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Validity and reliability study of the Turkish version of the tolerance for mental pain scale-10

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ABSTRACT

OBJECTIVE: Psychological pain has been accepted as one of the most critical psychological risk factors underlying suicidal ideation and behaviour. Suicide is chosen as a way to get rid of intense, painful and unbearable psychological pain. Since the level of tolerance rather than the intensity of psychological pain was considered to be more predictive for suicide, we aimed to investigate the validity and reliability of the Turkish version of Tolerance for Mental Pain Scale-10 (TMPS-10).

METHODS: A total of 121 patients diagnosed with depression in 62 of them had previous suicide attempts and 105 healthy controls who applied to the outpatient clinics of Çukurova University Faculty of Medicine Psychiatry Department were included in the study. Beck Depression Inventory (BDI), Beck Scale for Suicidal Ideation (BSIS), Beck Hopelessness Scale (BHS), Psychache Scale (PS) and TMPS-10 were applied to participants.

RESULTS: In the internal consistency analysis, Cronbach's alpha coefficient was 0.96 for enduring the pain, 0.96 for managing the pain, 0.98 for the whole scale, and item-total correlation coefficients were found to be between 0.87 and 0.93. The scale fit well to both the two-factor and single-factor structure in the confirmatory factor analysis. The multi-group confirmatory factor analysis showed that both the depressive patients and the control group interpreted the scale items in the same way. In convergent validity analysis, there was a negative, linear, high and statistically significant relationship between TMPS-10 scores and PS, BSIS, BDI and BHS scores ($r = -0.935$; -0.779; -0.890; -0.808; $p < .0.001$, respectively). In discriminant function analysis, TMPS-10 successfully differentiated the depressive group and the control group, as well as the depressive patients who did or did not attempt suicide (96.5%, 88.1%, respectively).

CONCLUSION: The Turkish version of TMPS-10 is valid and reliable, and may be useful in research and clinical practices about suicide.

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Tolerance for mental pain; mental pain; psychache; psychological pain; suicide; depression

Introduction

Suicide is a widespread health problem, and according to the World Health Organization (WHO), 800,000 people commit suicide annually [1]. According to the data from the Turkish Statistical Institute (TSI), the rate of suicide was 4 per 100,000 people in 2017 in Turkey [2]. Although depression is a significant risk factor for suicide, neither every patient diagnosed with depressive disorder attempts suicide nor every person who attempted suicide is diagnosed with depression [3]. Therefore, suicide may be considered as a syndrome independent from psychiatric diagnosis [4]. In the Diagnostic and Statistical Manual of Mental Disorders (DSM)-5 Suicidal Behavior Disorder (SBD) is placed among conditions for further study. The main symptom of SBD is the suicide attempt aiming to terminate life [5].

One of the most important theories proposed to prevent suicide and determine its predictors is the Mental Pain Theory [6]. Psychache, which is also known as mental pain or psychological pain, is an unbearable, irritating emotion due to frustrations, lovelessness, shame, attention problems, and failure [7,8]. Verrocchio et al. [9] indicated that the predictive effect of psychache on suicide was independent of the diagnosis. Studies on prisoners [10], students [11], depressive patients [12], homeless people [13], and other groups [6] have demonstrated that psychache affects suicide more than depression and hopelessness.

Review of suicidal notes and clinical interviews have detected that suicide attempters found suicide as the only way to escape from unbearable mental pain [6,7,14,15]. However, Shneidman [16] stated that the inability to tolerate psychological pain rather than its severity is a more important risk factor for suicide. Shelef et al. [17] detected stronger suicidal thoughts in the group with a lower tolerance for pain among soldiers who had similar psychological pain levels. A reverse

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correlation was also detected between tolerance for mental pain and suicide risk in a healthy population in the validation study of the Greek version of TMPS [18,19].

