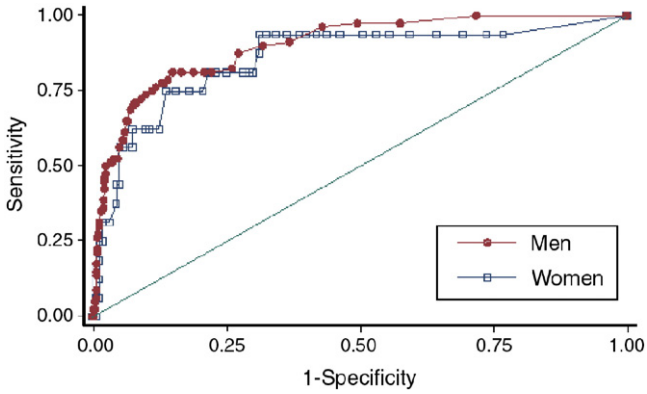

Fig. 3. Comparison of ROC curves by sex for the PCL.

The overall prevalence rate of PTSD (CAPS defined) for the analytical sample was 11.3%. African Americans had a slightly higher prevalence rate (13.5%) as compared with Caucasians (10.0%). There was slightly less variation between males and females, with prevalence rates of 11.9% and 9.1%, respectively. Table 1 shows demographic characteristics by race and sex. There were significant group differences on key demographic variables that might be important in interpreting screening results.

The ROC curve in Fig. 1 shows true-positive rates plotted against false-positive rates for PCL scores ranging from 17 to 85 for the PCL. Sensitivity, specificity, likelihood ratios (positive and negative), percentage of correctly classified and predictive values (positive and negative), based on 840 observations, were generated using the *roctab* command in STATA [23]. The AUC for the PCL was 0.882 (S.E.=0.018). The diagnostic performance of the PCL is outlined for all cutoff scores in Table 2, with key cutoff scores provided in boldface. This preliminary analysis indicates that a cutoff score of 31 provides a nearly perfect balance of sensitivity and specificity (sensitivity 81.05 and specificity 81.21). The corresponding proportions of false-positive and false-negative rates are 18.95% and 18.79%. In our data, the originally recommended cutoff score of 50 corresponds to a sensitivity of 52.63% and a specificity of

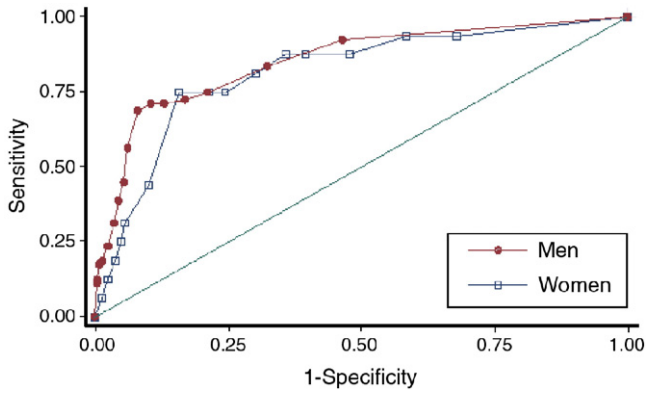

Fig. 4. Comparison of ROC curves by sex for the SPAN.

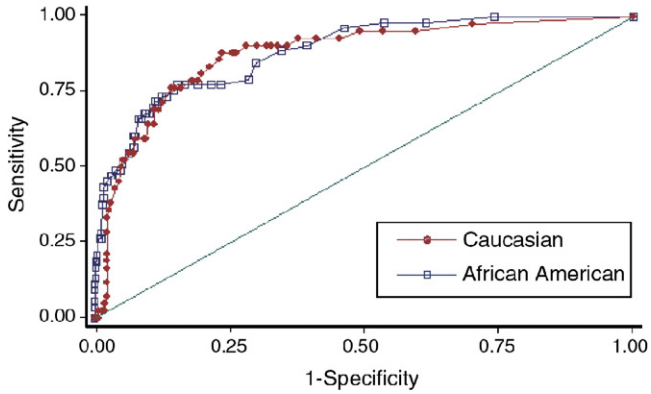

Fig. 5. Comparison of ROC curves by race for the PCL.

