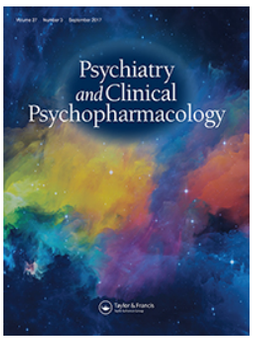

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Psychometric properties of the Turkish version of the PTSD Checklist for Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (PCL-5)

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ABSTRACT

Objective: The posttraumatic stress disorder (PTSD) Checklist is one of the most widely used screening tool in assessing PTSD symptomatology. Several changes to PTSD definition were made in the recent revision of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5). The aim of the study was to assess psychometric properties of the Turkish version of the PTSD Checklist for DSM-5 (PCL-5), the revised version conforming to the advances in DSM-5.

Method: Psychiatric outpatients with PTSD ($n = 29$) and major depressive disorder ($n = 73$) and a community group ($n = 360$) included in the study. Respondents completed the PCL-5, Trauma Symptom Checklist-40, Life Events Checklist for DSM-5, Dissociative Experiences Scale, Beck Anxiety Inventory, Beck Depression Inventory and Posttraumatic Cognitions Inventory.

Results: We found a four-factor solution best fit to the data providing support for the vast array of PTSD research. The PCL-5 demonstrated good reliability with composite reliability coefficients of re-experiencing (.79–.92), avoidance (.73–.91), negative alterations (.85–.90) and hyperarousal (.81–.88) and temporal reliability with two-week test retest intra-correlation coefficients of .70, .64, .78, and .76, respectively. Strong associations of the total and subscale scores of the PCL-5 with other measures of trauma-related symptoms were indicative of construct validity of the screening tool. The current investigation suggested a cut-off score ≥47 for PTSD diagnosis, with .76 sensitivity and .69 specificity.

Conclusion: The PCL-5 is a promising screening tool with sound psychometric properties.

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Posttraumatic stress disorder; screening; psychometrics; PCL-5

Introduction

The lifetime prevalence of exposure to traumatic events was about 90% of adults [1], and due to the awareness of ubiquity of traumatic experiences, posttraumatic stress disorder (PTSD) has been more recognized. The growing interest in identification of PTSD has led to a vast body of research considering development and examining psychometric properties of screening tools [2]. Although several screening tools are available for use in assessing PTSD symptom severity, the 17-item PTSD Checklist (PCL) is the most widely used self-report assessment instrument of PTSD symptoms [3]. The initial validation study used the Diagnostic and Statistical Manual of Mental Disorders (DSM) III-R criteria [4,5] and thereafter the factor structure of the 17-item version advanced to mapping on DSM-IV [6]. Adkins et al. [7] showed that the PCL was the strongest in discriminating PTSD from depression, social phobia and anxiety when compared to six other self-report measures of PTSD. On the other hand, there seems to be a considerable variability in cut-off scores due to the characteristics of sample to which the measure was administered [8].

There has been a large body of evidence in a wide range of populations indicative of that the PCL has good reliability and validity [9]. The internal consistency for the 17-item version was moderate to a high with an overall. The PCL has revealed strong connections with other PTSD symptom questionnaires – i.e. correlations with the Mississippi Combat Related PTSD $r = .93$, Impact of Events Questionnaire $r = .90$ [4] and Clinician-Administered PTSD Scale $r = .79$ [10]. In comparison to afflicted individuals, individuals without PTSD reported significantly lower mean scale scores [3] and scale scores were sensitive to treatment [11].

In the final revision of the PCL proposed by Weathers et al. [12], the screening tool was expanded to 20 items corresponding to symptoms of PTSD as presented in DSM-5 [13]. Akin to the preceding version, the scale assesses symptoms over the past month. Items are rated on a five-point Likert-type scale (0 – not at all bothersome to 4 – extremely bothersome)

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and the PCL for the DSM-5 (PCL-5) yields total scores ranging from 0 to 80. For the previous version, three versions exist and differ in wording with respect to the anchored event (PCL-Military, PCL-Civilian and PCL-Specific). In a systematic review of the PCL-related psychometric studies, Wilkins et al. [8] suggested that the measure (particularly PCL-Specific) has exhibited sound psychometric properties. Likewise, the expanded version prompts participants to identify a specific traumatic event at the outset of the measure, and thus PCL-5 can be used for assessment of PTSD in all types of traumatic experiences.

Thus far, most of the structural investigations of PTSD symptoms have supported the four-factor models [14–16], and inconsistency patterns found with regard to PCL is in consistent with the literature call into question the three-factor structure of the DSM-IV [17]. The final version is advanced to a four-factor structure mapping onto DSM-5 symptom clusters stipulated for PTSD diagnosis, which is more congruent with advances in the literature.

Research on previous versions of the PCL-5 occasionally had a foci limited to military, clinical, and male samples. The aim in the present study was to investigate psychometric properties of the Turkish version of the PCL-5 in clinical and non-clinical samples. Therefore, using the multi-sample confirmatory factor analysis (CFA) procedure, we examined whether the current DSM-5 four-factor structure fit to the clinical and non-clinical data. We also gathered data on Trauma Symptom Checklist-40 (TSC-40) to assess construct validity via connections between two scale scores. Morbidity of PTSD rarely is alone rather comorbid conditions are generally reported that co-occurring psychiatric conditions have been reported as much as 95% in epidemiological studies [18]. The evidence garnered have shown that anxiety, depression, and dissociation are the most common comorbid clinical conditions accompanying PTSD symptomatology, and pathological dissociation mediates the relationship between PTSD symptomatology and affective dysregulation specifically in the face of trauma exposure [19–21]. Therefore, the Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), and Dissociative Experiences Scale (DES) were administered to assess convergent validity of the Turkish version of the PCL-5.

