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Psychometric Validation and Cultural Adaptation of the Turkish Version of the Global Psychotrauma Screen

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ABSTRACT

Background: The prevalence of trauma-related disorders in Türkiye is higher than in high-income countries due to an increased likelihood of exposure to traumatic events. Türkiye's high prevalence of trauma-related disorders underscores the need for validated tools to screen for trauma-related symptoms. The Global Psychotrauma Screen (GPS) is a newly developed, brief instrument designed to screen for transdiagnostic trauma-related symptoms and risk factors. However, its validity in Turkish populations has yet to be established. This study aimed to evaluate the psychometric properties of the Turkish version of the GPS in a general population sample from Türkiye.

Methods: The Turkish version of the GPS was administered digitally to 499 individuals (36.3% male, 63.7% female) aged 18 to 74 years (mean ± SD = 24.58 ± 9.26). Psychometric analyses included exploratory factor analysis, internal consistency, reliability, clinical validity, and convergent-divergent validity. Specific statistical tests such as Cronbach's alpha for internal consistency and confirmatory factor analysis for validity were conducted. Convergent-divergent validity was assessed using correlations with other established measures of trauma symptoms, such as the posttraumatic stress disorder (PTSD) Checklist (PCL). Linear regression examined associations between risk factors and trauma-related symptoms.

Results: Exploratory factor analysis indicated a single-factor structure for trauma-related symptoms. The GPS showed strong internal consistency (α = 0.87) and reliability. Clinical validity was moderate with cut-off scores of 3 for probable PTSD and 2 for depression and anxiety. These cut-off scores resulted in high sensitivity but low specificity. Risk factors such as low social support, childhood trauma, a history of mental illness, and exposure to other stressful events were significantly associated with higher GPS symptoms. The convergent validity analysis indicated a significant correlation with the PTSD Checklist (PCL), showing convergence ($r = 0.48$, $P < .01$).

Conclusion: The Turkish version of the GPS is a valid and reliable screening tool for trauma-related symptoms and provides a quick and efficient screening process. However, clinical interviews are recommended following GPS screening to confirm diagnoses. These findings support the Turkish GPS as a rapid and culturally adaptable screening tool for trauma-related symptoms, although confirmatory clinical interviews remain essential for diagnosis. These findings support the applicability of GPS across diverse cultural contexts. Further studies are needed to explore its psychometric properties in other regions and languages.

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INTRODUCTION

Approximately 70% of the global population is exposed to traumatic events during their lifetime.[1] In Türkiye, the lifetime prevalence of experiencing at least 1 traumatic event, along with the prevalence of trauma-related disorders, appears to be higher than in high-income countries.[2,3] For example, posttraumatic stress disorder (PTSD) prevalence in Türkiye varies significantly, ranging from 8% to 63%, depending on the population and context, such as natural disasters or conflict zones. For example, a study in 3 provinces (Ankara, Kocaeli, and Erzincan)

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found that 84% of the population had experienced at least 1 traumatic event, with natural disasters (41%), loss of a loved one (28%), and severe accidents, fires, or explosions (11%) being the most common.[4,5] Also, in the Van regio, 2 consecutive avalanche disasters in 2020 caused significant trauma, and PTSD development was observed in the 35 participants in this study.[6] Probable PTSD was reported in 10% of this sample.[7] Another study found the lifetime prevalence of PTSD to be 11% in İzmir.[8] In conflict-affected regions like Diyarbakir, the PTSD rate was even higher, with 34.9% lifetime prevalence.[9] After the 1999 Marmara earthquakes, PTSD prevalence rates ranged from 8% to 63%.[10] Following major disasters, such as the 1999 Marmara earthquakes, PTSD prevalence rates showed considerable variation.

Türkiye's geographical location near conflict zones, coupled with its exposure to natural disasters and its role as a host to large refugee populations, contributes to elevated trauma exposure and related disorders. One contributing factor is the occurrence of traumatic events within Türkiye, such as terror attacks[11] and natural disasters. The country is prone to natural disasters, including earthquakes, floods, landslides, and avalanches.[12] The devastating 2023 earthquake, which caused widespread destruction in Türkiye and partly in Syria, is a recent reminder of this vulnerability.[13] Additionally, Türkiye's proximity to conflict zones, such as Syria and Ukraine, increases PTSD risk due to heightened exposure to trauma.[9,14]

Furthermore, Türkiye hosts a large population of Syrian refugees, many of whom experience high rates of trauma-related mental health conditions due to war, violence, and post-migration stress.[14] A recent study conducted among Syrian refugees residing in Türkiye (N=1678) indicated a high prevalence of PTSD (19.6%), along with even higher rates of anxiety disorders (36.1%) and depression (34.7%).[15]

In addition to PTSD, trauma can lead to a range of psychiatric disorders, such as depression, anxiety, and dissociative disorders.[16] This highlights the need for broad screening tools that can capture more than just PTSD symptoms. Early identification of trauma-related disorders is essential, especially given their significant impact on daily functioning.[19] Unfortunately, many existing screening tools are limited to 1 trauma-related disorder and are not validated in Turkish.[17] Therefore, there is a critical need for a comprehensive, brief screening instrument that can assess a range of trauma-related symptoms and risk factors in Türkiye.[24] A promising tool for this purpose is the GPS, a short screening instrument designed to assess a wide range of trauma-related symptoms, including PTSD, Complex PTSD (CPTSD), depression, anxiety, dissociation, self-harm, sleep disturbances, substance abuse, and other physical, social, and emotional issues. The GPS also measures risk and protective factors, using a simple dichotomous scoring system for its 17 symptom items. The GPS has been translated into over 35 languages and has demonstrated validity and reliability in several studies involving adults,[18-27] as well as in studies with children and adolescents.[20,28-29]

To date, the GPS has not been validated in Türkiye. This study aims to rigorously evaluate the construct validity, internal consistency, and clinical utility of the Turkish GPS, addressing a critical gap in trauma-related screening tools for this population.