Unbearable Psychache Scale (UP3) [20], and Tolerance for Mental Pain Scale (TMPS)-10 are the scales used to evaluate the tolerance for mental pain [21,22]. UP3 was developed from 3 items of the Psychache Scale [20]. The TMPS evaluates three aspects of tolerance for mental pain: surfeit of the pain, belief in the ability the cope with the pain, and containing the pain [21,22]. Because the confirmatory factor analysis did not demonstrate a good concordance with the original three-factorial model, Meerwijk et al. [22] decreased the number of questions was from 20 to 10, and named as TMPS-10.

Considering the statement "I can not bear this pain anymore" which is frequently seen in suicide notes, inability to tolerate psychological pain is seemingly an important predictor for suicide and level of tolerance for mental pain should be evaluated in patients who carry a risk for suicide [23]. This study aimed to demonstrate the validity and reliability of the Turkish version of TMPS-10.

Materials and methods

Sample and procedure

The study was approved by the Non-interventional Clinical Trials Ethics Committee of Çukurova University Medical School (Acceptance no. 37, 5 April 2019). Written informed consents were obtained from all participants. Psychiatric interviews were performed by the first author using DSM-5 diagnostic criteria [5]. The study was conducted with participants who admitted to the Psychiatry Department of Çukurova University Medical School between 15 April 2019 and 15 July 2019. The study flow-chart is shown in Figure 1.

Each participant was given 60–75 min to get a clinical interview and to complete the scales. We questioned whether the participants had a previous suicide attempt in the sociodemographic data form. Any act to terminate one's own life was accepted as a suicide attempt. Suicide attempts were found in 62 patients in the depressive group.

Power analysis

With a moderate effect size (Cohen's d = 0.50), 0.80 power, and 0.05 error ($p = 0.05$), the sample size for one group was calculated to be 64. Because there were two (patient and control) groups, the study was planned with 128 individuals in total. Power analysis was performed with R (v3.6.0) package programme (https://cran.r-project.org/web/packages/pwr/pwr.pdf) [24]. Accordingly, the power of the study, including 121 depressive patients and 105 controls, was found to be 99%.

Translation procedure

Before the study, permission was obtained by e-mail from Esther Meerwijk, the corresponding author of the team that developed TMPS-10.

The scale was translated to Turkish separately by three psychiatrists. Another team independent from the first translators formed a standard text from these three translations. Then, this text was retranslated to English, and the translation was compared with the original text. After the final approval, the text was prepared for the study.

Measures

Tolerance for Mental Pain Scale (TMPS-10)

This is a Likert-type self-report questionnaire in which answers are given between 1 (not true) and 5 (very true). TMPS-10 evaluates mental pain in two dimensions as "Managing the pain" and "Enduring the pain." "Managing the pain" corresponds to the presence of active coping strategies to relieve or decrease pain, and "Enduring the pain" corresponds to the belief that the pain will end rather than managing the pain. There are five items in each dimension. While scoring the scale, items about "Managing the pain" (items 2, 3, 5, 7, and 10) are reverse scored [22].

'Enduring the pain' has similar items like 'Belief in the ability to cope with the pain' factor of TMPS. 'Managing the pain' corresponds to the combination of 'Surfeit the pain' and 'Containing the pain' variables of TMPS [22].

The Cronbach alpha value was 0.90 for "Managing the pain"; 0.84 for "Enduring the pain" [21,22]. Higher scores correspond to higher tolerance to mental pain.

Psychache Scale (PS)

The PS is a 5-point, 13-item, Likert type scale developed by Holden et al. [25]. Higher scores from the scale indicate higher levels of psychache. The Cronbach alpha value was 0.98 in the validity and reliability study of the Turkish version [26].

Beck Depression Inventory (BDI)

The BDI is a 21-item, self-report, 4-point Likert type scale [27]. Higher total scores from the scale suggest more severe depression levels. The Cronbach alpha value in the Turkish validity and reliability study was 0.80 [28].

