ORIGINAL ARTICLE

Observational Study

Psychological impact of cancer scale: Turkish validity and reliability study

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Abstract

BACKGROUND

In the diagnosis and treatment of cancer, it is important to evaluate the components of psychological adjustment. Considering the key role of nurses in providing care to patients, it is important to evaluate patients, to determine high-risk patients and to use tools with acceptable validity and reliability to develop care plans.

AIM

To analyze the Turkish validity and reliability of The Psychological Impact of Cancer Scale (PICS).

METHODS

This methodological study was conducted with 257 cancer patients admitted to the oncology-haematology clinic and outpatient clinic of a University Hospital between February and October 2021. After the translation process of the scale, content and construct validity were conducted. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) was examined with construct validity, while item analyses and internal consistency analysis were conducted for reliability.

RESULTS

Analyses and assessment results showed that the content validity index of the scale was 0.96. In the exploratory factor analysis of the Turkish adaptation study, total variance rate explained was found as 84.98%. Factor loads of all items were between 0.82 and 0.94. It was found that Cronbach Alpha values were between

0.860 and 0.930 and total scale Cronbach Alpha value was 0.844. EFA and CFA showed that Turkish form of 12-item and 4-factor. The Psychological Impact of Cancer Scale was confirmed with no changes to the original scale. CFA revealed good fit indices.

CONCLUSION
Turkish PICS is a valid and reliable measurement tool for the evaluation of individual's psychological response to cancer diagnosis and treatment and for being used in clinical practice.

Key Words: Cancer; Patient; Psychological impact; Reliability; Validity

Core Tip: In the diagnosis and treatment of cancer, it is important to evaluate the components of psychological adjustment. Considering the key role of nurses in providing care to patients, it is important to evaluate patients, to determine high-risk patients and to use tools with acceptable validity and reliability to develop care plans. A valid and reliable intercultural adaptation of Turkish the Psychological Impact of Cancer Scale can be useful in making comparisons across settings and to be used in the psychological assessment of cancer in Turkish patients. Therefore, the aim of this study is to conduct validity and reliability of Turkish version of the scale. In this research, it was seen that the Turkish version of the 12-item and 4 sub-dimensional Cancer Psychological Impact Scale was confirmed without any change in the original scale form.

INTRODUCTION

Cancer is the second leading cause of death globally and it was evaluated as the cause of one in six deaths in 2020[1]. Cancer continues to grow globally by causing a huge physical, emotional and financial burden on individuals, families, societies and health systems. Survival rates in many cancer types continue to increase with early diagnosis, good treatment and quality care[1,2]. Cancer patients develop emotional, psychological and behavioural reactions before diagnosis, during diagnosis, during treatment, after treatment, during disease progression and during terminal /palliative periods. Due to the unexpected and difficult to control nature of cancer, it is known that the diagnosis and treatment process is disturbing and traumatic for the individual[3]. With this aspect, cancer, which can be associated with metaphors such as "war", "the angel of death", "winter" and "monster' by patients, may cause radical changes in the lives of individuals[4]. During the treatment phase, treatment methods such as examinations and surgery, chemotherapy and radiotherapy come to the fore according to the type of cancer[5]. It may cause a decrease in the quality of life during the treatment phase by disrupting many issues such as social life, activity, work life, sexual life, *etc*.[6-8]. These changes related to the process and treatment of cancer represent an important stress factor for any patient and create both physical and psychological threats to the patient[9,10]. Compared with the general population, studies have shown patients with malignancies to have higher rates of distress, anxiety and depression[11,12].

"The Psychological Impact of Cancer Scale (PICS)" which was developed by Hulbert-Williams *et al* [13] in 2019 for the evaluation of the components of psychological adjustment to cancer diagnosis and treatment is one of the measurement instruments with high validity and reliability. It is an easily applicable 12-item scale with which the psychological impact of cancer on patients can be evaluated [13]. Considering the key role of nurses in providing care to patients, it is important to use tools with acceptable validity and reliability to evaluate patients, to determine patients with high risk and to develop care plans[8]. A valid and reliable intercultural adaptation of Turkish the Psychological Impact of Cancer Scale can be useful in making comparisons across settings and to be used in the psychological assessment of cancer in Turkish patients. At the same time, the scale can be easily applied to cancer patients since it has a small number of items. The scale is expected to be useful in terms of evaluating the psychological impact of cancer on Turkish patients and will make it easier to decide whether patients need psychological support. For this purpose, the aim of the study is to conduct validity and reliability of Turkish version of the scale.