MATERIAL AND METHODS

Study Design

This cross-sectional study recruited N=525 participants from universities and local community centers in Türkiye, using convenience sampling methods. Data collection took place between January 2022 and June 2022. Eligibility criteria included proficiency in Turkish, being 18 years or older, and the ability to provide informed consent. Participants received a link to the information letter, consent form, and questionnaires, which they had 1 week to complete. Participation was anonymous, voluntary, and without compensation, with the option to withdraw at any time without repercussions. The study was conducted in accordance with the principles of the Helsinki Declaration and approved by the Ethics Committee of Trakya University (Ethics ID: E-29563864-050.04.04-178169 on December 22, 2021).

MEASURES

Demographic Information

Participants provided demographic data including age, identified gender, marital status, education, parenthood status, experience of COVID-19-related stress, current illness or health problems, country of residence, and Turkish language proficiency.

Global Psychotrauma Screen

The GPS is a 22-item self-report questionnaire designed to assess stress-related symptoms and risk factors.[18-27] The symptoms assessed (17 items) span 9 domains: posttraumatic stress symptoms (PTSS), disturbances in self-organization (DSO), anxiety, depression, sleep problems, dissociation, self-harm, substance abuse, and other physical, emotional, or social problems. Additionally, 5 items cover risk factors including childhood trauma, history of mental illness, low social support, lack of psychological resilience, and other stressful events. The total GPS symptom score is derived by summing the 17 symptom items, ranging from 0 to 17. Domain scores are averaged, ranging from 0 to 1, with high scores indicating greater symptom severity. The GPS has been translated from English into Turkish by Z. Altunbezel, H. Ozgen, and V. Sar (April 21, 2020) following the translation and cultural adaptation process described by Sousa and Rojjanasrirat.[30]

Life Event Checklist for DSM-5

The LEC-5 is a 16-item self-report measure used to screen for exposure to potentially traumatic events throughout one's life, assessing their impact on PTSD or distress.[31] The LEC-5 does not have a cumulative score but categorizes experiences into different types of trauma exposure. For each item, respondents indicate the type of exposure: (1) happened to me, (2) witnessed it, (3) learned about it, (4) part of my job, (5) not sure, or (6) does not apply. This approach allows for a nuanced understanding of the nature and extent of an individual's exposure to traumatic events without aggregating the responses into a single score. The Turkish adaptation of this scale has been validated.[32]

Adverse Childhood Experiences Questionnaire

The ACEs questionnaire measures adverse early life experiences across 10 items, divided into maltreatment (i.e., emotional, physical, and sexual abuse, and physical and emotional neglect) and household challenge (i.e., household mental illness, household substance abuse, household physical violence, parental separation/divorce, incarcerated family members) subdomains.[33] Each item is scored on a dichotomous scale as 0 (absence of the adverse experience) or 1 (presence of the adverse experience), resulting in a total score range from 0 to 10. Higher scores indicate greater exposure to adverse childhood experiences, with each point representing an additional type of adversity encountered during childhood. The Turkish adaptation of this scale has been validated.[34] In this sample, the internal consistency of the ACEs was $\alpha = 0.74$.

PTSD Checklist for DSM-5

The PCL-5 is a 20-item self-report measure that assesses PTSD symptoms according to DSM-5 criteria[35] (Weathers et al, 2013a). The items correspond to 4 PTSD symptom clusters: re-experiencing, avoidance, negative alterations in cognition and mood, and hyperarousal. Each item is rated on a 5-point scale (0 = "Not at all" to 4 = "Extremely"), with a total score range from 0 to 80. Higher scores indicate more severe PTSD symptoms. A cut-off score of ≥47 is suggested for a probable PTSD diagnosis.[32] The Turkish adaptation, validated by Boysan et al,[32] demonstrated excellent psychometric properties. In this sample, internal consistency was $\alpha = 0.95$ or the subdomains it was $\alpha = .88$ for re-experiencing, $\alpha = .83$ for avoidance, $\alpha = .89$ for negative alterations in cognition and mood, and $\alpha = .84$ for hyperarousal.

General Anxiety Disorder - 7

The GAD-7 is a 7-item self-report measure used to screen for generalized anxiety disorder (GAD) in primary care settings[36] The items assess the frequency of anxiety-related symptoms. Each item is rated on a 4-point Likert scale (0 = "Not at all" to 3 = "Nearly every day"), with total scores ranging from 0 to 21. Cut-off scores of 5, 10, and 15 indicate mild, moderate, and severe anxiety, respectively. A score of 8 is suggested for identifying probable GAD.[37] The Turkish version has been validated.[37] In this sample, internal consistency was $\alpha = 0.91$.

Patient Health Questionnaire

The Patient Health Questionnaire (PHQ)-9 is a 9-item self-report scale assessing the severity of depressive symptoms.[38] It is based on the diagnostic criteria for major depressive disorder.[39] Each item is rated on a 4-point Likert scale (0 = "Not at all" to 3 = "Nearly every day"), based on the frequency of symptoms experienced over the preceding 2 weeks, resulting in scores ranging from 0 to 27. Scores of 5, 10, 15, and 20 correspond to mild, moderate, moderately severe, and severe depression, respectively. A cut-off score of 10 is often used to identify the presence of depression.[40] The Turkish version has been validated.[41] In this sample, internal consistency was $\alpha = 0.88$.