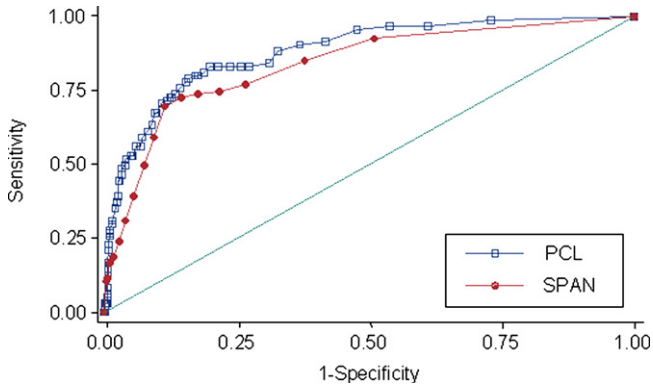

Fig. 7. Comparison of ROC curves for the PCL and SPAN.

94.90% (false-negative rate of 47.37% and false-positive rate of 5.10%).

As with the PCL, sensitivity, specificity, likelihood ratios (positive and negative), percentage of correctly classified and predictive values (positive and negative) for the SPAN were based on 839 observations (SPAN data were missing for one patient) and were similarly generated using the *roctab* command in STATA [23]. The AUC for the SPAN in Fig. 2 was 0.837 (S.E.=0.023). The originally recommended cutoff score of 5 on the SPAN corresponds to a sensitivity of 73.68% and a specificity of 81.99% (Table 3).

3.1. Sex and race AUC comparisons

No significant difference was found in AUCs by race or sex for the PCL and SPAN in our sample (Table 4 and Figs. 3 and 4). The AUC for the PCL in men (AUC=0.899, S.E.=0.018) was greater than that observed in women (AUC=0.858, S.E.=0.057); however, this difference was not statistically significant (P=.494). Furthermore, there was no significant difference in AUCs by race (P=.854; Table 4 and Figs. 5 and 6), with AUCs of 0.883 for Caucasians and 0.876 for African Americans. In our sample, when comparing the SPAN ROC curves, men and women demonstrated AUCs of 0.852 (S.E.=0.024) and 0.816 (S.E.=0.058), respectively, and were not significantly different (P=.495). Similarly, there was no significant difference in AUCs between Caucasians (0.818) and African Americans (0.857; P=.376).

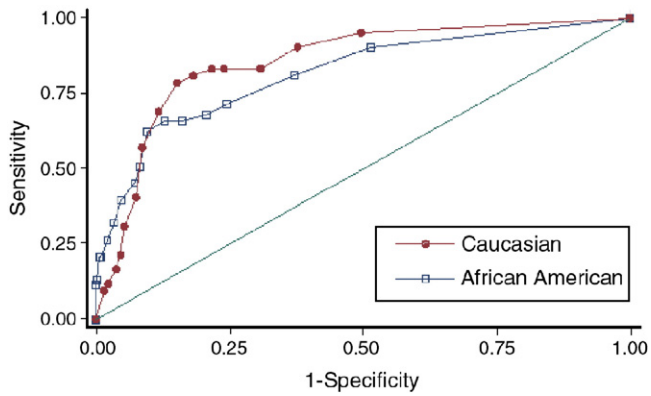

Fig. 6. Comparison of ROC curves by race for the SPAN.

3.2. Stratified analyses

Because there were significant differences in age distributions for our comparison groups (Table 1), we looked into separate comparisons within age strata. Sex and race comparisons were made for the following three age strata: <50 years; 50–64 years; and ≥65 years. For the PCL, race ROC curves were found to be significantly different only in the younger group (<50 years; P<.005). Within this stratum, the PCL performed exceptionally well for Caucasians, with an AUC of 0.99 as compared with that of 0.81 for African Americans. Race comparisons tested within the remaining two strata (50–64 and ≥65 years) were not statistically significant. Sex comparisons were also nonsignificant across all three age strata, with AUCs ranging from 0.81 to 0.95. For the SPAN, there was no significant difference across the three age strata for either sex or race.