Method

Participants

The sample consisted of 462 participants. The mean age of the sample was 25.18 (SD ± 7.50, range 17–65). Participants were primarily female ($n = 282$; 61.04%). An estimated 17.53% of the sample were married ($n = 81$). The control group consisted of 360 adults and college students who reported not having any diagnosis of current psychiatric condition. Control subjects were recruited from various undergraduate and graduate programmes at Yüzüncü Yıl University as well as those of patients and their companions who admitted to university hospital clinics and volunteered to participate in the study. Psychiatric group was composed of 73 outpatients with depression and 29 outpatients with PTSD, with a total of 102 patients consecutively admitted to Yüzüncü Yıl University psychiatry clinics. The demographic characteristics of the sample are presented in Table 1.

Table 1. Sample demographical characteristics.

		n	%
Sex	Male	180	38.96
Marital status	Single	381	82.47
Education	No education	13	2.81
	Elementary	32	6.93
	High school	28	6.06
	University	389	84.20
Psychiatric diagnosis	Control	360	77.92
	Depression	73	15.80
	PTSD	29	6.28
Physical illness		64	13.85
Prior psychiatric illness		55	11.90
Family history of psychopathology		45	9.74

Using Structured Clinical Interview for DSM-IV Axis I disorders [22], patients who met clinical major depression were assessed according to DSM-IV-TR [17]. Having briefly informed about the study, all subjects gave a written consent and completed psychometric instruments. The study procedure received approval from the Ethical Committee of Yuzuncu Yil University.

Psychometric instruments

PCL-DSM-5 (PCL-5): The 20-item self-report measure of PTSD rated on a five-point scale (scored 0–4) and yielding a scale score range of 0–80 was expanded from previous PCL [12]. The PCL-5 consists of four scales mapping onto PTSD symptom clusters in DSM-5: re-experiencing (B criteria), avoidance (C criteria), negative alterations (D criteria), and hyper-arousal (E criteria) (see appendix for the Turkish version).

TSC-40: This 40-item self-report instrument was derived from earlier version of the Trauma Symptom Checklist-33 [23] to evaluate symptomatology in adults associated with childhood or adult traumatic experiences [24]. It measures facets of posttraumatic stress syndrome and other symptom clusters observed in traumatized individuals. The scale consists of six subscales: dissociation, anxiety, depression, sexual abuse trauma index, sleep disturbance, and sexual problems. The measure demonstrated excellent psychometric properties on the current data.

Life Events Checklist for DSM-5 (LEC-5): The LEC-5 is a self-report measure designed to screen for lifetime

traumatic events [25]. The instrument assesses exposure to 16 different adverse life events that may have a putative result in PTSD or distress. Based on the current data, we computed a Kuder–Richardson internal reliability coefficient of .66 among psychiatric outpatients and of .61 among controls. Test–retest reliability was $r = .83$.

DES: The DES is 28-item self-report measure developed to evaluate dissociative experiences in both community and clinical populations. Items are scored on a measure 0–100 and the overall DES score is obtained by averaging the summed up 28 item scores. The DES scores ≥30 are indicative of pathological dissociation characterized by severe disturbance in emotional regulation [26]. An eight-item sub-scale of the DES (DES-taxon) assesses pathological dissociation [27]. The Turkish version had an α coefficient of .97 and good temporal reliability ($r = .77$) [28].

BAI: The BAI is a 21-item self-administered inventory designed to assess severity of anxiety symptoms [29]. The Turkish version of the measure was translated by Ulusoy et al. [30] and demonstrated to be reliable and valid in Turkish population (Cronbach's $\alpha = .93$).

BDI: The BDI is a 21-item self-administered inventory designed to assess severity of depressive symptoms [31]. The Turkish version of the measure was translated by Hisli [32] and demonstrated to be reliable and valid in Turkish population (Cronbach's $\alpha = .80$).

PTCI: The PTCI is a 33-item self-report questionnaire to assess negative cognitions associated with childhood or adult traumatic experiences [33]. The inventory yields three scales, including negative cognitions about self and negative cognitions about the world and self-blame. The Turkish version was demonstrated to have good reliability and validity, with internal consistency of .93 for overall scale, and .92, .82 and .73 for sub-scales, respectively [34].

Statistical analysis

Initially, we run descriptive statistics for sample demographical characteristics. We adhered to the multi-sample CFA approach to validate the current DSM-5 four-factor structure via examining the fit of the latent factor structure of PTSD symptoms to separate data from clinical samples and non-clinical controls in one structural model. We run multi-sample CFAs in two occasions: one model estimated the Satorra–Bentler corrected maximum likelihood parameters with an equality constriction across clinical and non-clinical samples, and the latter unconstrained model freely estimated the parameters across groups. We used model fit indices of the Satorra–Bentler scaled chi square (S–Bχ^2), root mean square of approximation (RMSEA), Tucker–Lewis Index (TLI), comparative fit index (CFI), incremental fit index (IFI), and standardized root mean residuals (SRMR) to evaluate validity of the models as suggested in the guidelines [35]. Regarding the CFA, the proportions of the variance explained by the factors and composite reliability values were computed for total and four-factors of the Turkish version of the PCL-5. Cronbach's α values and two-week test–retest intra-correlations were also computed to assess internal and temporal reliability. Given its underestimation of internal consistency, Raykov [36] recommends composite reliability outperforms Cronbach's α. Analysis of variance (ANOVA) was conducted to compare scale scores across groups in evaluating concurrent validity of the screening tool. Pearson product moment correlation coefficients between the PCL-5, TSC-40, BDI, BAI, DES, and PTCI were computed for convergent validity. Finally, receiver operating characteristic (ROC) curve was used to obtain an optimal cut-off score which maximizes true positive cases and true negative cases. We also used a conjoint plot that helps detect the intersection point between specificity and sensitivity.