MATERIALS AND METHODS

Study design and sample

This methodological study was carried out at Oncology-Haematology clinic and outpatient clinic of a University between February and October 2021. Population of the study consisted of cancer patients receiving treatment between these dates. The sample included 257 volunteering patients who met the research criteria (having been diagnosed with cancer at least for 3 mo, being older than 18 years of age, not having any psychiatric problems and being able to communicate sufficiently) between the aforementioned dates. In scale adaptation studies, at least 5 individuals for each item should be reached for factor analysis. If it is not a problem to reach the sample, 10 individuals for each item should be reached. The Psychological Impact of Cancer Scale consists of a total of 12 items. Aiming to reach at least 10 cancer patients for each item, the study was completed with 257 patients[14].

Outcome Measurements

Personal Information Form: This form prepared by the researchers includes 9 questions to find out patients' socio-demographic and disease-related characteristics (age, gender, marital status, educational status, employment status, duration of disease, stage of disease, presence of another chronic disease and type of treatment).

PICS: It was developed by Hulbert-Williams *et al*[13] in 2019 to evaluate the psychological impact of the disease in cancer patients. 12-item PICS is used to evaluate the components of psychological compliance with cancer diagnosis and treatment. Each item is answered with "Totally suitable (1)", "Not suitable (2)", "Suitable (3)", "Totally suitable (4)". The scale is a 4-likert type scale. It consists of 4 factors: Cognitive distress (2, 6, 7); Cognitive avoidance (8, 10, 11); Emotional Distress (3, 5, 12); Spiritual Coping (1, 4, 9). Factor scores are calculated by adding the scores obtained from items in each scale. There are no reversely coded items[13].

Data Assessment: Study data were analysed with IBM SPSS (Statistical Package for Social Sciences) 22 and Scientific Software International, Inc. LISREL 8.8. In data analysis, number and percentage were used for evaluation of personal information. Content and construct validity were analysed with expert views, Barlett Tests, Kaiser-Meyer-Olkin Index (KMO), exploratory factor analysis (EFA), confirmatory factor analysis (CFA) and principle components analysis. In terms of reliability, internal consistency was determined with Cronbach's a coefficient, Pearson correlation analysis, item-total score correlation, composite reliability coefficient (CR) and average variance explained (AVE).

Ethical Considerations: Fırat University Non-Interventional Research Ethics Committee (2020/12 numbered) approved the study. Official permission was taken through e-mail from the researcher who developed the scale for adapting the scale into Turkish and using the scale in the study. Helsinki Declaration of Human Rights was adhered to while carrying out the study. Verbal consent was taken from study participants after the aim of the study was explained.

Stages in the adaptation of the scale to Turkish: Official permission was first obtained from the author *via* e-mail to adapt and use PICS in Turkish. Adaptation phase of the scale was carried out in five steps. Language validity was carried out in the first step; two linguists translated the scale into Turkish independently. Translation was followed with a form including the expressions in scale items, which was examined by two Turkish language experts. These experts examined whether scale items were suitable, checked Turkish language validity and cultural appropriateness and made corrections. Following the corrections, scale items were collected in a single form and they were back translated into the original language by a language expert[14]. Turkish form was found to be similar to the English form after the original scale and the translated form were compared.

In the second step, content validity was performed to prove both language and cultural equivalence and content validity of items with numerical values[15]. Content Validity Index (CVI) of the items was calculated with percentage of agreement between the opinions of at least 3 and at most 20 experts[16]. A pilot study was conducted in the third step. In scale adaptation studies, with the pilot study, a sample of about 30 should be reached, the scale should have an internal consistency value of ≥ 0.70 and it should be checked whether item total correlation is lower than 0.30[15]. In the present study, the pilot study was conducted with 30 cancer patients. With the pilot study, it was determined that the questions were understandable. The data of the pilot study were not included in study data. After the pilot study, the study was initiated without making any corrections in the light of this information. In the fourth step, EFA and CFA were conducted for construct validity[14,17]. Acceptable range of CFA goodness of fit values were found as $5 > \chi^2/df < 2$, RMSEA < 0.08, RMR < 0.08, SMR < 0.08, NFI > 0.80, CFI > 0.90, IFI > 0.90, GFI > 0.90, AGFI > 0.85, PGFI > 0.50, and PNFI > 0.50[14,18-20]. In the fifth step, to determine the reliability of the scale, test-retest reliability with an interval of two weeks in data collection stage, Cronbach alpha reliability coefficient Pearson Correlation analysis, item-total score correlation, composite reliability coefficient and mean explained variance were used[21-24].