Alcohol, Smoking, and Substance Involvement Screening Test

The Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST) is a screening tool developed by the World Health Organization (WHO) to assess the use of various substances, including tobacco, alcohol, cannabis, and other drugs.[42] The tool assesses the frequency, impact, and risk of substance use. Each substance is scored individually, with higher scores indicating a greater risk of substance-related problems. In this study, 3 items were used to evaluate risky alcohol use. A score of 9.5 or higher on the alcohol subscale suggests a probable alcohol use disorder. The Turkish adaptation has been validated.[43]

Insomnia Severity Index

The Insomnia Severity Index (ISI) is a 7-item scale evaluating the nature, severity, and impact of insomnia problems through questions related to sleep onset, sleep maintenance, and the impact of insomnia on daytime functioning.[44] Each item is rated on a 5-point Likert scale (0 = "No problem" to 4 = "Very severe problem"). The total score ranges from 0 to 28, with specific cut-off points indicating the severity of insomnia: 0-7 = no clinically significant insomnia; 8-14 = subthreshold (mild) insomnia; 15-21 = moderate insomnia; 22-28 = severe insomnia. The Turkish version has been validated.[45] In this sample, internal consistency was $\alpha = 0.86$.

World Health Organization Quality of Life

The WHOQOL-BREF is a 26-item self-report questionnaire that assesses an individual's quality of life across 4 domains: physical health, psychological health, social relationships, and environment.[46] Each domain score is scaled positively, meaning that higher scores reflect a better perceived quality of life. The domain scores are calculated by averaging the scores of all items within that

domain, then multiplying by 4 to align with a 0-100 scale. In this study, 1 item from the psychological health domain was used, assessing an individual's perception of general functioning in daily life. The Turkish adaptation of the scale was used.[47]

Data Analysis

Descriptive statistics were used to summarize participants' characteristics. Sample size determination followed the criteria by Bujang and Adnan.[48] Prior to data analysis, missing data patterns were assessed using Little's Missing Completely at Random (Little MCAR), which indicated data were missing at random, $P = 1.00$. Pairwise deletion was applied when less than 5% of the data was missing. Normality was assessed using the Shapiro–Wilk test, and variance heterogeneity was tested using Levene's test.

Construct validity was assessed using Exploratory Factor Analysis (EFA) with tetrachoric correlation and oblique Promax rotation because factors were expected to be correlated.[49] Kaiser normalization was applied to obtain the stability of solutions among the samples. Parallel Analysis was used to determine the optimal number of factors with consideration to the Eigenvalues of the factors (>1), the slope of the scree plot, and the interpretation of the factor solution. The total variance explained by the factors, factor loadings, absence of cross-loading, and the value of Cronbach's Alpha if item was deleted were also examined. Internal consistency was measured using Cronbach's Alpha, inter-item correlation, item-total correlation, and Cronbach's Alpha if item was deleted. Diagnostic accuracy of Turkish GPS was evaluated using the Receiver Operating Curve analysis, with sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), positive likelihood ratio (LR+), and negative likelihood ratio (LR−) assessed. Youden's index was used to determine optimal cut-off points for several trauma-related outcomes.

Convergent and divergent validity were evaluated by correlating GPS scores with criterion variables (PTSD, CPTSD, anxiety, depression, insomnia, substance use) using Pearson's correlation. Linear regression was used to analyze the relationship between GPS risk factors and symptom scores. Statistically significant was set at $P < .05$, and analyses were conducted using SPSS version 28.0 (IBM SPSS Corp.; Armonk, NY, USA) and R version 3.6.1.

RESULTS

Study Sample

After excluding outliers (Z score > ±3), the final sample included 499 participants (36.3% male, 63.7% female), aged 18 to 74 years (mean ± SD=24.58 ± 9.26). Participant characteristics are detailed in Table 1.

Table 1. Participant Characteristics

Variable	Group	N	%
Sex	Male	181	36.3
	Female	318	63.7
Age	Mean (SD)	24.58	9.26
Marital status	Single	418	83.8
	Married	70	14.0
	Divorced	4	0.8
	Widow	7	1.4
Education	Lower than high school	29	5.8
	High school	360	72.1
	Higher education	110	22.0
Student status	No	208	41.7
	Yes	291	58.3
Children	No	411	82.4
	Yes	88	17.6

Exposure Characteristics

According to GPS exposure items, the most frequently reported traumatic events were the sudden death of a loved one 188 (38%), a life threating event experienced by someone else 154 (31%), emotional violence 136 (27%), serious injury to someone else 125 (25%), and physical violence toward someone else 116 (23%). COVID-19-related stressors were identified as significant by 23% (n=116) of the participants. The most impactful events, as reported by participants, included the death of a loved one 75 (16%), accidents 35 (7%), and sexual harassment 30 (6%). The symptom with the highest mean was PTSD (mean ± SD=2.74 ± 1.64), while self-harm had the lowest mean score (mean ± SD=0.13 ± .34). These percentages are shown in Figure 1.

Descriptive statistics and intercorrelations among GPS symptom domains and related psychological outcomes are provided in Table 2. Also, Summary statistics for trauma-related and psychosocial risk factors assessed by the GPS are presented in Table 3.