Beck Hopelessness Scale (BHS)

The BHS is a 20 item self-report scale where hopelessness increases with the increasing total score [29]. The

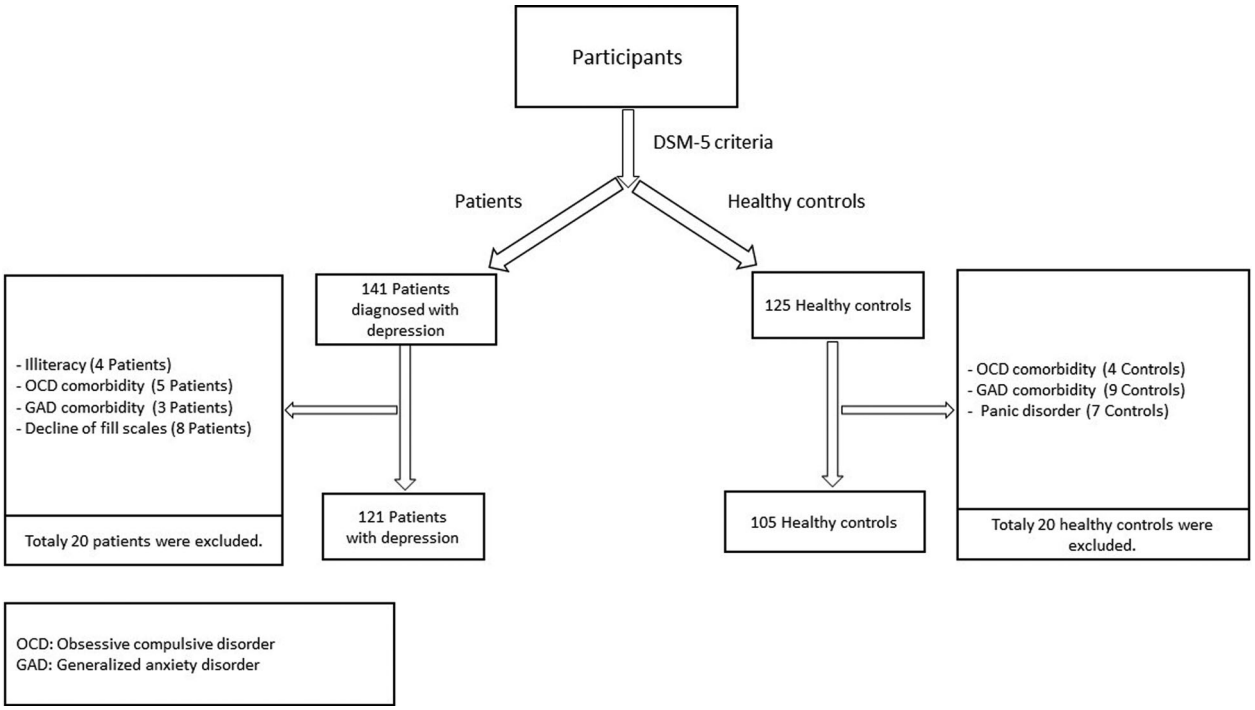


Figure 1. The flow-chart for enrolment of the participants.

Cronbach alpha value in the Turkish validity and reliability study was 0.86 [30].

Beck Suicidal Ideation Scale (BSIS)

The BSIS consists of five components where the total score indicates the severity of suicidal ideation [31]. The Cronbach alpha value in the Turkish validity and reliability study was 0.84 [32].

Statistical procedures

Confirmatory factor analysis was used to confirm the two-factor structure of the scale. Maximum likelihood method based on the asymptotic covariance matrix with a robust prediction method was used for confirmatory factor analysis because the assumption of normal distribution was not confirmed [33]. The model-data concordance was determined by the evaluation of the goodness of fit index (GFI), factor loading values, and error variances. The Cronbach alpha reliability coefficient was calculated. Multi-group confirmatory factor analyses were performed to demonstrate that TMPS-10 has the same meaning for both the depression patients and the controls. Before the multi-group confirmatory factor analysis, separate factor analyses were performed for both the patient and control groups to confirm the measurement model. With multi-group confirmatory factor analysis, mean matrices for the depressive patients and the control group were compared. Kolmogorov–Smirnov test was used in addition to skewness and kurtosis to assess whether the scale scores distributed normally. The correlations of TMPS-10 with the PS, BDI, BHS, and BSIS were evaluated to determine its convergent validity. Because the BSIS scores were not normally distributed, its relationship with other scales was evaluated with Spearman's rho correlation coefficient; Pearson's correlation was used for the relationships among other scale scores. Differences between the control group and the depression group regarding sex, marital status, medical disease history, and place of residence were tested with chi-square test; differences regarding mean age and years of education were tested by independent samples *t*-test. Discriminant Analysis was used to evaluate the discriminant validity of TMPS-10 scores. Difference between the TMPS-10 scores based on sex was evaluated with independent samples t-test. The statistical analyses were performed with Jamovi