RESULTS

Mean age of the patients was found as 59.32 ± 12.89 in the study. It was found that 51.4% of the patients were female, 53.7% were primary education graduates, 91.1% were married, 47.9% had a disease duration between 1-5 years, 40.5% were in stage 2, 86.4% were not employed, 67.3% were receiving only chemotherapy and 65.8% did not have another chronic disease.

Results on validity

Exploratory factor analysis: KMO value was 0.799 and χ^2 value was calculated as 2310.444 as a result of Barlett's Test of Sphericity analysis in the study. Test results were found to be significant at $P = 0.000$ Level of significance (Table 1). The sample size was found to be adequate and suitable for factor analysis and this showed that the analysis could be continued[14,20].

In the exploratory factor analysis, it was found that the scale explained 84.98% of total variance (Table 2). Due to the number of factors in the EFA, Varimax factor rotation method was applied and the scale items were checked in terms of items with cross-loading. The factors with an eigenvalue of > 1 were evaluated while determining the factors. It was found that the scale items were grouped under 4 factors with factor load values found as > 0.30 (0.82-0.94). Varimax rotation method results showed that. It was found that there were no items that had to be deleted from the scale[14,25]. The values obtained showed that the scale consisted of 12 items and 4 factors.

CFA: In Table 3, CFA fit index values were found as: χ^2 = 116.49, df = 47 ($P < 0.05$), χ^2/df = 2.47, RMSEA = 0.076, CFI = 0.97, NFI = 0.95, IFI = 0.97, RMR = 0.034, SRMR = 0.059, GFI = 0.92, AGFI= 0.88, PGFI= 0.56 and PNFI = 0.68. It was found that model fit was acceptable and some values showed perfect fit[14, 18-20]. Figure 1 shows PATH diagram obtained with CFA.

In the study, it was found as a result of EFA and CFA that Turkish form of 12-item and 4-factor "PICS'' was confirmed without any changes to the original scale form. All these results obtained show that the scale has high validity in Turkish culture.

Results regarding reliability

For reliability analysis, the data were reapplied two weeks later to 50 individuals from the sample on whom EFA was conducted. Test retest correlation coefficient was found as 0.923 for the whole scale, as .0951 for "Cognitive avoidance (F1)" factor, as 0.992 for "Cognitive distress (F2)" factor, as 0.904 for "Spiritual coping (F3)" factor and as 0.993 for "Emotional distress (F4)" factor (Table 4).

Cronbach Alpha coefficient was calculated to find out the internal reliability of the scale. It was found as 0.930 for "Cognitive avoidance" factor, as 0.0914 for "Cognitive distress" factor, as 0.899 for "Spiritual coping" factor and as 0.860 for "Emotional distress" factor. Total Cronbach Alpha coefficient was found as 0.844 (Table 4).

In this study, AVE value was found as 0.89 and CR value was 0.96 for cognitive avoidance factor; AVE value was 0.78 and CR value was 0.91 for cognitive distress factor; AVE value was 0.77 and CR value was 0.91 for spiritual coping factor, and AVE value was found as 0.67 and CR value was found as 0.86 for emotional distress factor. As a result, it was found that all CR values were higher than AVE values and AVE values were found to be higher than 0.50, which is the critical value (Table 4). When the item-total correlation coefficients of the scale were examined, it was found that all item total correlation coefficients were higher than 0.30 (0.41-0.63) (Table 2).

DISCUSSION

Content validity

Opinions of 5 experts were taken for content validity. CVI was used to evaluate expert opinions. The fact that CVI value was > 0.80 shows that there is agreement between expert opinions[26,27]. In the evaluation after expert opinions, CVI value was calculated as 0.96 in this study. This result shows that there is agreement among experts and the scale measures the subject sufficiently and content validity is met.

