

Validity and reliability of the Turkish version of the Fear of Cancer Scale

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Abstract

This study assessed the validity and reliability of the Turkish version of the Fear of Cancer Scale (FOCS) among 285 state university students from December 2022 to February 2023. The validity analysis included language, content, and structural assessments, with structural validity examined through exploratory and confirmatory factor analyses. Reliability was evaluated using item-total correlation, Cronbach's Alpha, and split-half analysis. Results confirmed that the Turkish version maintained the original factor structure, with a two-dimensional model explaining 52.73% of the variance. Factor loadings ranged from 0.455 to 0.757, and confirmatory factor analysis indicated acceptable model fit. The scale showed excellent internal consistency, with an overall Cronbach's Alpha of 0.920, and sub-dimension values of 0.870 for direct fear and 0.861 for indirect fear. These findings confirm the Turkish version of FOCS as a valid and reliable instrument for measuring cancer fear in non-oncological individuals.

Keywords

adaptation, cancer, fear, psychometrics, reliability, validity

Introduction

Cancer is a major global health issue that ranks among the top causes of death and greatly impacts lives. Although cancer is a preventable and curable disease in its early stages, cancer cases and death numbers are nevertheless on the rise. Global cancer statistics indicate that 1 in 5 people may develop cancer, with men having a 1 in 9 chance of dying from cancer and women having a 1 in 12 chance of dying from it (WHO, 2024). It is known from the Global Cancer Observatory (GLOBOCAN) data of 2020 that around 19.3 and 9.9 million new cancer patients and deaths occurred globally (Sung et al., 2024). By 2040, there will be an estimated 29.9 million cancer cases, resulting in 15.3 million deaths (IARC, 2024). These

alarming numbers clearly show that cancer is a major health threat to individuals as well as the general public.

Despite advancements in medical science, cancer remains a disease associated with death, suffering and unpredictability. The idea that cancer is one of the world's most serious diseases and relates to suffering and death is something that has become a societal norm in our

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daily lives (Whitaker et al., 2015). Confronting a deadly disease such as cancer has a profound impact that everyone connected to the patient feels, be it the patient or the patient's family (Haun et al., 2014; Öz, 2015). Many individuals feel anxiety and terror when they get the diagnosis of cancer or when they develop cancer symptoms. Routine screenings, worrying about people undergoing cancer treatments, family history of cancer and repeated medical treatments for suspected cancer diagnosis are all factors that contribute to the fear of cancer (Sherif et al., 2001). The fact that this disease is serious, the unpredictability of the treatment process, and the possibility of changes in quality of life in general give rise to a much greater fear of cancer. This fear that cancer patients feel may generate various psychological disorders including disruptions of their thinking, feelings and behavior and as a consequence lower the quality of their life (Vrinten et al., 2016). Furthermore, some patients may also experience fear of cancer without any physical signs of the disease, and any family history of cancer. Thus, it can be said that fears about cancer deeply affect the general health perception of society.

Identifying, measuring and effectively managing fears about cancer is crucial to improving patients' quality of life. Studies on cancer fear among individuals with a history of cancer, and these studies play a crucial role in understanding the psychological and emotional experiences of patients. However, recognizing that cancer fear is not limited to individuals diagnosed with cancer and can pertain to any type of cancer is crucial for shaping health policies and services more effectively. Researching cancer fear in healthy individuals can help healthcare providers better anticipate health-related concerns. Additionally, such research can contribute to the more effective design of cancer prevention and early detection programs and to better inform the community in the fight against cancer. Although there are scales in the literature such as Champion's Breast Cancer Fear Scale (CBCFS), Colorectal Cancer Fear Scale

(CRCFS), and Cancer Worry Scale (CWS) which were developed to measure fear of cancer and have good reliability, unfortunately, these scales can only be applied to a single target cancer type (Champion et al., 2004; Leung et al., 2014; Uner and Korukcu, 2020). Therefore, this study aimed to evaluate the Turkish validity and reliability of the Fear of Cancer Scale (FOCS) developed by Feng et al. (2022) to measure the fear of cancer in healthy individuals.