Results

Sample characteristics

Using LEC-5, we found that 89.39% of the sample ($n = 413$) experienced at least one type of prior trauma. A great proportion of the sample have experienced Van Earthquake in 2011 (72.94%). These rates were followed by other types of stressful events, which includes reports of adverse life experiences in person other than 16 types of traumatic events assessed in the LEC-5 (42.42%). The LEC-5 results indicated that motor vehicle accidents (21.86%), physical assaults (22.73%), and severe human suffering (23.81%) were also not rare in the sample. Reported prior traumatic experiences are presented in Table 2.

One-hundred and eighteen individuals (25.54%) scored ≥30 on the DES and 18.61% of respondents ($n = 86$) were assigned in DES-taxon membership due to the algorithm suggested by Carlston and Putnam (1997). All patients with PTSD reported at least one type of prior trauma. Approximately half of patients with PTSD scored ≥30 on the DES (55.17%, $n = 16$) and had DES-taxon membership (48.28%, $n = 14$). About one-fifth of the depressive patients scored ≥30 on the DES (20.55%, $n = 15$) and had DES-taxon membership (19.18%, $n = 14$). We found similar proportions for control group that 24.17% scored ≥30 on the DES ($n = 87$) and 16.11% had DES-taxon membership ($n = 58$).

Table 2. Prior trauma rated on the LEC-5.

	n	%
Natural disaster	337	72.94
Fire/explosion	55	11.90
Motor vehicle accident	101	21.86
Other serious accident	38	8.23
Exposure to toxic substance	31	6.71
Physical assault	105	22.73
Assault with weapon	22	4.76
Sexual assault	19	4.11
Unwanted sexual experience	22	4.76
Combat	16	3.46
Captivity	1	0.22
Life-threatening injury/illness	33	7.14
Severe suffering	110	23.81
Witness violent death	23	4.98
Sudden death of important others	34	7.36
Caused death/injury of another	13	2.81
Other stressful events	196	42.42

Multi-sample CFAs

A multi-sample CFA approach was used to examine the factor structure of the PCL for DSM-5. Since the multivariate non-normality can impact negatively to the reliability of CFAs, robust maximum likelihood estimation method was used for all reported analyses. All models were tested by imputing covariance and asymptotic covariance matrices separately for controls and psychiatric groups into LISREL 8.71. Due to the small sample size for patients with PTSD ($n = 29$), we computed covariance and asymptotic covariance matrices after merging two psychiatric groups of patients with PTSD and patients with depression ($n = 120$). Five commonly recommended goodness-of-fit model statistics were computed. These fit statistics were the RMSEA, TLI, CFI, IFI, and SRMR. TLI, CFI, and IFI should be higher than .90 and the upper limit of the RMSEA and SRMR should not exceed .10 [37].

To test original four-factor structure of the PCL-5, a four-factor constrained model was tested next. Although almost all the fit statistics of the model met the specified guidelines, the SRMR value computed for the psychiatric patients exceeded the model adequateness limit of .10. Therefore, we tested a four-factor unconditional model in which the item loadings were set free across control and patient groups. Goodness-of-fit statistics from the unconstrained four-factor model met the specified guidelines. All the fit statistics either met or exceeded the specified guidelines. Results showed that four-factor unconstrained model best fit to the observed data.

All of the standardized loadings were significantly tied to the respective factors. An estimated 44.35% and 62.04% of the variance was explained by four-factor solution in community and clinical groups. In the community group, greater variance was explained by negative alterations (15.32%), and this factor was followed by hyper-arousal (12.45%), re-experiencing (10.86%), and avoidance (5.70%). In the clinical group, greater variance was explained by negative alterations (19.83%) that was followed by re-experiencing (17.31%), hyper-arousal (16.54%), and avoidance (8.38%). Goodness-of-fit statistics from all of the tested models and standardized loadings emerged from multi-sample CFA are indicated in Tables 3 and 4.

Descriptive statistics and reliability

Corrected item-total correlation coefficients were excellent for total 20 items and sub-scales of the PCL for DSM-5. We found good internal reliability for total and sub-scales of the measure. As the use of traditional methods such as Cronbach's α has been call into question within a latent variable context, we performed a more rigorous method of composite reliability analysis, which is shown in Table 4. Using standardized factor loadings derived from the multi-sample CFA, composite reliability coefficients were computed separately for the groups adhering to the procedure recommended by Raykov [36]. Even though composite reliability of the PCL-5 was excellent for both respondent group, internal reliability was slightly higher in the outpatient group. Test–retest reliability of the scale was assessed by computing intra-correlation coefficients between two applications among 53 respondents (30 controls, 15 depressive outpatients, and 8 PTSD patients) with a 15-day interval. Although temporal reliability was generally good for total and sub-scale scores, avoidance scale revealed a slightly low test retest intra-correlation between two applications ($r = .64$). Descriptive statistics for item and scale scores of psychometric instruments and reliability analyses are presented in Table 5.