Construct Validity

A sample of 499 participants was utilized to conduct an EFA to assess the construct validity of the GPS. Preliminary checks confirmed suitability for factor analysis. Bartlett's test for sphericity yielded significant results, indicating that the correlations between items were sufficiently large to justify the use of EFA, $\chi^2(136) = 1358.039$, $P < .001$. Additionally, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .76, demonstrating that the sample was adequate for factor analysis.

The EFA revealed a one-factor for the GPS. The analysis identified a single factor with an Eigenvalue exceeding 1, accounting for 49% of the total variance. A parallel analysis, along with other post-estimation model selection

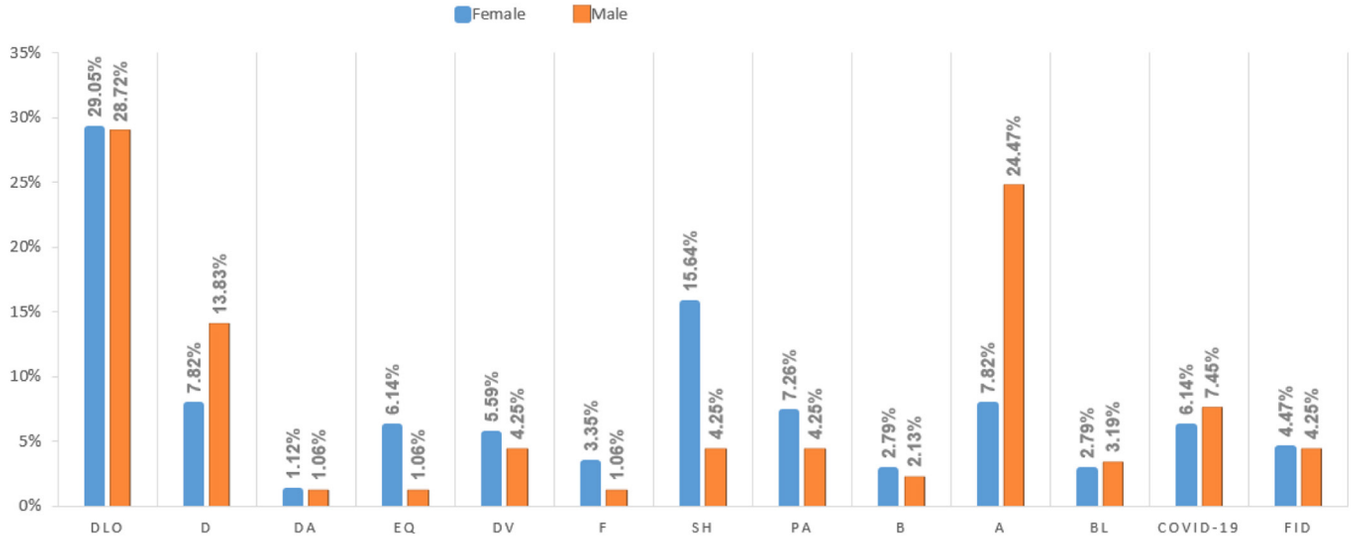


Figure 1. Identification of traumatic event experienced. *Note: Death of a loved one (DLA), Divorce (D), Dog attack (DA), Earthquake (EQ), Domestic violence (DV), Fire (F), Sexual harassment (HS), Physical assault (PA), Burning (B), Accident (A), Bullying (BL), COVID-19 İnfection (COVID), Fatal illness diagnosis (FID).

criteria, suggested a one-, two-, or three-factor solution could be appropriate for the Turkish version of GPS. First, a one-factor solution was explored, given that only one factor had an Eigenvalue exceeding the 95th percentile of the simulated data. The EFA supported a one-factor solution with an Eigenvalue of 8.25, explaining 49% of the total variance, with item loadings ≥ .40 (Table 3). The communalities, which represent the amount of variance explained by the factors for each item, were all above .19, indicating that the one-factor model provided an acceptable level of explanation. This model met the criteria for unidimensionality, as the single factor accounted for more than 49% of the variance, the Eigenvalue ratio was greater than 3, and parallel analysis supported the retention of a single factor.[18,50]

Next, a two-factor solution was considered, as the second factor's Eigenvalue was higher than the simulated data, though below 1. The EFA revealed Eigenvalues of 5.83 and 3.53 for the 2 factors, which together explained 55% of the total variance. However, this solution encountered issues, as several items did not load on any of the factors. Due to these limitations, the two- and three-factor solutions were considered less favorable. Detailed results for the two- and three-factor solutions are provided in the supplemental materials (Supplementary Tables 1 and 2).

Internal Consistency and Reliability

The internal consistency was assessed using Cronbach's alpha, inter-item correlation, and item-total correlation scores. The total GPS symptom score showed good internal

Table 2. Descriptive Statistics of Global Psychotrauma Screen Domains and Symptom Score (N = 499)

	n	M	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. GPS PTSD	499	2.74	1.64											
2. GPS DSO	499	.88	.82	.54**										
3. GPS CPTSD	499	.362	2.19	.95**	.77**									
4. GPS Anxiety	499	1.33	.81	.57**	.61**	.65**								
5. GPS Depression	499	1.30	.80	.59**	.56**	.65**	.64**							
6. GPS Insomnia	499	.58	.49	.38**	.30**	.40**	.40**	.44**						
7. GPS Self_harm	499	.13	.34	.22**	.36**	.30**	.24**	.19**	.23**					
8. GPS Dissociation	499	.52	.71	.40**	.41**	.45**	.37**	.36**	.25**	.38**				
9. GPS SubstanceAbuse	499	33	.47	.20**	.26**	.25**	.23**	.25**	.17**	.21**	.17**			
10. GPS OtherProblems	499	.580	.49	.41**	.44**	.47**	.51**	.48**	.32**	.18**	.29**	.27**		
11. GPS Risk	499	2.15	1.20	.45**	.41**	.49**	.51**	.45**	.30**	.23**	.36**	.33**	.47**	
12. GPS symptom scores	499	17.36	5.04	.75**	.70**	.83**	.75**	.70**	.51**	.38**	.56**	.40**	.60**	.66**

CPTSD, complex PTSD; DSO, disturbances in self-organization; GPS, Global Psychotrauma Screen; PTSD, posttraumatic stress disorder.
*$P < .05$.
**P < .001.