The Turkish validity and reliability evaluation of the Fear of Cancer Scale (FOCS) will provide healthcare professionals in Turkey with the opportunity to assess cancer fear more comprehensively and accurately. By precisely measuring cancer fear, researchers will be able to explore the connections between psychological distress and physical health outcomes more effectively, thereby contributing to a holistic understanding of health and disease. This will furnish essential information for designing more effective health policies and preventive strategies. The use of the FOCS in both research and clinical practice is expected to play a significant role in improving overall mental health outcomes and quality of life for individuals. Consequently, this study represents an important step toward better understanding cancer-related concerns and enhancing quality of life.

Methods

Study design and settings

This study was planned with a descriptive and methodological design. The study aimed to adapt the FOCS developed by Feng et al. (2022) into Turkish and to determine its validity and reliability. The study was conducted with students studying at a state university in Turkey between December 2022 and February 2023. Research questions to be answered in the study;

- (a) Is the FOCS a valid measurement tool in the Turkish population?

- (b) Is the FOCS a reliable measurement tool in the Turkish population?

Study sample

The population of the study consisted of students studying at a vocational college of a state university in Turkey. The reason for conducting the study with students is that they form a homogeneous sample due to their similar age group, educational level, and social environment, and this homogeneity helps to better control the effects of variables. There is no specific guideline for sample size calculations in factor analysis (Abu-Alhaija et al., 2023). Therefore, the sample size was determined according to the ideal sample size recommended for scale validity and reliability studies. In the literature, it is stated that the sample size should be at least 5–10 times the number of scale items or should not fall below 100 (Gorsuch, 2015). Considering that the FOCS consists of 17 items, it was aimed to reach 170 participants using the convenience sampling method for this study. In addition, the Kaiser-Meyer-Olkin (KMO) test of sample adequacy and Bartlett's test of sphericity were calculated to determine whether the sample size was suitable for factor analysis (Field, 2017). Thus, a total of 285 students were included in the study, 30 in the pre-application, 85 in the pilot study and 170 in the main study.

Inclusion and exclusion criteria

Inclusion criteria included being at least 18 years old, being a student at a vocational college of health services, being a healthy individual without a history of cancer and volunteering to participate in the study. Individuals who incompletely completed the data forms, withdrew from the study and did not meet the inclusion criteria were not included in the study.

Data collection procedure

The data collection phase of the study took place between December 2022 and February

2023. The data collection process was carried out by distributing data forms to the students through online platforms. The process of distributing these forms took place simultaneously with the face-to-face interactions between the researchers and the students in the classroom. Before distributing the data forms, the researchers conducted an information session with the participating students explaining the research endeavor's objectives, methodology and ethical considerations. Students completed the data forms after reading the participant information statement and giving their informed consent. Each student allocated approximately 10 minutes to complete the form.

Data collection tool

FOCS was used as the data collection tool in the study. FOCS is a scale developed by Feng et al. (2022) to measure the fear of cancer, consisting of two sub-dimensions (direct fear and indirect fear) and 17 items. Scale responses are scored on a five-point Likert scale ranging from 0 (strongly disagree) to 4 (strongly agree). The minimum score that can be obtained from the scale is 0 and the maximum score is 68. The higher the score obtained from the scale, the higher the individual's level of fear toward cancer. The Cronbach alpha coefficient of the direct fear sub-dimension of the original scale is 0.902, the Cronbach alpha coefficient of the indirect fear sub-dimension is 0.877 and the total Cronbach alpha coefficient of the scale is 0.916.

Statistical data analysis

The data obtained in the study were analyzed using Statistical Product and Service Solutions (SPSS) version 25 and Analysis of a Moment Structures (AMOS) version 21 software. Initially, the data were evaluated for missing values, outliers and normality. The normality of the data was checked utilizing histogram plots and z-scores of skewness and kurtosis values

(Kim, 2013). Descriptive findings are presented as numbers, percentages, means and standard deviations. The significance level of the analyses was set at 0.05.

Pre-application and pilot study

For the pre-application, a group of 30 students were asked for their opinions on the readability and comprehensibility of the items. After the pre-application, the comprehensibility of each item was examined and no changes were made since all items were reported to be readable and comprehensible. Then, 85 students were included in the pilot study. Those included in the pre-application and pilot study shared the same characteristics as the intended participants of the study but were not included in the main study. The reliability analysis conducted after the pilot study showed that the overall alpha value of the scale was 0.867. Once the instrument was found to be reliable, the main study was conducted.