Construct validity

KMO and Bartlett's Sphericity test evaluated the appropriateness and sufficiency of the data for factor analysis. It is stated in literature that Bartlett's Sphericity test should be statistically significant and KMO value should be at least 0.60 for factor analysis[28]. In this study, Bartlett's Sphericity test value is 2310.444 and it is statistically significant ($P = 0.000$). KMO value was calculated as 0.799. These results show that data base and sample size are suitable for factor analysis[28]. The data base and sample size in this study are similar to those of Hulbert-Williams *et al*[13] who developed the original scale.

In order to determine the number of factors, eigenvalue was taken as ≥ 1 and it was found that the scale consisted of four factors (cognitive distress, cognitive avoidance, emotional distress, spiritual coping)[29,30]. The original scale also consists of four factors[13]. In the exploratory factor analysis, it

Table 1 Results of the Kaiser–Meyer–Olkin measure of sampling adequacy and Bartlett's test of Sphericity

Tests		Test results	
KMO		0.799	
Bartlett Sphericity Test	χ^2	2310.44	$P < 0.001$
	SD	66	
	P value	0	

Table 2 Exploratory factor analysis results of Psychological Impact of Cancer Scale

Scale items	Communality	Corrected item-total correlations	Cronbach's alpha if item deleted	Factor load values			
				F1	F2	F3	F4
Item 8	0.909	0.411	0.839	0.943			
Item 10	0.894	0.492	0.834	0.917			
Item 11	0.848	0.454	0.837	0.888			
Item 2	0.887	0.511	0.7		0.833		
Item 6	0.87	0.538	0.7		0.83		
Item 7	0.879	0.556	0.7		0.829		
Item 1	0.887	0.46	0.68			0.837	
Item 4	0.836	0.635	0.67			0.827	
Item 9	0.882	0.536	0.5			0.831	
Item 3	0.798	0.543	0.67				0.83
Item 5	0.764	0.51	0.66				0.833
Item 12	0.812	0.54	0.66				0.831
Eigenvalue	-	-	-	2.686	2.587	2.52	2.406
Total explained variance (%) = 84.98%	-	-	-	22.382	21.555	21.001	20.051

was found that the 4-factor scale explained 84.98% of the total variance. In multi-factor scales, explained variance is desired to be over 40% and the higher total variance, the stronger the construct validity is[29, 30]. In this study, high explained variance shows that construct validity is robust. It was decided in which factors the scale factors would be included by examining the factor loads. Factor load should be ≥ 0.30[25]. In this study, it was found that the factor loads of the items in the scale were between 0.82 and 0.94 and factor loads were very high. In this study, the fact that factor loads obtained from each scale were > 0.30 shows that the scale has a robust factor structure.

It is reported in literature that CFA should examine the construct revealed with exploratory factor analysis[31]. In this study, it was found with EFA that the scale has 4 factors, as in the original scale. For 4-factor CFA, factor loads of all factors were > 0.30 and goodness of fit indices were (GFI, NFI, CFI and IFI) > 0.90, RMSEA = 0.076. χ^2 value divided by degree of freedom was $\chi^2/df = 2.47$. A robust and significant correlation was found between the scale and factors. In literature, a model fit indicator of > 0.90, $\chi^2/df < 5$ and a RMSEA value of < 0.08 are considered as good fit indicators[14,18-20]. CFA results of the present study are in parallel with the criteria reported in literature. In their study, Hulbert-Williams *et al*[13] calculated RMESA value as 0.083. CFA results show that the data are consistent with the model, the four factor construct is confirmed, factors are associated with the scale and the items in each factor define their own factor sufficiently. In this study, EFA and CFA results supported construct validity and showed that the scale is a valid tool.

Reliability analysis

Cronbach's alpha coefficient shows whether the scale items measure the same characteristics and whether the items are correlated with the subject to be measured. Cronbach's alpha value is expected to be as close to 1 as possible. Cronbach's alpha coefficients between 0.60 and 0.80 show that the scale is reliable, while those between 0.80 and 1.00 show that the scale is highly reliable[23,29,32]. In this study, both total and factor α values of the scale are > 0.90. These results show that PICS Turkish version is a reliable measurement tool in evaluating the psychological reactions of patients towards cancer. Hulbert-