Table 3. Factor loadings for the one-factor solution model of Turkish Global Psychotrauma Screen

Number	Global Psychotrauma Screen Item	Factor
1	Nightmares	.55
2	Avoidance	.58
3	Hypervigilance	.56
4	Numbing/detachment	.82
5	Guilt	.64
6	Worthlessness	.83
7	Anger Dyscontrol	.67
8	Anxiety	.85
9	Worrying	.83
10	Depression	.88
11	Anhedonia	.82
12	Insomnia	.63
13	Self-harm	.60
14	Derealization	.68
15	Depersonalization	.52
16	Other problems	.73
17	Substance use	.44

consistency (α=.87), with corrected item-total correlations ranging from .85 to .87 and inter-item correlations ranging from .04 to .58. These findings suggest that the items consistently measure the same underlying construct. For the GPS subdomains, internal consistency varied. The complex PTSD and PTSD subdomains showed acceptable internal consistency (α=.75 and α=.70 respectively). The depression (α=.66) and anxiety (α=.66) subdomains exhibited moderate internal consistency. The DSO (α=.52) and dissociation (α=.51) subdomains demonstrated poor internal consistency, indicating that these subdomains may require further refinement.

Internal consistencies indicate excellent alpha values. The GAD-7 showed excellent internal consistency (α=.91), and the PCL-5 subscales demonstrated good internal consistency, with Cronbach's alpha values of α=.88 for re-experiencing, α =.83 for avoidance, α =.89 for negative alterations in cognition and mood, and α =.84 for hyperarousal. The PHQ-9 (α=.88) and ISI (α = .86) also showed good internal consistency, confirming their reliability in measuring their respective constructs. The

Table 4. Global Psychotrauma Screen Risk Factors

	Minimum	Maximum	M	SD
17. Previous trauma exposure	.00	1.00	.64	.48
18. Lack of social support	.00	1.00	.43	.49
19. Childhood trauma	.00	1.00	.54	.50
20. Mental health issues	.00	1.00	.24	.43
21. Resilience	.00	1.00	.30	.46

ACE measure indicated acceptable internal consistencies (α=.74), as did the WHQOL-BREF domains of environment (α = .79), physical health (α=.78), and general health (α = .71). The psychological health of the WHQOL-BREF demonstrated moderate internal consistency (α=.63), and poor internal consistency for the social relationship (α=.57), suggesting that the latter may benefit from further scale development.

Clinical Validity

The clinical validity of the GPS was assessed for the domains of PTSD, anxiety and depression (Table 5). The area under the curve (AUC) values were acceptable (AUC >.70) for PTSD and depression, indicating that the GPS has a reasonable ability to distinguish between those with and without these conditions. For PTSD, a cut-off score of 4 demonstrated low sensitivity (.57) and good specificity (.85), suggesting that while the measure accurately identifies individuals without PTSD, it may miss some cases. A lower cut-off of 3 improved sensitivity to an acceptable level (.74) but reduced specificity (.62), indicating a better balance between identifying true positives and minimizing false positives.

For anxiety, the optimal cut-off score was determined to be 2, yielding good sensitivity (.82) but low specificity (.57). This suggests that while the GPS is effective in identifying individuals with anxiety, it may also result in a higher rate of false positives. Similarly, the optimal cut-off score for depression was also 2, with good sensitivity (.83) and low specificity (.56), indicating a similar trade-off between identifying true cases of depression and avoiding false positives.

Convergent and Divergent Validity

Convergent validity was assessed by examining the correlations between the total GPS symptom scores and

Table 5. Clinical Validation of Turkish Global Psychotrauma Screen

Probable Diagnosis	AUC (95% CI)	Optimum Cut-Off	Sensitivity (95% CI)	Specificity (95% CI)	PPV (95% CI)	NPV (95% CI)	LR+ (95% CI)	LR- (95% CI)
PTSD	.75 (.71-.79)	4	.57 (.50-.63)	.85 (.80-.90)	.83 (.76-.86)	.62 (.56-.71)	3.85 (2.76- 5.36)	.51 (.44-.59)
PTSD	.75 (.71-.79)	3	.74 (.69-.79)	.62 (.55-.68)	.70 (.65-.76)	.66 (.60-.72)	1.95 (1.63-2.34)	.41 (.33-.52)
Anxiety	.70 (.66-.74)	2	.82 (.74- .87)	.57 (.51- .62)	.45 (.40- .57)	.88 (.82-.90)	1.90 (1.65-2.19)	.32 (.22-.46)
Depression	.70 (.66-.75)	2	.83 (.74-.90)	.56 (.50-061)	.29 (.25-.44)	.94 (.90-.95)	1.88 (1.63-2.17)	.30 (.19-.48)

AUC, Area Under the Curve; LR+, Positive Likelihood Ratio; LR-, Negative Likelihood Ratio; NPV, Negative Predictive Value; PPV, Positive Predictive Value; PTSD, posttraumatic stress disorder.