Validity and reliability analysis

The psychometric properties of the scale were tested based on the assumptions of classical measurement theory (DeVellis and Thorpe, 2021). WHO Guidelines on translation and adaptation of instruments were followed during the scale adaptation process (Cruchinho et al., 2024). The methods used for the reliability and validity testing of the instrument are given below:

Validity analysis

Linguistic, content, and construct validity techniques were used in the validation phase of the FOCS. In terms of linguistic validity, the adaptation phase of the scale into Turkish was carried out by four linguists. In the first step, two independent translators who are native Turkish speakers and can speak and write both languages very well translated the scale into

Turkish. In the second step, the back-translation method was used. The scale translated into Turkish was translated back into English by two independent translators. Then, the English and Turkish meanings of the items were reviewed by Turkish language experts. The items were finalized by making the necessary adjustments.

To ensure the content validity of the Turkish translated scale, expert opinions were obtained from 10 experts in the field. The Expert Evaluation Form prepared by the researchers was used to collect expert opinions. Davis method was used to evaluate the content validity. According to this method, each item is scored between 1 and 4 (1-very appropriate, 2-appropriate but needs modification, 3-item needs to be made appropriate, 4-not appropriate). For each item, the content validity index (CVI) was calculated by dividing the number of experts who approved the 3rd and 4th options by the total number of experts who made an evaluation. The criterion for the item to be sufficient in terms of content validity was evaluated as 0.80 (Davis, 1992).

Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were applied to evaluate the construct validity of the scale. Before performing EFA, KMO and Bartlett's test of sphericity were calculated for the suitability of factor analysis (Field, 2017). Since the sample size was limited in our study and the study was conducted in a special group, both EFA and CFA analyses were performed on the same sample in line with the literature (Doğan et al., 2017). EFA was conducted to determine the item-factor relationships, and CFA was conducted to evaluate whether the items explained the basic structure of the scale. Principal Component Analysis (PCA) was used as the factor extraction method in EFA. The extracted factor numbers were determined using parallel analysis, the Guttman-Kaiser method, and the scree plot. Factor rotation was performed using Direct Oblimin. To determine the subscales of the instrument, the factor loadings were reviewed in the rotated factor matrix

(Field, 2017). Items with factor loadings ≥ 0.30 were considered acceptable (Hair, 2010). In the CFA analysis, χ^2/df , Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Squared Residual (SRMR), Comparative Fit Index (CFI), Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Incremental Fit Index (IFI), Tucker-Lewis Index (TLI), and Normed Fit Index (NFI), values were examined as fit indices (Kline, 2015).

Reliability analysis

Reliability analysis is conducted to test whether the statements in the scales are consistent among themselves and whether all of the statements measure the same subject (Ural and Kılıç, 2011). For the tests and results to be reliable, the measurements must be reliable. In this context, the reliability of the scale was examined by item-total correlations, Cronbach's Alpha coefficient, split-half, Hotelling's *T*-squared test, Tukey's Additivity test, average variance explained (AVE) and composite reliability (CR) values. The internal consistency reliability criterion was set at 0.70 (Hair, 2010).

Ethical considerations

Firstly, permission to use the scale was obtained from the relevant author for its adaptation into Turkish. Ethics approval (Date: 25.10.2022; No: 277843) was obtained from the medical research ethics committee of the university where the study was conducted. Students were informed about the study before the scale application. Consent was obtained from the students who wanted to participate in the study and those who volunteered were included in the study.

Results

The findings of the analysis of the FOCS are given below in three steps: validity analyses of FOCS, reliability analyses of the FOCS and

descriptive analysis of the FOCS. The Turkish version of the FOCS is presented in Appendix.