Concurrent validity

To assess the concurrent validity of the PCL-5, we performed ANOVA across control, depression, and PTSD groups. Mean scale scores significantly differed across three groups in the ANOVAs. Using the Student–Newman–Keuls multiple comparison test, differences on mean scale scores across sample groups were evaluated. In comparison to controls and outpatients with

Table 3. Model fit indices from multi-sample CFA of the PCL-5.

	Factor	df	S–B χ^2	RMSEA	TLI	CFI	IFI	SRMR1	SRMR2
Constrained model	4	374	648.03	.056	.98	.98	.98	.055	.13
Unconstrained model	4	354	616.04	.057	.98	.98	.98	.050	.094

Note: df = degrees of freedom, S–B χ^2 = Satorra–Bentler Scaled χ^2, RMSEA = root mean square of approximation, TLI = Tucker–Lewis Index, CFI = comparative fit index, IFI = incremental fit index, SRMR = standardized root mean residuals.

Table 4. Standardized factor loadings of the PCL for DSM-5 from multi-sample CFA.

	Factor I: re-experiencing		Factor II: avoidance		Factor III: negative alterations		Factor IV: hyper-arousal	
	Control	Clinical	Control	Clinical	Control	Clinical	Control	Clinical
Item 1	.69	.83						
Item 2	.59	.82						
Item 3	.65	.87						
Item 4	.69	.96						
Item 5	.67	.65						
Item 6			.74	.94				
Item 7			.77	.89				
Item 8					.66	.80		
Item 9					.66	.72		
Item 10					.63	.78		
Item 11					.68	.90		
Item 12					.66	.64		
Item 13					.65	.71		
Item 14					.69	.69		
Item 15							.74	.76
Item 16							.62	.80
Item 17							.66	.72
Item 18							.56	.82
Item 19							.66	.70
Item 20							.61	.64
Composite reliability (for the overall scale = 0.94 and 0.97, respectively)	.79	.92	.73	.91	.85	.90	.81	.88
% of variance explained	10.86	17.31	5.70	8.38	15.32	19.83	12.45	16.54

Note: Statistical significance for all factor loadings exceeded the significance threshold ($p < .05$).

depression, outpatients with PTSD scored significantly higher scores on total and sub-scales of all measures of psychological symptoms and traumatic cognitions. One exception was avoidance scale of the PCL-5 that mean scale scores of outpatients with PTSD and depression did not significantly differ, with the same was true for the BDI scores. ANOVA results are presented in Table 6.

Convergent validity

To test the concurrent validity of total and sub-scale scores of the PCL-5, we run Pearson's product moment correlations between these two instruments, and afterwards with scale scores of the DES, BAI, BDI, and PTCI. Strong associations between total and sub-scale scores of the PCL-5 and TSC-40 were evidenced for convergent validity of these two screening tools. The only exception was that sexual problems sub-scale of the TSC-40 was correlated mild to moderate with PCL-5 scale scores (see Table 7).

Turning to relations of the PCL-5 scores with dissociation, depression, anxiety and posttraumatic cognitions, significant correlations were moderate to strong. Likewise, merely sexual problems sub-scale of the TSC-40 revealed mild-to-moderate relations with psychological variables. Results are presented in Table 8.

Table 5. Descriptives and item statistics of the measures.

	n	*α*	Intra *r*	*Rjt*	Inter-item *r*	*M*	SD	*M* range (items)	SD range (items)
PCL for DSM-5	462	.94	.80**	.57–.71	.27 to .64	39.19	17.47	1.51–2.38	1.11–1.43
Re-experiencing (B Criteria)	462	.84	.70**	.60–.67	.45 to .61	10.15	4.70	1.62–2.38	1.11–1.29
Avoidance (C Criteria)	462	.78	.64**	.64–.64	.64 to .64	4.10	2.27	2.04–2.06	1.24–1.27
Negative alterations (D Criteria)	462	.87	.78**	.60–.67	.38 to .60	13.60	6.81	1.71–2.11	1.18–1.38
Hyper-arousal (E Criteria)	462	.83	.76**	.57–.66	.37 to .55	11.34	5.94	1.51–2.22	1.30–1.43
TSC-40	462	.94	.73**	.21–.73	−.04 to .69	34.19	20.80	0.18–1.80	0.55–1.12
Dissociation	462	.79	.75**	.45–.65	.27 to .54	6.27	4.18	0.45–1.47	0.81–1.09
Anxiety	462	.79	.73**	.24–.61	.10 to .48	7.77	5.29	0.18–1.40	0.55–1.08
Depression	462	.81	.71**	.36–.64	.14 to .59	8.80	5.80	0.36–1.80	0.81–1.12
Sexual Abuse Trauma Index	462	.70	.72**	.27–.49	.10 to .44	5.40	3.93	0.24–1.47	0.65–1.09
Sleep disturbance	462	.77	.67**	.31–.66	.19 to .69	2.59	4.12	0.26–1.63	0.69–1.11
Sexual problems	462	.84	.70**	.36–.69	.11 to .65	6.93	4.17	0.24–0.41	0.65–0.85
LEC-5	462	.63	.83**	.07–.43	−.08 to .36	2.50	1.97	0.01–.073	0.05–0.85
DES	462	.94		.40–.67	.11 to .61	21.38	16.18	0.66–4.31	15.64–32.30
BAI	462	.94		.48–.75	.21 to .72	19.27	13.82	0.24–1.65	0.65–1.10
BDI	462	.93		.37–.76	.14 to .61	16.91	12.47	0.25–1.21	0.59–1.18
PTCI	462	.97		.45–.78	.17 to .76	96.58	45.80	2.05–4.90	1.69–2.30
Negativistic Cognitions About Self	462	.96		.63–.80	.40 to .76	53.07	32.11	2.05–3.43	1.69–2.24
Negativistic Cognitions About World	462	.89		.64–.74	.45 to .70	29.24	11.93	3.54–4.90	2.11–2.30
Self-blame	462	.76		.50–.63	.23 to .51	14.28	7.35	2.23–3.53	1.81–2.20