Table 3 Confirmatory factor analysis results

Fit criteria	Found	Appropriate	Acceptable	Result
χ^2/df	2.47	< 2	< 5	Perfect fit
RMSEA	0.076	< 0.05	< 0.08	Acceptable fit
CFI	0.97	> 0.95	> 0.90	Perfect fit
NFI	0.95	> 0.95	> 0.80	Acceptable fit
IFI	0.97	> 0.95	> 0.90	Perfect fit
RMR	0.034	< 0.05	< 0.08	Perfect fit
SRMR	0.059	< 0.05	< 0.08	Acceptable fit
GFI	0.92	> 0.95	> 0.90	Acceptable fit
AGFI	0.88	> 0.95	> 0.85	Acceptable fit
PGFI	0.56	> 0.89	> 0.50	Acceptable fit
PNFI	0.68	> 0.89	> 0.50	Acceptable fit

CFI: Comparative fit index; RMSEA: Root mean square error of approximation; RMR: Root mean square residual; NFI: Normed fit index; IFI: Incremental fit index; SRMR: Standardized root mean square residual; GFI: Goodness of fit index; AGFI: Adjusted goodness of fit index; PGFI: Parsimony goodness of fit index; PNFI: Parsimony normed fit index.

Table 4 Correlations between factors, mean scores and reliability results

Factors	α	AVE	CR	mean ± SD	Test-retest (*r*)
F1	0.93	0.89	0.96	2.57 ± 0.66	0.951
F2	0.914	0.78	0.91	2.32 ± 0.85	0.992
F3	0.899	0.77	0.91	2.69 ± 0.71	0.904
F4	0.86	0.67	0.86	2.66 ± 0.80	0.993
PICS total	0.844	-	-	2.56 ± 0.50	0.923

α: Cronbach Alpha Coefficient; *r*: Correlation; AVE: Average variance extracted; CR: Construct Reliability; PICS: Psychological Impact of Cancer Scale.

Williams *et al*[13] found the total Cronbach alpha of the scale as > 0,62. In this study, AVE value was 0.89 and CR value was 0.96 for cognitive avoidance factor; AVE value was 0.78 and CR value was 0.91 for cognitive distress factor; AVE value was 0.77 and CR value was 0.91 for spiritual coping factor, and AVE value was 0.67 and CR value was 0.86 for emotional distress factor. The fact that AVE value is > 0.50 and CR value is > 0.80 shows that the scale has good reliability[33]. In addition, values of CR > AVE; AVE > 0.5 are required for convergent validity[24]. As a result, it was found that all CR values were found to be higher than AVE values and AVE values were > 0.50, which is the critical value.

Item-total score analysis is recommended to prove whether the items in the scale measure the variable to be measured. Item-total score analysis explains the correlation between the scores obtained from each item of a scale[34]. In item-total score analysis, it is expected of the correlation to be positive and the correlation value to be > 0.20. When item-total correlation coefficients were examined in the present study, all item total correlation coefficients were found to be > 0.30 (0.41-0.63). Item-total correlation coefficients of the original scale were between 0.33 and 0.73. These results show that the item-total correlation coefficients in the present study are similar to the original scale and item reliabilities are high.

One of the best ways to measure consistency of scales is test retest method[29,35]. No statistically significant difference was found between the two measurements obtained as a result of test-retest analysis (*P* > 0.01). Test-reliability coefficients of the scale items were found to be statistically significant in the evaluation of the correlation between first and second application scores of each item (*P* = 0.000).