Validity analyses of the FOCS

The CVI values were found to be between 0.80 and 1.00 in the expert opinion applied to ensure the content validity of the FOCS. This result emphasized the strong agreement among the experts on the content validity of the scale and showed that the measurement tool covered the targeted topics. Before factor analysis to test the construct validity of the scale, the adequacy of the sample size and the suitability of the data set for factor analysis were assessed using KMO and Bartlett's test of sphericity. The KMO value was 0.931, and Bartlett's test of sphericity was significant ($\chi^2 = 3050.577$; $p < .001$). Then, EFA was conducted using the principal components method as the extraction method and Direct Oblimin as the rotation technique. EFA analysis revealed two subscale structures consisting of 17 items with factor loadings ranging from 0.455 to 0.757. The first factor (direct fear) explained 44.69% of the total variance, and the second factor (indirect fear) explained 52.73% of the total variance (Table 1).

After performing EFA, CFA was carried out, and it was found that the two-factor scale structure consisting of 17 items provided a good model fit, as shown in Figure 1. Improvements were made in the model by selecting the highest ones among the errors with high modification index values. Looking at the goodness of fit indices of FOCS, RMSEA was 0.076 and χ^2/df was 3.167, indicating that the model showed an acceptable fit. As a result, it was determined that the construct validity of the scale was achieved. Other fit indices according to CFA results are shown in Table 2.

Reliability analyses of the FOCS

When the Cronbach alpha values of the FOCS were analyzed, the overall Cronbach alpha value was calculated as 0.920. The reliability

Table 1. Exploratory factor analysis result of the FOCS.

Items	Factor 1 (Direct fear)	Factor 2 (Indirect fear)	Eigenvalues	% of variance	% cumulative
Item1	0.720		7.597	44.69	52.73
Item2	0.546				
Item4	0.609				
Item8	0.583				
Item9	0.480				
Item10	0.757				
Item12	0.653				
Item13	0.668				
Item3		0.533	1.368	8.04	
Item5		0.688			
Item6		0.653			
Item7		0.585			
Item11		0.630			
Item14		0.552			
Item15		0.626			
Item16		0.594			
Item17		0.455			

coefficient was 0.870 for the direct fear and 0.861 for the indirect fear sub-dimension. In addition, the reliability of the scale was also evaluated using the split-half method. According to the results, the correlation coefficient between the two halves was 0.889; the Spearman-Brown coefficient was 0.942; the Guttman coefficient was 0.938, and the scale was found to be reliable (Table 3).

The item-total correlation values of the participants' answers to the scale questions were examined, and it was determined that there were no items below 0.30. When each sub-dimension was evaluated within itself, it was found that the item-total correlation coefficients of the "direct fear" sub-dimension of the scale were between 0.480 and 0.757 and significant, and the item-total correlation coefficients of the "indirect fear" sub-dimension were between 0.455 and 0.688 and significant.

The response bias of FOCS was analyzed with Hotelling's T-squared test. In the response bias of the FOCS, the homogeneity of the responses given for each item was evaluated. As a result of this test, it was determined that individuals answered the items of the FOCS

according to their own opinions and that there was no response bias in the scales with an F statistic of 77.661 (Hotelling $T^2 = 1294.497$; $p < 0.001$). In addition, Tukey's test of additivity was conducted to obtain a total score from the scale. The results showed that the scale was summable and the traits measured showed sufficient diversity ($p < 0.05$). When the AVE of the measurement model was evaluated, it was found that direct fear was 0.47 and indirect fear was 0.40, and when the CR was evaluated, it was found that direct fear was 0.87 and indirect fear was 0.86.

Descriptive analysis of the FOCS

Descriptive statistics of the participants' FOCS scores are given in Table 4. FOCS consists of two sub-dimensions: direct fear and indirect fear. The direct fear sub-dimension consists of eight questions, and the mean score is 2.43 ± 0.78 . The indirect sub-dimension consists of nine questions with a mean of 1.69 ± 0.75 . The overall scale consists of a total of 17 questions with a mean of 2.04 ± 0.72 . When the mean scores of the