Table 1. The TMPS-10 scores and the sociodemographic features of the participants.

		Depression	Control	Total group
TMPS10	Min.	10	32	10
	Max.	38	50	50
	$\bar{X}$	22.54	43.01	32.03
		Depression	Control	*p*
Gender, *n* (%)				
Female		88 (72.7)	71 (67.6)	0.489
Male		33 (27.3)	34 (32.4)	
Marital status, *n* (%)				
Single		59 (48.8)	63 (60.0)	0.119
Married		62 (51.2)	42 (40.0)	
Place of residence, *n* (%)				
Urban		88 (72.7)	82 (78.1)	0.437
Rural		33 (27.3)	23 (21.9)	
Medical history, *n* (%)				
Yes		27 (22.3)	21 (20.0)	0.794
No		94 (77.7)	84 (79.0)	
Age, (Mean ± SD)		35.21 ± 11.17	34.80 ± 6.73	0.737
Years of education, (Mean ± SD)		10.88 ± 2.89	10.28 ± 2.94	0.124

Table 2. Single and two-factor confirmatory factor analysis of TMPS-10.

								Factor loads		Error variances	
	χ^2	χ^2/df	*p*	CFI	GFI	NFI	RMSEA	Max.	Min.	Max.	Min.
Two factor	78.18	2.30	0.000	0.99	0.91	0.99	0.076	0.94	0.87	0.24	0.11
Single factor	77.89	2.23	0.000	0.99	0.91	0.99	0.074	0.94	0.87	0.24	0.11
Recommended value		χ^2/df ≤ 3		≥0.90	≥0.90	≥0.90	≤0.080	≥0.30		≤0.90	

CFI, comparative fit index; GFI, goodness of fit index; NFI, Normed Fit Index; RMSEA, root mean square error of approximation.

(Version 0.9.6.9), JASP Team (2018, Version 0.10.0), and LISREL 8.50 (Mooresville, Ind). The significance value for the statistical analyses (*p*-value) was set as 0.05. The *p*-values in the analysis are two-tailed.

Results

The TMPS-10 scores and the sociodemographic features of the participants are given in Table 1.

Mean total TMPS-10 score of the depressive patients who attempted suicide (17.76 ± 7.25) was statistically significantly lower than mean total TMPS-10 score of the depressive patients who did not attempt suicide (27.56 ± 6.20; $p < 0.001$).

Confirmatory factor analysis was used to demonstrate the two-factor structure of the Turkish version of TMPS-10. Table 2 demonstrates the GFI, factor loading (max–min), and error variance (max–min). In addition, the model obtained from the analysis is shown in Figure 2.

The χ^2/df value was less than 3, which indicated a very good fit between the model and the data. Comparative Fit Index (CFI) was 0.99; the GFI was 0.91, and the Normed Fit Index (NFI) was 0.959, which suggested a good fit between the model and the data. The Root Mean Square Error of Approximation (RMSEA) index for the model was 0.076, which also indicated a high level of goodness of fit. The general evaluation of the goodness of fit indexes suggested that the two-dimensional model fits well to the data. Factor loading values for the items in each dimension varied between 0.87 and 0.94. Since the factor loading values were above 0.30, indicating that each item served its purpose in the dimension it belonged. Figure 2 shows that the correlation between the two dimensions was 1.00. A high correlation value shows that the two-factor structure can be taken as a single factor in total. Therefore, the single-factor structure was tested by the confirmatory factor analysis.