Note: *n* = sample size, *α* = internal consistency, intra *r* = 15-day interval test retest intra-correlations ($n = 53$), *Rjt* = corrected item-total correlations (range), inter-item *r* = Spearman inter-item correlations (range), *M* = mean, SD = standard deviation, *M* range (items) = item means (range), SD range (items) = item standard deviations (range).

**$p < .01$.

Table 6. Comparison of mean scale scores between groups.

	Control ($n = 360$)		Depression ($n = 73$)		PTSD ($n = 29$)					
	Mean	SD	Mean	SD	Mean	SD	$F(2, 459)$	p	η^2	*Post hoc*[a]
PCL for DSM-5	36.26	16.31	46.84	17.36	56.34	16.49	29.193	<.001	.113	Control < Depression < PTSD
Re-experiencing (B Criteria)	9.41	4.37	12.07	4.89	14.55	4.66	25.703	<.001	.101	Control < Depression < PTSD
Avoidance (C Criteria)	3.83	2.16	4.86	2.23	5.52	2.76	13.088	<.001	.054	Control < Depression = PTSD
Negative alterations (D Criteria)	12.52	6.42	16.63	6.91	19.45	6.19	24.755	<.001	.097	Control < Depression < PTSD
Hyper-arousal (E Criteria)	10.51	5.64	13.27	5.91	16.83	5.69	21.538	<.001	.086	Control < Depression < PTSD
TSC-40	29.59	18.15	46.45	20.72	60.48	20.29	55.169	<.001	.194	Control < Depression < PTSD
Dissociation	5.71	3.95	7.32	4.10	10.59	4.15	23.073	<.001	.091	Control < Depression < PTSD
Anxiety	6.78	4.87	10.70	4.91	12.72	5.85	34.623	<.001	.131	Control < Depression < PTSD
Depression	7.48	4.96	12.56	6.25	15.72	5.37	56.262	<.001	.197	Control < Depression < PTSD
Sexual Abuse Trauma Index	4.66	3.45	7.11	4.15	10.24	4.32	41.559	<.001	.153	Control < Depression < PTSD
Sexual problems	1.61	2.77	5.51	5.63	7.48	6.36	61.947	<.001	.213	Control < Depression < PTSD
Sleep disturbance	6.29	3.89	8.56	4.34	10.76	4.15	24.200	<.001	.095	Control < Depression < PTSD
LEC-5	2.33	1.82	2.73	2.17	4.10	2.47	11.992	<.001	.050	Control = Depression < PTSD
DES	20.81	15.55	18.51	15.84	35.63	18.09	13.295	<.001	.055	Control = Depression < PTSD
BAI	16.44	12.32	28.37	14.13	31.52	14.52	40.783	<.001	.151	Control < Depression < PTSD
BDI	13.24	9.67	28.36	11.84	33.59	14.11	104.684	<.001	.313	Control < Depression = PTSD
PTCI	87.62	40.05	118.14	50.50	153.66	42.41	44.582	<.001	.163	Control < Depression < PTSD
Negative Cognitions About Self	45.69	26.97	72.89	35.08	94.76	31.08	60.123	<.001	.208	Control < Depression < PTSD
Negative Cognitions About World	28.42	11.66	29.56	12.67	38.55	9.28	10.093	<.001	.042	Control = Depression < PTSD
Self-blame	13.51	7.00	15.68	7.83	20.34	7.29	13.943	<.001	.057	Control = Depression < PTSD

[a]*Post hoc* analysis was conducted using the Student–Newman–Keuls multiple comparison test.

Table 7. Pearson's product moment correlations between the PCL for DSM-5 and TSC-40.

	TSC-40	Dissociation	Anxiety	Depression	Sexual Abuse Trauma Index	Sexual problems	Sleep disturbance
PCL for DSM 5	.75**	.67**	.67**	.71**	.67**	.33**	.62**
Re-experiencing (B Criteria)	.66**	.58**	.60**	.62**	.61**	.28**	.57**
Avoidance (C Criteria)	.57**	.50**	.54**	.53**	.51**	.19**	.46**
Negative alterations (D Criteria)	.68**	.61**	.58**	.65**	.60**	.33**	.51**
Hyper-arousal (E Criteria)	.69**	.61**	.62**	.64**	.60**	.29**	.62**

**$p < .01$.

Table 8. Pearson's product moment correlations of the PCL for DSM-5 and TSC-40 with psychological variables.