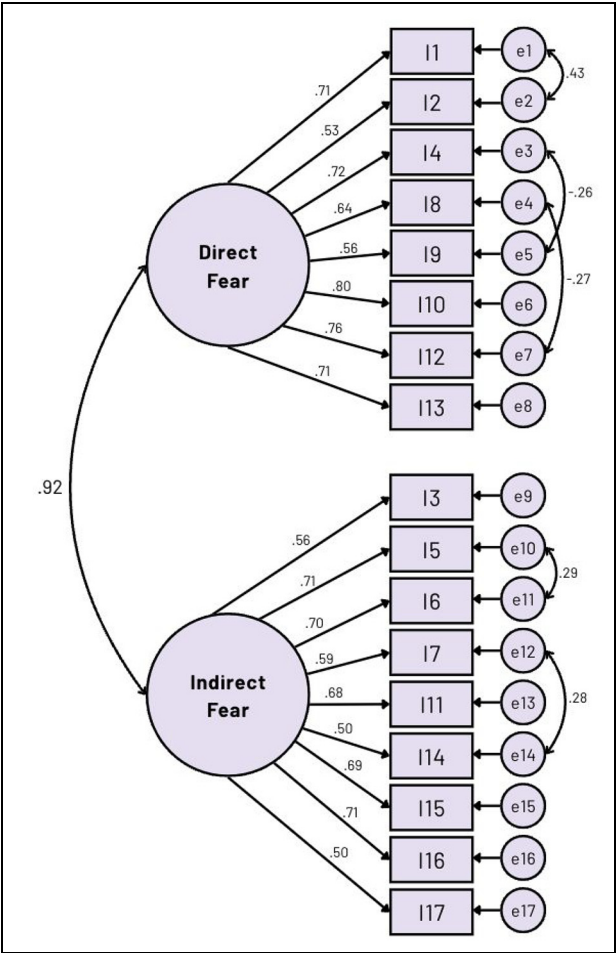


Figure 1. The measurement model for the Turkish version of the Fear of Cancer Scale.

Table 2. Confirmatory factor analysis result of the FOCS.

Fit index	Excellent fit	Acceptable fit	FOCS
χ^2/df	$0 \leq \chi^2/df \leq 3$	$3 \leq \chi^2/df \leq 5$	3.167
RMSEA	$0.00 \leq RMSEA \leq 0.05$	$0.05 \leq RMSEA \leq 0.08$	0.076
SRMR	$0.00 \leq SRMR \leq 0.05$	$0.05 \leq SRMR \leq 0.08$	0.051
CFI	$0.95 \leq CFI$	$0.85 \leq CFI$	0.918
GFI	$0.90 \leq GFI$	$0.85 \leq GFI$	0.894
AGFI	$0.90 \leq AGFI$	$0.85 \leq AGFI$	0.857
IFI	$0.90 \leq IFI \leq 1.00$	$0.80 \leq IFI$	0.918
TLI	$0.90 \leq TLI$	$0.80 \leq TLI$	0.901
NFI	$0.90 \leq NFI$	$0.80 \leq NFI$	0.885

Table 3. Reliability analyses result of the FOCS.

Subscales	Cronbach α	1st half of Cronbach α	2nd half of Cronbach α	Spearman-Brown	Guttman split-half	Correlation between two halves
Direct fear	0.870	0.844	0.851	0.942	0.938	0.889
Indirect fear	0.861					
Total FOCS	0.920					

items of the FOCS were analyzed, the lowest mean score was 1.01 ± 0.96 for item14. The highest mean score is item2 with 2.80 ± 1.03 .

Discussion

This study revealed the results of the reliability and validity tests of the FOCS in Turkish. FOCS is a scale developed to measure the level of cancer fear in people without a history of cancer. To ensure objective evaluation data, only university students with no cancer history were chosen as participants. However, since the aim of the study was to conduct a validity and reliability study of the FOCS, demographic variables were not investigated to examine the relationship between fear of cancer and different factors. The results of the study showed that the Turkish version of the FOCS has good validity and reliability.