Practical implications

The fact that the number of items is low will make implementation and evaluation stages easier. The scale can be easily administered to cancer patients. It is thought that using this scale will be beneficial in terms of evaluating the psychological impact of cancer on Turkish patients and will facilitate deciding
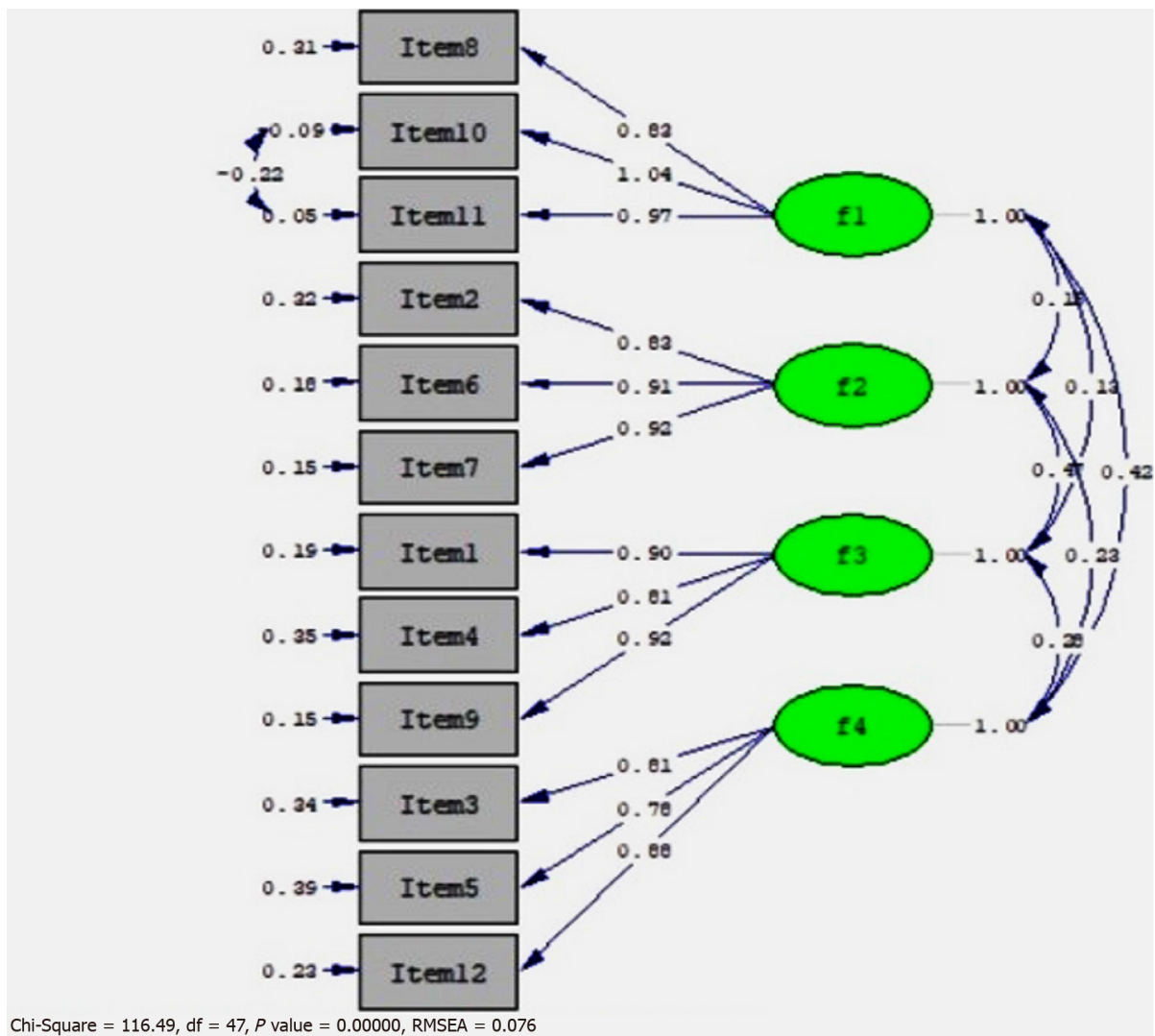
Chi-Square = 116.49, df = 47, *P* value = 0.00000, RMSEA = 0.076

Figure 1 Path diagram regarding the factor structure of the scale.

on whether patients require psychological support.

CONCLUSION

The present study shows that The Psychological Impact of Cancer Scale is a valid and reliable measurement tool in evaluating the psychological impact of cancer for Turkey sample. The scale can present new research opportunities for researchers who want to work in the field. In terms of researchers, it can be said that the scale is practical and economical since the number of items is low and the expressions are short in the scale.

ARTICLE HIGHLIGHTS

Research background
Cancer patients develop emotional, psychological and behavioural reactions before diagnosis, during diagnosis, during treatment, after treatment, during disease progression and during terminal /palliative periods.

Research motivation
Turkish scale adaptation.

Research objectives
To analyze the Turkish adaptation of The Psychological Impact of Cancer Scale (PICS).

Research methods
This methodological study was conducted with 257 cancer patients.

Research results
Cronbach Alpha value was 0.844. Exploratory factor analysis and Confirmatory factor analysis showed that Turkish form of 12-item and 4-factor.

Research conclusions
PICS Turkish version has acceptable validity. PICS is homogeneous and consistent for Turkish society. Healthcare professionals can use PICS.

Research perspectives
The use of the scale will be useful in evaluating the psychological impact of cancer on Turkish patients.

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FOOTNOTES

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