	DES	BAI	BDI	PTCI	Negative Cognitions about Self	Negative Cognitions about the World	Self-blame
PCL for DSM-5	.53**	.66**	.64**	.61**	.58**	.47**	.48**
Re-experiencing (B Criteria)	.43**	.64**	.55**	.54**	.51**	.42**	.41**
Avoidance (C Criteria)	.40**	.51**	.48**	.47**	.44**	.39**	.38**
Negative alterations (D Criteria)	.50**	.57**	.61**	.59**	.57**	.44**	.49**
Hyper-arousal (E Criteria)	.48**	.58**	.56**	.51**	.49**	.39**	.39**
TSC-40	.57**	.75**	.75**	.70**	.70**	.51**	.49**
Dissociation	.63**	.64**	.61**	.60**	.59**	.47**	.42**
Anxiety	.47**	.75**	.63**	.58**	.57**	.43**	.39**
Depression	.47**	.69**	.75**	.67**	.68**	.47**	.47**
Sexual Abuse Trauma Index	.57**	.66**	.66**	.61**	.60**	.47**	.43**
Sexual problems	.26**	.41**	.48**	.41**	.43**	.22**	.29**
Sleep disturbance	.41**	.61**	.56**	.51**	.50**	.39**	.35**

**$p < .01$.

ROC curve for the PCL-5

To examine the diagnostic utility of the PCL-5, we performed ROC curve. Figure 1 shows the false positive rate (1-specifity) and the true positive rate (sensitivity). Values corresponding to the breakpoint near the upper left corner of the curve maximize both sensitivity and specificity. The area under the curve was .79, indicative of good overall accuracy.

We examined the PCL-5 scores in the range of 40–50 using interview diagnosis based on DSM-5. We utilized three measures of diagnostic performance: sensitivity, specificity, and diagnostic efficiency (the proportion of cases correctly diagnosed). We utilized ROC curve and conjoint plot to detect optimal demarcation point for the cut-off score of the PCL-5 (see Figures 1 and 2). Based on diagnostic efficiency value and ROC curve, the optimal cut-off score of 47 yielded a sensitivity of .76, a specificity of .69, and a diagnostic efficiency of .73. Nonetheless, we suggest a conjoint plot analysis to have a more balanced demarcation point through pairing sensitivity and specificity pointing out that the optimal cut-off score of 48 yielded a sensitivity of .72, a specificity of .71, and a diagnostic efficiency of .72. A cut-off score of 47 seems to be appropriate for clinical use, while using the score of 48 in discriminating individuals with PTSD may be more reliable in community samples. Findings are presented in Table 9.

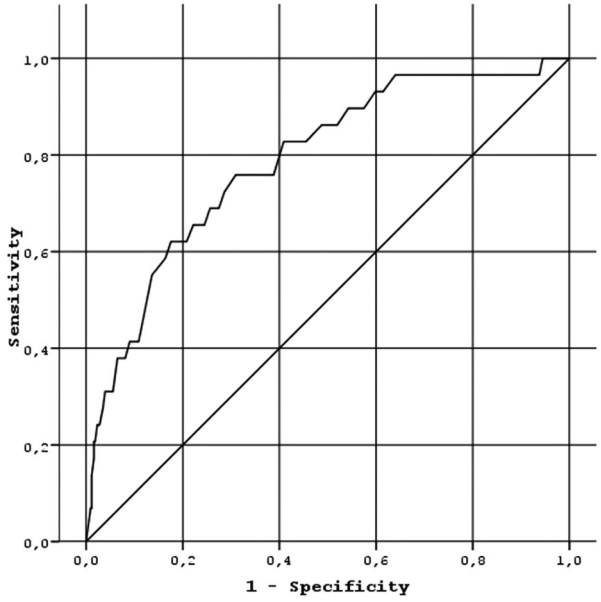

Figure 1. Receiver operator characteristic curve indicating sensitivity and specificity of the PTSD Checklist for DSM-5 in identifying individuals meeting diagnostic criteria of PTSD based on DSM-5.

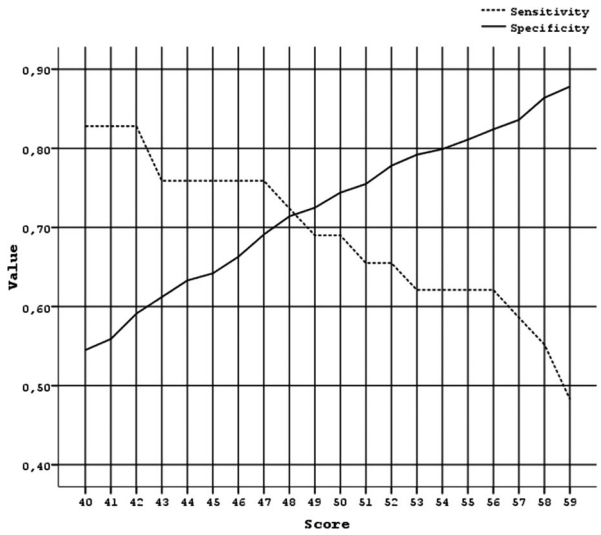

Figure 2. Conjoint plot indicating the optimal cut-off point of sensitivity and specificity of the PTSD Checklist for DSM-5 in identifying individuals accurately meeting diagnostic criteria of PTSD based on DSM-5.

Conclusion

The PCL-5 is an easily administered self-report measure mapping onto 20 symptoms of PTSD outlined in DSM-5. The present findings provide preliminary evidence and are akin to those reported by a host of preceding studies supporting the previous 17-item version as a valid measure of PTSD symptomatology. Our findings of validity of four-factor structure and high internal consistency for the constellation of items corresponding to DSM-5 symptom clusters are generally in consonant with the current advances in diagnostic structure of PTSD. Item-total scale correlations were excellent for four symptom clusters of the PCL-5. The PCL-5 total

Table 9. Sensitivity, specificity, and accuracy of the PCL for DSM-5 cut-off scores.