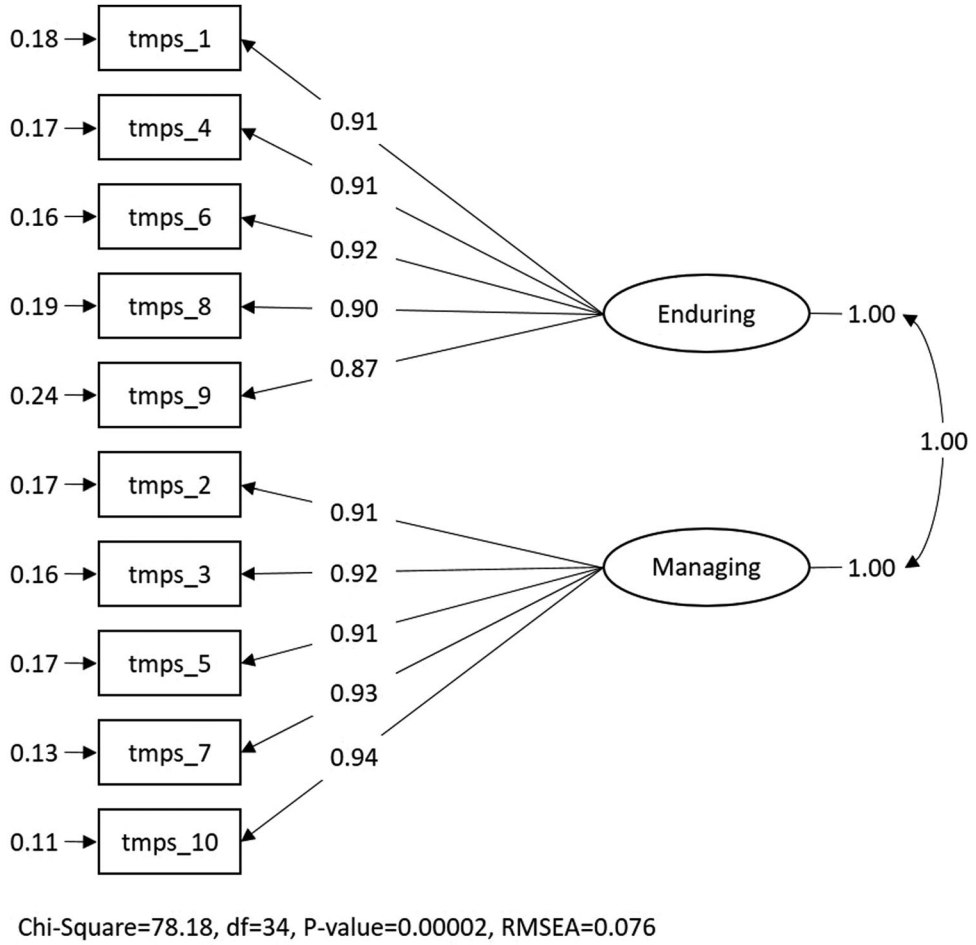


Figure 2. Two-factor structure of TMPS-10.