3.3. PCL versus SPAN

We observed a significant difference (P<.0006) between the 17-item PCL (AUC=0.882, S.E.=0.018) and the 4-item SPAN (AUC=0.837, S.E.=0.023) in AUCs (Fig. 7).

4. Discussion

Based on our data, the widely recommended cutoff score of 50 for the PCL [19] corresponds to a sensitivity of 52.63% and a specificity of 94.90% for veterans seen in VA primary care clinics. Depending on the application, a sensitivity of 53% might be inadequate. Some health care providers and researchers may choose to abandon 50 as a cutoff score in favor of one with a higher sensitivity. We found several meaningful cutoff scores, each with its own attributes and applications. In this section, several guidelines accounting for these characteristics are recommended to

optimize the cutoff score selection process. We found no significant difference in subgroup comparisons based on sex and race; therefore, we do not recommend that these attributes be factored into the cutoff score selection process. The finding of no significant racial difference parallels the more general lack of racial differences across variables in this sample [9]. We however did observe a significant difference ($P<.0006$) between the PCL and SPAN in AUCs; thus, the PCL is recommended, unless brevity is the chief concern.

Because there were age differences by race and sex, we conducted stratified analyses to examine the meaning of such differences. Only for the youngest race stratum (<50 years) did we find that the PCL performed significantly better for Caucasians than for African Americans. While clinicians may wish to consider higher cutoff scores for younger African-American primary care patients, it does not seem beneficial to pursue race- or sex-specific independent scoring rules for either the PCL or the SPAN. Although we could also have investigated race and sex differences stratifying on other variables (e.g., education and marital status), it is unlikely that such data would be helpful clinically or taken into account in realistic screening situations.

It is important to consider the costs of false-positive and false-negative results. These costs, for PTSD, can be difficult to assess due to the relatively high level of associated comorbidities, the heterogeneity of treatment settings and the relatively high prevalence of the disorder, particularly in certain populations. Research in the area of medical econometrics is ongoing and could benefit from a critical investigation of both screening and more formal assessments of PTSD.

The costs of any positive result in a primary care setting are generally very high. However, as with many psychiatric screening assessments, a score on the PCL or SPAN that is high enough to indicate a positive screening result may not be detecting an actual PTSD. It is possible that many of these patients may have subclinical or partial PTSD and therefore experience some benefits from treatment anyway. Another possibility is that these false-positive results may in fact be an artifact of a different psychiatric disorder that would likely be discovered as a result of the false-positive results. For these reasons, health care providers may be interested in casting a wider net. To this end, a cutoff score with a better balance between sensitivity and specificity is recommended. For example, a PCL cutoff score of 43 benefits from a sensitivity of 67% (up from 53%, cutoff score=50) while maintaining a specificity over 90% (down from 95%, cutoff score=50).

The strengths of our analyses include the fact that we have data on one of the largest samples of primary care patients using the gold standard of CAPS diagnosis. Our sample represents four hospitals throughout the southeastern region. We also had a large number of elderly patients. The weaknesses of our analyses are that we only interviewed veterans, the hospitals are only regionally representative and we used a slightly different recruitment strategy for our female oversample. Results could be different for non-veterans or for a national sample with individuals of other ethnic backgrounds (aside from African Americans).

5. Conclusions

Our PCL cutoff score of 31 is consistent with the findings of other studies involving female samples, which recommended 38 [25] and 30 [26,27]. In another study on older primary care patients who were prescreened to have emotional distress, recent binge drinking or suicidal ideation, Cook et al. [28] found that a cutoff score of 37 optimized sensitivity and specificity. These findings are significantly lower than the widely accepted cutoff score of 50 [19]. Based on these findings, clinicians and researchers should consider lower cutoff scores for the PCL when used in primary care settings. Cutoff scores need not vary by sex or race, although clinicians may wish to consider higher PCL scores for younger African-American patients as suggestive of PTSD. Our findings concur with those of Meltzer-Brody et al. [22] in recommending 5 as the optimum cutoff score for the SPAN.

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