Score	Sensitivity	Specificity	Diagnostic efficiency
40	.828	.545	.687
41	.828	.559	.694
42	.828	.591	.710
43	.759	.612	.686
44	.759	.633	.696
45	.759	.642	.701
46	.759	.663	.711
47	.759	.691	.725
48	.724	.714	.719
49	.690	.725	.708
50	.690	.744	.717
51	.655	.755	.705
52	.655	.778	.717
53	.621	.792	.707
54	.621	.799	.710
55	.621	.811	.716
56	.621	.824	.723
57	.586	.836	.711
58	.552	.864	.708
59	.483	.878	.681

Note: Sensitivity: true positives/(true positives + false negatives), specificity: true negatives/(true negatives + false positives), diagnostic efficiency = (sensitivity + specificity)/2.

and sub-scale scores revealed strong correlations with the other measures of trauma-induced symptoms (i.e. Trauma Symptom Chechlist-40 and DES), trauma-related cognitions, anxiety, and depression that lend support for the convergent validity of the screening tool. Additionally, measures of diagnostic performance partially supported the accuracy of the PCL-5 in relation to interview-derived diagnosis.

In terms of factor structure, we found support for construct validity of the four-factor original factorial structure of the PCL-5, but unconstrained model in which the parameters were separately estimated for groups best fit to the clinical and non-clinical samples data. This finding lend further evidence for accumulated findings in the literature concerning factor structure of PTSD [15,16,38] and prior examinations of earlier version of the PCL [39–41].

PTSD diagnosis differentiates from other psychiatric disorders with a high comorbidity pattern and significantly co-occurs with depression. Investigating the concurrent validity of the PCL-5, we found that the screening tool successfully distinguished PTSD-afflicted patients from depressive individuals and healthy controls. Only on the mean scale scores of C symptom cluster (including avoidance symptoms), PTSD patients did not significantly differ from depressive patients. Some of the prior studies suggested that avoidance and numbing symptoms should be conceived as distinct rather than as similar [42,43]. However, contrarily, the four-factor numbing model of PTSD suggested by King et al. [16] centres on avoidance and numbing symptoms in their conceptualization. Additionally, numbing symptoms were incorporated into the recent definition of PTSD in DSM-5. According to a hypothesis proposed by Watson [44,45], a higher order factor of negative emotional

states, including fear, anger and sadness, accounts for the high co-occurrence rates across clinical conditions. Avoidance symptoms may be central to negative affectivity, which can be a shared feature with other clinical entities, including PTSD and depression.

PTSD is a multifaceted disorder, heterogeneous in nature. Therefore, we found strong correlations with dissociation, depression, and anxiety, lending further support for the recent advances incorporating affective symptoms in clinical definition of PTSD [18]. Changes in cognition to a negative stance have been widely recognized in PTSD research that these findings provided further support for pivotal role of negative thinking in development and maintenance of trauma-related symptomatology [33,46,47].

The PCL-5 demonstrated a moderate diagnostic utility in the sample. The optimal cut-off score detected in the present study is in concordance with those in the prior studies examined using 17-item version of the measure [4,48–50]. On the other hand, with regard to the diagnostic performance of the PCL, it has been suggested that the cut-off scores may significantly vary due to study-specific sample characteristics, the base rate of PTSD affected individuals, or differences in severity trauma exposure [8]. Therefore, we proposed using a cut-off score of 47 with high sensitivity for clinical samples, and a more balanced cut-off score of 48 with equal sensitivity and specificity may be preferable in surveys of community samples. Most respondents reported multiple trauma exposure, and only one-fifth of outpatients with PTSD reported one type of traumatic experience listed in the LEC-5 (n = 6). Multiple exposure of adverse life events may cultivate more complicated symptom profiles and is supposed to effect responses to self-report measures of posttraumatic symptomatology when compared to single exposure to potentially traumatic events [51]. Of note, a great proportion of healthy controls and depressive patients also reported potentially traumatic events (about 90%), whereas the multiplicity of traumatic exposure was higher among patients with PTSD in comparison to depressive individuals and healthy controls. A more parsimonious cut-off score of the PCL-5 should be warranted in further studies in relatively large clinical samples.

The present study had several limitations to be addressed. First, the clinical sample specifically including PTSD patients was relatively small. Second, small sample sizes may increase the risk of improper solutions and lower accuracy of parameter estimates. Loehlin [52] suggested a sample size of at least 100 cases is a prerequisite for models with two- to four-factor structures. Although we merged two clinical groups to stick to the guidelines, investigation of validity of factor structure of PCL-5 should be verified in larger clinical groups composed of patients with PTSD. Third, although this research study includes information reliability, validity, and diagnostic performance of the PCL-5, findings rely on a sample with mixed characteristics and can vary with respect to the type of trauma and different sample characteristics. Therefore, other investigators may reiterate similar research using PCL-5 among larger samples with relatively homogenous characteristics. Contrarily, the consistency of our findings with the literature and psychometric studies concerning prior version of the PCL lend support for the robustness of our results. Finally, majority of the sample reported prior exposure to a severe earthquake that the high cut-off score can be attributable to having experienced a natural disaster. Also in the present study, PTSD diagnosis was relied entirely on clinical assessment of clinicians based on DSM-5 [13]; however, utilization of a gold standard of PTSD such as Clinician-Administered PTSD Scale for DSM-5 [53] might have changed the cut-off values obtained for the Turkish version of the PCL-5. Moreover, diagnostic utility specifically with regard to true non-cases was relatively low that the PCL-5 screening in community samples would tentatively yield overestimation of PTSD cases. Therefore, these demarcation points for the PCL-5 should be considered with caution and warranted in further studies.