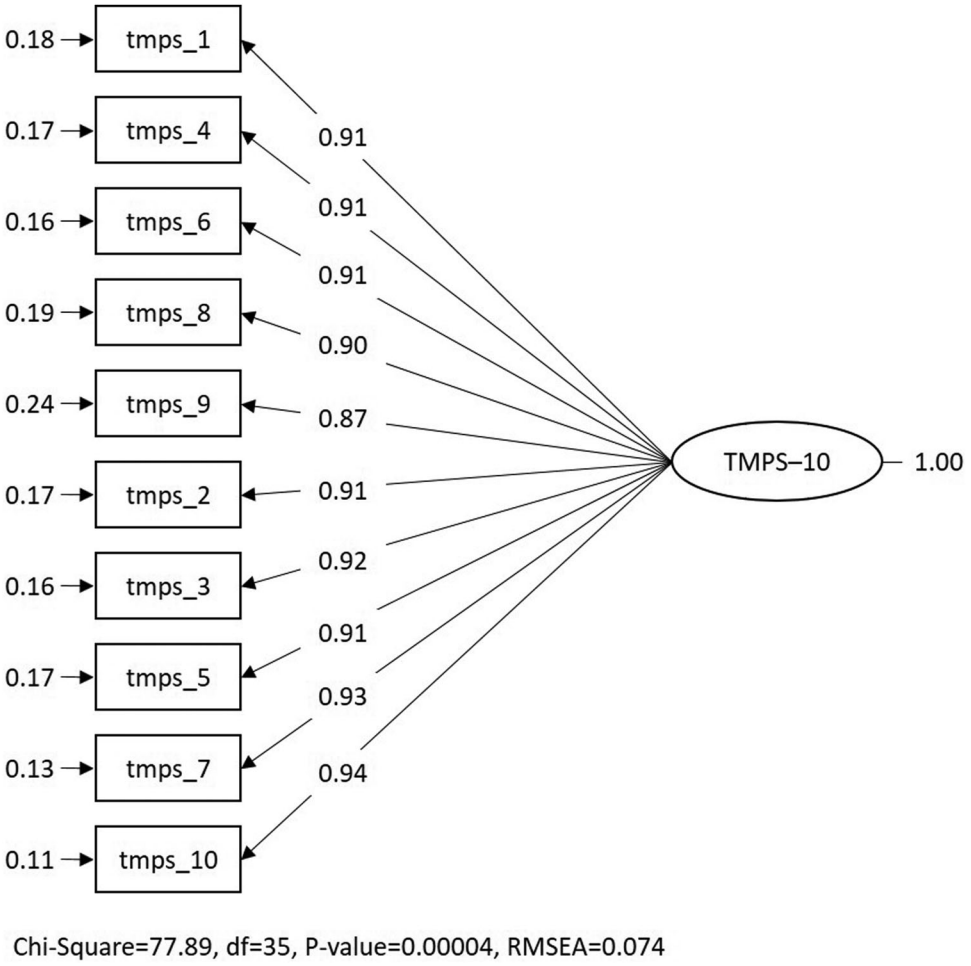


Figure 3. Single-factor structure of TMPS-10.

Results of the confirmatory factor analysis for the single-factor structure are demonstrated in Table 2. In addition, the model obtained from the analysis is shown in Figure 3. Evaluation of the goodness of fit values in Table 2 suggests that the single-factor structure of TMPS-10 fits well to the data. However, single factor model was not significantly better than two factor model, $\Delta\chi^2(1) = 0.29$, $p > 0.05$.

The item-total score correlations, Cronbach alpha coefficients, and factor loads for TMPS-10 are shown in Supplementary Table 1. In addition, Cronbach alpha values calculated for both dimensions ("Managing pain" and "Enduring pain"), and the total scale are given in Supplementary Table 13.

Cronbach alpha values above 0.70 for TMPS-10 subscale scores and total scores in Supplementary Table 1 suggests that the scale is reliable, and the internal consistency of the scale is very high. In addition, item-total score correlation varied between 0.862 and 0.932, and factor loads varied between 0.871 and 0.943, which indicate that the items in the scale have high validity and serve the purpose.

Multi-group confirmatory factor analysis was performed to evaluate the assessment equality of the TMPS-10 for the patient and the control groups. The model global fitness index values obtained by comparison are given in Table 3. The global fitness index was less than 3, indicating that the model fits very well to the data. The CFI was 0.97, Incremental Fit Index (IFI) was 0.97, and NFI was 0.95. Higher scores than 0.90 represent a good fit of the model to the data. The RMSEA index for this model was 0.111, which suggests that the model does not fit well to the data. General evaluation of fitness indexes suggests that each item in TMPS-10 suggest the same thing for the patient and the controls. In other words, it can be said that in Turkish version, the structure of TMPS-10 is the same in both depressive patients and healthy controls.

Table 3. Multi-group confirmatory factor analysis according to diagnosis for TMPS-10.