Table 6. Convergent Validity for Global Psychotrauma Screen Symptoms

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. GPS PTSD	-														
2. GPS DSO	.54**														
3. GPS CPTSD	.95**	.77**													
4. GPS Anxiety	.57**	.61**	.65**												
5. GPS Depression	.59**	.56**	.65**	.64**											
6. GPS Insomnia	.38**	.30**	.40**	.40**	.44**										
7. GPS Self harm	.22**	.36**	.30**	.24**	.19**	.23**									
8. GPS Dissociation	.40**	.41**	.45**	.37**	.36**	.25**	.38**								
9. GPS-Substance Abuse	.20**	.26**	.25**	.23**	.25**	.17**	.21**	.17**							
10. GPS-Other Problems	.41**	.44**	.47**	.51**	.48**	.32**	.18**	.29**	.27**						
11. GPS Risk Protect	.45**	.41**	.49**	.51**	.45**	.30**	.23**	.36**	.33**	.47**					
12. GPS Total	.75**	.70**	.83**	.75**	.70**	.51**	.38**	.56**	.40**	.60**	.66**				
13. GAD-7	.45**	.47**	.51**	.46**	.44**	.30**	.27**	.38**	.23**	.31**	.45**	.48**			
14. PHQ	.43**	.46**	.49**	.38**	.43**	.35**	.35**	.40**	.30**	.33**	.47**	.46**	.76**		
15. PCL- 5	.55**	.52**	.61**	.48**	.50**	.32**	.26**	.44**	.24**	.37**	.43**	.54**	.65**	.60**	
16. ISI	.29**	.28**	.32**	.26**	.32**	.51**	.22**	.24**	.19**	.19**	.30**	.33**	.49**	.56**	.49**

CPTSD, complex PTSD; DSO, disturbances in self-organization; GAD-7 = Generalized Anxiety Disorder; ISI = Insomnia Severity Index; PCL-5 = PTSD Checklist for DSM-5; PTSD, posttraumatic stress disorder; PHQ = Patient Health Questionnaire.
**Pearson Correlation coefficient significant at 0.01 level.

the total scores of criterion variables ACE, PCL-5, ISI, GAD-7, and PHQ (Table 6). Significant positive correlations were found across these measures, with the strongest correlation observed between the total GPS symptom score and the PCL-5 total score, $r(499) = .48$, $P < .01$. Additionally, the GPS total score was significantly correlated with the PCL-5 subdomains, including re-experiencing, avoidance, negative alterations in cognition and mood, and hyperarousal.

Divergent validity is supported by significant negative correlations between the total GPS symptom score and 5 domains of the WHQOL-BREF: physical health, psychological health, social relationships, environment, and general health (Supplementary Table 3). These negative correlations indicate that higher GPS symptom scores are associated with lower quality of life in these areas, as expected.

Furthermore, strong positive correlations were observed among the GPS subdomains. Notably, the CPTSD subdomain correlated highly with the PTSD subdomain ($r = .95$, $P < .001$) and with the overall GPS total score ($r = .83$, $P < .001$) (Supplementary Table 3). These findings provide evidence for the acceptable convergent and divergent validity of the GPS factors.

In assessing the divergent validity of GPS symptoms, their relationship with various dimensions of the World Health Organization Quality of Life (WHOQOL) scale was examined. The analysis revealed that GPS symptoms demonstrated weak negative correlations with most of the WHOQOL subscales. Specifically, the correlation with Physical Health was $r = -.20$ ($P < .001$), with Psychological Health was $r = -.10$ ($P < .05$), with Social Relations was $r = -.15$ ($P < .001$), with National Environment was $r = -.14$ ($P < .001$), and with General Health was $r = -.19$ ($P < .001$). These results suggest that while GPS symptoms are somewhat related to WHOQOL dimensions, the associations are relatively weak, supporting the divergent validity of GPS symptoms from broader quality of life indicators.

Risk Factors

The relationship between risk factors (low psychological resilience, other stressful events, history of mental illness, low social support, and childhood trauma) and GPS symptoms was examined in a sample of 499 participants. Collectively, these risk factors accounted for 42% of the variance in GPS symptoms, indicating substantial explanatory power ($R^2 = .42$). Specifically, other stressful events ($P < .001$), low social support ($P < .001$), history of mental illness ($P = .004$), and childhood trauma ($P < .001$) were significantly and strongly correlated with GPS symptoms (Table 7).

DISCUSSION

In a country with a high risk of natural disasters, war, conflict-related trauma, traffic accidents, and violence, identifying individuals at risk for trauma-related disorders is crucial. This study aimed to validate the Global Psychotrauma Screen (GPS), a brief and easy-to-administer screening tool, within a Turkish sample. In this large convenience sample, the GPS was found to be a valid

Table 7. Relationship Between Risk Factors and Global Psychotrauma Screen Symptoms

Variable	Unstandardized B	Standardized Coefficients β	*t*	*P*	*R*
Other stressful events	4.06	.42	11.44	<.001***	.55
Low social support	2.30	.25	6.73	<.001	.42
Childhood trauma	0.96	.10	2.90	.004	.26
History of mental illness	2.10	.19	5.57	<.001	.31
Low resilience	0.36	.04	1.02	.309	-.05

β represents standardized regression coefficients.
*P < .05.
**P < .001.

and reliable tool for detecting trauma-related disorders in the Turkish population.