Given the ubiquity of lifetime potentially traumatic experiences, the need to develop effective and accurate evaluation process is increasingly beneficial, especially with respect to assessment of PTSD diagnosis and symptom severity. Ease of administration and scoring, and psychometric soundness of the PCL-5 makes the measure promising for more prevailing use for a more thorough evaluation of PTSD symptoms. These results showed the utility of the PCL-5 as an assessment tool for survey purposes. Nevertheless, further studies are needed in Turkish samples.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Appendix. DSM-5 için Travma Sonrası Stres Bozukluğu Kontrol Listesi.

Aşağıda çok stresli bir olay karşısında insanların yaşayabildikleri problemlerin bir listesi yer almaktadır. *Zihninizi meşgul etmeye DEVAM EDEN yaşadığınız en kötü olayı* düşünerek aşağıda listelenen her bir problemi dikkatlice okuyun. SON BİR AY İÇİNDE bu olayın size ne kadar sıkıntı verdiğini, sağdaki kutuların içindeki size en uygun rakamı yuvarlak içine alarak gösteriniz

GEÇEN AY içinde aşağıda yer alan durumlar sizi ne ölçüde bunalttı	Hiç	Çok az	Orta derecede	Oldukça fazla	Aşırı
1. Stresli olayın tekrarlayan, rahatsız eden ve istenmeyen anıları sizi ne kadar bunalttı?	0	1	2	3	4
2. Stresli olaya ilişkin tekrarlayan, rahatsız eden rüyalar sizi ne kadar bunalttı?	0	1	2	3	4
3. Aniden stresli olayı sanki gerçekten bir daha yaşıyormuş gibi hissetmek veya davranmak *(sanki gerçekten olayın yaşandığı ana geri dönmüş yeniden yaşıyormuş gibi)* sizi ne kadar bunalttı?	0	1	2	3	4
4. Bir şeyler size stresli olayı anımsattığı zaman yaşadığınız üzüntü hissi sizi ne kadar bunalttı?	0	1	2	3	4
5. Bir şeyler size stresli olayı anımsattığı zaman güçlü fiziksel tepkiler vermek *(örneğin, kalp çarpıntısı, nefes almada güçlük, terleme gibi)* sizi ne kadar bunalttı?	0	1	2	3	4
6. Stresli olayla ilişkili anılardan, düşüncelerden ve duygulardan kaçınmaya çalışmak sizi ne kadar bunalttı?	0	1	2	3	4
7. Stresli olayı anımsatan etraftaki hatırlatıcı şeylerden *(örneğin, insanlardan, yerlerden, konuşmalardan, etkinliklerden, nesnelerden veya durumlardan)* kaçınmaya çalışmak sizi ne kadar bunalttı?	0	1	2	3	4
8. Stresli olaya ilişkin önemli kısımları hatırlamada yaşanan güçlükler sizi ne kadar bunalttı?	0	1	2	3	4
9. Kendiniz, diğer insanlar veya dünya hakkında güçlü olumsuz düşüncelere sahip olmak *(örneğin, kötü biriyim, bende ciddi şekilde yanlış olan bir şeyler var, kimseye güvenilmez, dünya tümüyle tehlikeli bir yerdir gibi düşünceler)* sizi ne kadar bunalttı?	0	1	2	3	4
10. Stresli olay veya bu olayın sonrasında ortaya çıkan durumlar için kendinizi veya bir başkasını suçlamak sizi ne kadar bunalttı?	0	1	2	3	4
11. Korku, dehşete kapılma, öfke, suçluluk veya utanç gibi güçlü olumsuz duygular sizi ne kadar bunalttı?	0	1	2	3	4
12. Daha önce yapmaktan keyif aldığınız etkinliklere olan ilginizi kaybetmek sizi ne kadar bunalttı?	0	1	2	3	4
13. Başka insanlardan uzak veya kopmuş hissetmek sizi ne kadar bunalttı?	0	1	2	3	4
14. Olumlu duyguları yaşayamamak *(örneğin, mutluluğu hissedememek veya size yakın insanlara sevgi dolu hisler duyamamak)* sizi ne kadar bunalttı?	0	1	2	3	4
15. Asabi davranışlar, öfke patlamaları veya öfkeli hareketler sizi ne kadar bunalttı?	0	1	2	3	4
16. Çok fazla risk almak veya size zarar verebilecek şeyler yapmak sizi ne kadar bunalttı?	0	1	2	3	4
17. Aşırı tetikte olmak veya temkinli davranmak veya hazırda beklemek sizi ne kadar bunalttı?	0	1	2	3	4
18. Yerinden sıçramak veya kolayca irkilmek sizi ne kadar bunalttı?	0	1	2	3	4
19. Dikkati toplamada güçlükler sizi ne kadar bunalttı?	0	1	2	3	4
20. Uykuya dalma veya uykuyu devam ettirme güçlükleri sizi ne kadar bunalttı?	0	1	2	3	4

PCL-5 (8/14/2013) Weathers, Litz, Keane, Palmieri, Marx, and Schnurr – National Center for PTSD.