	χ^2	χ^2/df	χ^2	CFI	IFI	NFI	RMSEA
Scale	197.93	2.38	<0.001	0.97	0.97	0.95	0.111
Recommended value		χ^2/df ≤ 3		≥0.90	≥0.90	≥0.90	≤0.080

CFI, comparative fit index; GFI, goodness of fit index; NFI, Normed Fit Index; RMSEA, root mean square error of approximation.

Table 4. The results of the discriminant analysis according to the diagnostic group.

			Estimated group memberships		
			Depression	Control	Total
Observed group memberships	*n*	Depression	115	6	121
		Control	2	103	105
	%	Depression	95.0	5.0	100.0
		Control	1.9	98.1	100.0

Percentage of correct classification 96.5%.
Wilks' Lambda = 0.317 ($\chi^2_{(1)} = 255.376$; $p < 0.05$).

The correlation of TMPS-10 with the PS, BDI, BHS, and BSIS scores were evaluated to assess its convergent validity (Supplementary Table 2).

Table 4 shows that 115 (95%) of 121 patients in the depression group and 102 (98.1%) of the 104 subjects in the control group were classified correctly according to the TMPS-10 scores. In general, the percentage of correct classification was 96.5%. It can be concluded that depressive patients can be successfully differentiated from the control patients by TMPS-10 scores.

Discriminant analysis was used to determine classification correctness of TMPS-10 for the participants according to the presence of suicide attempts. The results are shown in Table 5, which demonstrates that 49 (79%) of the 62 participants with suicide attempts were classified correctly with TMPS-10 scores. 150 (91.5%) of the 164 individuals who did not have suicide attempts were classified correctly based on the TMPS-10 scores. In general, the rate of correct classification was 88.1%. In conclusion, TMPS-10 differentiates subjects with and without suicide attempt history.

We could not find a statistically significant relationship between TMPS-10 scores and age in the depression group and the whole group ($r = 0.104$ and $r = 0.075$, respectively). In the control group, there was a positive, moderate, and statistically significant relationship between TMPS-10 scores and age ($r = 0.362$ and $p < 0.001$). In conclusion, TMPS-10 scores increased with increasing age in the control group.

No significant differences were found between the TMPS-10 scores of genders in the depressive patients and the whole group ($p > 0.05$ for each), while the mean TMPS-10 score of the males was significantly higher than that of females ($p = 0.011$).

Table 5. The results of discriminant analysis according to the presence of suicide attempt.

			Estimated group memberships		
		Suicide	Yes	No	Total
Observed group memberships	*n*	Yes	49	13	62
		No	14	150	164
	%	Yes	79.0	21.0	100.0
		No	8.5	91.5	100.0

Percentage of correct classification 88.1%.
Wilks' Lambda = 0.494 ($\chi^2_{(1)} = 157.647$; $p < 0.05$).

Discussion

The main finding of this study is that the Turkish form of TMPS-10 is valid and reliable among depressive patients and healthy controls. In the study of original version, Meerwijk et al. [22] performed internal consistency analyses and found Cronbach alpha coefficient 0.91 for TMPS-10, 0.90 for "Managing the pain" subscale, and 0.84 for "Enduring the pain." In our study, the Cronbach alpha value for TMPS-10 total score was 0.98 and was 0.96 for both subscales. According to these results, the Turkish version of TMPS-10 has excellent internal consistency, and it is reliable [34].

Meerwijk et al. [22] obtained a two-factor solution for TMPS-10 and explained these factors as "Managing the pain" and "Enduring the pain." The main difference between these two factors is the coping strategies being active or passive. In our study, the two-factor model fits very good to the model. After finding a very strong correlation among the dimensions of the scale, the single-factor structure was evaluated, and it also had a very strong correlation with the model. The difference of the factor solutions between our study and Meerwijk et al. [22] can be explained by the nature of samples and the underlying psychopathology. According to these results, it is concluded that participants in our study developed both active and passive strategies to cope with mental pain. A very strong correlation was found between the two dimensions of the scale in our study notwithstanding a weak correlation in the study by Meerwijk et al. [22], supporting the hypothesis that different coping strategies may be used in different cultures [35].