Regarding construct validity, results from the EFA indicated a one-factor solution for trauma-related symptoms measured by the GPS, explaining 49% of the variance. This aligns with the transdiagnostic nature of the consequences of trauma and mirrors findings in English-speaking populations.[18,20] In the two-factor model, PTSD and depressive symptoms loaded onto one factor, while dissociation-related symptoms (self-harm, depersonalization) loaded onto another. The three-factor model separated anxiety, dissociation, and PTSD symptoms. Considering the parallel analysis and the 49% variance explained, the one-factor solution is preferred for the GPS. However, future research could evaluate the model with two- and three-factor solutions with a possibly expanded version of the GPS to cover the peri- and posttraumatic coping mechanisms which generate symptoms beyond PTSD, anxiety, and depression.

The results demonstrated good internal consistency and reliability of the GPS in line with previous studies.[18-27] The clinical validity of the GPS symptoms was moderate, with a cut-off of 3 for PTSD. The results also supported the cut-off score of 4 for possible PTSD, but a cut-off score of 3 provided a better balance between sensitivity and specificity. Note that the specificity was relatively low in this study. Hence, using the GPS to screen for PTSD will result in many false positives. Similarly, the GPS had an acceptable AUC for depression and anxiety, with good sensitivity but low specificity at a cut-off of 2. Overall, these results indicate that the GPS performs moderately in screening for PTSD, depression and anxiety. GPS validation studies in other countries reported a better screening performance of the GPS. Therefore, it was recommended that future studies to investigate whether the performance of the GPS in Türkiye can be improved, for example, by using a more sensitive 5-point Likert scale instead of binary answer options. This small adaptation might increase the GPS's sensitivity. The moderate screening for PTSD, depression and anxiety could also be caused by cultural factors specific to the Turkish population, such as collective trauma, stigmatization, and the influence of religion and gender roles on the expression of trauma. This could have influenced the interpretation of GPS items. Furthermore, while cultural factors play an important role in shaping the manifestation and expression of trauma, recent studies examining biological markers of trauma, such as oxidative stress and thiol/disulfide homeostasis, have highlighted the complexity of trauma's impact on both psychological and physiological levels.[51]

The convergent validity of the GPS was supported, as GPS scores were highly correlated with established measures of trauma, such as the PCL-5, ACE, LEC-5, ISI, GAD-7, and PHQ-9, consistent with earlier studies.[23,25] Key risk factors such as low social support, childhood trauma, history of mental illness, and other stressors significantly predicted trauma-related symptoms, whereas psychological resilience did not.

This study has some limitations that should be considered. First, the sample was predominantly female (66%) and composed largely of students (approximately 59%), limiting the generalizability of the results and not considering gender differences in PTSD risk factors.[21] Further validation studies of the GPS in a more diverse sample of the population are recommended. Second, for some measures the cut-off value could not be calculated, which impacts the accuracy of the results. Third, the data consisted solely of self-reported questionnaires and was not supported by clinical interviews. Further research should include clinical interviews to increase the reliability of the measures. Fourth, the current study did not include test-retest reliability. As the GPS is intended for repeated use, this should be a priority in future studies on the psychometric characteristics of the GPS to provide the stability of the measure and investigate the development of trauma-related symptoms in a diverse context and timespan.

This study is the first to evaluate the psychometric properties of the GPS in the Turkish language. The results provide an empirical basis to use the GPS as a valid and reliable screening instrument for trauma in the Turkish population. Due to its lower specificity, the GPS may yield more false positives in this population compared to others. Therefore, it is recommended that the GPS is only used for initial screening and alongside clinical interviews to confirm diagnoses. Given the high prevalence of trauma and trauma-related disorders in Türkiye and the brief and charge- and copyright-free characteristics, the GPS has

the potential to contribute to an economical, quick, and accessible tool for trauma screening processes that could be utilized by researchers and practitioners across various settings such as primary care, educational institutes, clinical practice, and disaster settings in Türkiye.

The findings of this study indicate that the GPS is a valid and reliable screening tool for trauma-related symptoms in the Turkish population. Its high sensitivity makes it effective for early detection of a wide range of trauma-related issues, serving as a first step toward potential self-help programs or further diagnosis and treatment. However, given its lower specificity, clinical interviews are recommended following GPS screening to confirm trauma diagnoses.

While the conclusion highlights the utility of the GPS as a screening tool, it would benefit from more detailed guidance on integrating the GPS into clinical workflows. For example, clinicians should consider how to manage the anticipated high rate of false positives. Strategies could include further assessment through clinical interviews or additional diagnostic tools. Clinicians working in high-risk environments may need to prioritize immediate follow-up interventions or create protocols for more accessible referral systems.

Future research should explore the GPS's performance in long-term assessments, particularly focusing on its ability to track the progression or remission of trauma symptoms over time. Longitudinal studies could offer critical insights into the tool's ability to monitor changes in trauma symptoms, guiding clinicians on how to adjust treatment plans based on symptom progression. By tracking symptom changes over time, the GPS could play an even more integral role in the ongoing management of trauma-related disorders.

Further research is needed to assess the psychometric properties of the GPS across different regions and languages. Expanding the scope of validation studies will enhance the generalizability and applicability of the GPS in diverse settings and populations.

In conclusion, while the Turkish version of the GPS demonstrates strong reliability and validity as a trauma screening tool, future studies should focus on refining its integration into clinical workflows, its long-term use in monitoring symptom changes, and expanding its validation across diverse cultural and regional settings.

Data Availability Statement: The data that support the findings of this study are available on request from the corresponding author.

Ethics Committee Approval: This study was approved by the Ethics Committee of Trakya University (Approval no.: Ethics ID: E-29563864-050.04.04-178169; Date: 12.2021).

Informed Consent: Informed consent was obtained from the patients who agreed to take part in the study.

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Supplementary Table 1. Factor loadings for the two-factor solution model of Turkish GPS

No	GPS Item	Factor 1	Factor 2
1	Nightmares	.76	-.20
2	Avoidance	.94	-.36
3	Hypervigilance	.46	.14
4	Numbing/detachment	.71	.15
5	Guilt	.52	.16
6	Worthlessness	.63	.25
7	Anger Dyscontrol	.03	.75
8	Anxiety	.51	.41
9	Worrying	.62	.26
10	Depression	.88	.04
11	Anhedonia	.71	.16
12	Insomnia	.44	.23
13	Self-harm	-.32	1.07
14	Derealization	.24	.52
15	Depersonalization	.09	.70
16	Other problems	.56	.22
17	Substance use	.20	.28

Supplementary Table 2. Factor loadings for the three-factor solution model of Turkish GPS

No	GPS Item	Factor 1	Factor 2	Factor 3
1	Nightmares	.12	-.12	.63
2	Avoidance	-.02	-.20	.92
3	Hypervigilance	-.21	.32	.62
4	Numbing/detachment	.41	.10	.42
5	Guilt	.20	.16	.39
6	Worthlessness	.54	.11	.27
7	Anger Dyscontrol	.50	.48	-.21
8	Anxiety	.75	.13	.04
9	Worrying	.53	.11	.27
10	Depression	.99	-.28	.21
11	Anhedonia	.60	.01	.29
12	Insomnia	.50	.06	.13
13	Self-harm	.17	.87	-.26
14	Derealization	.14	.48	.20
15	Depersonalization	-.20	.81	.10
16	Other problems	.73	-.04	.07
17	Substance use	.59	.02	-.17

Supplementary Table 3. GPS and other scale correlations

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
WHQOL Physical Health	- .27**	- .27**	- .30**	- .24**	- .30**	- .28**	- .24**	- .29**	- .10*	- .18**	- .28**	- .20**
WHQOL Psychological	- .20**	- .27**	- .25**	- .19**	- .2**	- .13**	- .10*	- .15**	- .16**	- .16**	- .23**	- .10*
WHQOL Social Relation	- .22**	- .23**	- .25**	- .16**	- .23**	- .12**	- .15**	- .19**	- .13**	- .21**	- .28**	- .15**
WHQOL National Environment	- .23**	- .21**	- .25**	- .13**	- .23**	- .18**	- .14**	- .20**	- .13**	- .10*	- .25**	- .14**
WHQOL General Health	- .23**	- .26**	- .27**	- .22**	- .29**	- .20**	- .21**	- .21**	- .18**	- .20**	- .26**	- .19**
Total ACE	.23**	.27**	.27**	.19**	.23**	.15**	.24**	.22**	.25**	.22**	.34**	.32**
Total PCL 5	.55**	.52**	.61**	.48**	.50**	.32**	.26**	.44**	.24**	.37**	.43**	.54**
Reexperiencing PCL 5	.50**	.44**	.54**	.43**	.42**	.26**	.21**	.39**	.21**	.34**	.37**	.48**
Avoidance PCL 5	.48**	.43**	.52**	.39**	.41**	.25**	.20**	.35**	.21**	.30**	.38**	.44**
Negative alterations PCL 5	.54**	.52**	.59**	.46**	.52**	.25**	.24**	.40**	.24**	.36**	.41**	.51**
Hyper arousal PCL 5	.45**	.47**	.51**	.40**	.40**	.37**	.25**	.42**	.20**	.30**	.38**	.48**
ISI Total	.29**	.27**	.32**	.26**	.32**	.51**	.22**	.24**	.19**	.19**	.30**	.33**
GAD-7 Total	.45**	.47**	.511**	.46**	.44**	.30**	.27**	.38**	.23**	.31**	.45**	.48**
PHQ Total	.43**	.46**	.49**	.38**	.43**	.35**	.35**	.40**	.30**	.33**	.47**	.46**
ASSIST Tabacco	.16**	.15*	.17**	.14*	.14*	.12*	.00	.11	.49**	.09	.20**	.20**
ASSIST Marijuana	.15*	.19**	.18**	.10	.06	.07	.16*	.15*	.18**	.13*	.16*	.17**
ASSIST Cocaine	- .02	-.03	- .02	.07	-.10	.01	- .04	- .01	.06	- .01	-.03	- .08
ASSIST Amphetamine stimulants	.08	.07	.09	.01	.00	.04	.11	.10	.09	.06	.04	.07
ASSIST inhalants	.00	-.02	- .01	- .01	- .05	.04	- .04	.06	.08	.07	-.02	.00
ASSIST tran	.13*	.19**	.17**	.23**	.22**	.19**	.13*	.22**	.22**	.20**	.31**	.26**
ASSIST hallucinogens	.07	.11	.10	.06	.05	.08	.16**	.15*	.12*	.08	.09	.12
ASSIST Opioid	.08	.08	.09	.04	.03	.05	.12	.11	.09	.06	.03	.08
ASSIST Others	.06	.10	.08	.13	.07	.06	.17**	.09	.19**	.02	.12	.14*

*1= GPS_PTSD, 2=GPS_DSO,3=GPS_CPTSD, 4= GPS_Anxiety,5= GPS_Depression, 6=GPS_Insomnia,7=GPS_Self_harm,8=GPS_Dissociation, 9= GPS_SubstanceAbuse,10= GPS_OtherProblems, 11= GPS_Risk, 12= GPS_Total