Meerwijk et al. [22] evaluated the American population and Facebook users and found that the subjects with past suicide attempts took lower scores from both dimensions of the scale than the subjects without suicide attempts. Meerwijk et al. [22] evaluated participants diagnosed with a mental disorder and those who were not, and the participants did not give information about their disorders. We evaluated depressive patients who were admitted to a university hospital, and healthy controls. Discriminant analysis indicated that the scale discriminated successfully between those who attempted and did not attempt suicide and between the patient and control groups. We also demonstrated that TMPS-10 has the same meaning for the depressive patients and the healthy controls. Our results suggest that TMPS-10 can be used in studies that involve both healthy population and depressive patients.

Meerwijk et al. [22] compared TMPS-10 total scores with respect to gender and did not find a significant difference. In our study, no difference could be detected between genders in the depressive group, while males

had higher TMPS-10 scores in the control group. Lower TMPS-10 scores in females in the healthy population may be explained by the fact that women may use different strategies while coping with psychache like in physical pain and they have lower pain thresholds [36,37].

Meerwijk et al. [22] detected a weak and negligible relationship between age and mental pain, and they interpreted this finding as increasing confidence that the subject can cope with mental pain with increasing age. We found no significant relationship between TMPS-10 scores and age in patient group, but there was a positive, moderate, linear, and statistically significant relationship in the control group. These results suggest that tolerance for mental pain and psychological resilience increase with getting older in healthy individuals as Gooding et al. [38] stated.

According to Beck's hopelessness theory [39], the common theme behind the suicidal thoughts among the depressive patients is hopelessness. Klonsky and May [40] emphasize the importance of the comorbidity of unbearable mental pain and hopelessness in the development of suicidal thought in "Three-Step Theory of Suicide." Becker et al. [41] detected a negative relationship between tolerance to psychological pain and the severity of psychological pain, perceived stress level, depression, hopelessness, and suicidal thoughts and attempts in the adolescent group. In our study, strong, significant, and negative correlations were detected between TMPS-10 total score and PS, BDI, BHS, and BSIS total scores. According to these results, it can be concluded that convergent validity of TMPS-10 is high and the tolerance to mental pain decreases and risk of suicide increases when suicidal thoughts are severe, hopelessness is high, depressive symptoms are severe, and mental pain is severe.

Our study has several limitations. We grouped depressive patients as those with or without previous suicide attempts. The timing and severity of the suicide attempts were not evaluated. Therefore, an evaluation of the severity of suicide and recent versus remote suicide attempts could not be made. Selection of the participants from the patients who admitted to a university hospital may limit the generalization of the data we have obtained. Lack of a pilot study of the Turkish translation of TMPS-10 as well as not using a structured suicidality scale (i.e. Columbia Suicide Severity Screening Scale) may be considered as other limitations.

The strengths of the study include the demonstration that the scale fits both to the multiple and single-factor models, the scale differentiates the healthy and control groups and those who did or did not attempt suicide and the demonstration of convergent validity not only with PS but also with BDI, BSIS, and BHS.

In conclusion, inability to decrease suicide rates despite advanced treatment options suggests that this topic warrants further study. Shneidman [16] suggested that the inability to tolerate psychache is a significant risk factor for suicide. TMPS-10 is a reliable scale which can be filled by all healthcare workers in a short time. To the best of our knowledge, this is the first adaptation study of TMPS-10 in a language other than English. Our results suggest that the Turkish form of this scale can be used both in the depressive patients and the healthy controls in suicide studies. Therefore, studies in different diagnoses, cultures, and languages in which coping strategies are also evaluated are needed to prevent suicide and to determine therapeutic approaches that might be used.

Author contributions

Finding the subject: LT, MED; Literature review: MED, LT, ZN; Conducting research: MED, LT, ZN, OED; Applying scales: MED; Statistical Analysis: LT, MED; Writing the manuscript: MED, LT, ZN, OED; Review the manuscript: LT, MED, ZN, OED. All authors have seen and approved the final version of the manuscript.

Disclosure statement

No potential conflict of interest was reported by the authors.

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