Checking content validity is crucial to ensuring that a measurement tool accurately represents the intended concept. Within the scope of ensuring content validity, experts were consulted to evaluate the Turkish version of the scale. The CVI of all items in the scale was found to be 0.80 and above, indicating that the scale items were comprehensible and the scale had strong content validity (Polit et al., 2007). After the final version of the scale was given, pre-application and pilot studies were carried out. After it was found that the scale items were clearly understood in the pre-application and the scale gave reliable results in the pilot study, factor analysis was performed. Before the EFA and CFA analyses, the suitability of the sample for factor analysis was evaluated using the

KMO coefficient and Bartlett's sphericity test. KMO values vary between 0.00 and 1.00, and KMO values $\geq .70$ are desirable (Lloret et al., 2017). A KMO value between 0.90 and 1.00 is considered excellent, between 0.80 and 0.89 is considered very good, between 0.70 and 0.79 is considered good, between 0.60 and 0.69 is considered moderate, between 0.50 and 0.59 is considered poor, and below 0.50 is considered unacceptable (Watkins, 2018). As a result of the analysis, the KMO coefficient was 0.931, and Bartlett's test of sphericity was significant at $p < 0.001$. Thus, the suitability of the sample for factor analysis was confirmed, and then factor analysis was performed.

EFA analysis showed that FOCS is a conceptually meaningful scale consisting of 17 items with a 2-factor structure. For a scale, particularly one with multiple dimensions, explaining over 40% of the variance is considered good. More explained variance means better construct validity (Boateng et al., 2018). In our study, the variance explained exceeded 50% and showed a value of 52.73%, which indicates robust construct validity. Since the original study did not provide information about EFA and explained variance, it was not possible to compare them. In EFA analysis, items with factor loadings of 0.30 or higher should be kept, while items with lower loadings should be excluded from the scale (Finch, 2019). In the original version of the scale, the factor loadings of the scale items ranged from 0.537 to 0.850, while in our study they ranged from 0.455 to 0.757. Our study's results align with the factor loadings of the original scale and confirm a stable factor structure.

Table 4. Descriptive analyses of the FOCS.

Items	Mean \pm SD	Min-Max	Skewness	Kurtosis
Direct fear	2.43 \pm 0.78		-.340	.057
Item 1	2.44 \pm 1.03	0-4	-.274	-.457
Item 2	2.80 \pm 1.03	0-4	-.584	-.287
Item 4	2.12 \pm 1.16	0-4	-.060	-.809
Item 8	2.63 \pm 1.03	0-4	-.794	.355
Item 9	2.16 \pm 1.15	0-4	-.113	-.716
Item 10	2.70 \pm 1.03	0-4	-.709	.115
Item 12	2.00 \pm 1.14	0-4	.114	-.805
Item 13	2.58 \pm 1.07	0-4	-.527	-.270
Indirect fear	1.69 \pm 0.75		.305	.019
Item 3	1.87 \pm 1.25	0-4	.137	-1.034
Item 5	1.57 \pm 1.03	0-4	.556	-.080
Item 6	1.62 \pm 1.05	0-4	.474	-.297
Item 7	1.39 \pm 1.10	0-4	.506	-.535
Item 11	1.65 \pm 1.13	0-4	.406	-.667
Item 14	1.01 \pm 0.96	0-4	1.048	.893
Item 15	1.99 \pm 1.19	0-4	-.009	-.911
Item 16	2.57 \pm 1.06	0-4	-.553	-.240
Item 17	1.57 \pm 1.05	0-4	.585	-.160
Total FOCS	2.04 \pm 0.72	0-4	.001	-.007

In the CFA analysis conducted to evaluate whether the factors determined in EFA exhibit a valid and well-fitting structure, the fit indices of the two-factor structure were found to be acceptable (Brown, 2015). Among the various fit indices used in CFA, especially χ^2 /df value of 3.167 and RMSEA value of less than 0.08 showed the adequacy of the model. The fit indices CFI, IFI, and TLI all surpassed the required value of 0.90, providing additional evidence of the fit of the model. In addition, the fact that the RMSEA value in our study is more favorable than the RMSEA value of the original study (0.085 vs 0.076) is also an important finding. In conclusion, these findings show that the scale data exhibit a strong fit, statistical reliability and construct validity. Based on this analysis, it can be concluded that all items and both subscales effectively measure fear of cancer in healthy individuals.

Within the scope of the reliability analysis of the scale, Cronbach's alpha coefficient was found to be 0.870 for the direct fear subscale,

0.861 for indirect fear and 0.920 for the overall score. The fact that Cronbach's alpha coefficient was above 0.70 for both the subscale and the overall score indicates that the scale has excellent reliability (17). It should be emphasized that the overall Cronbach's alpha coefficient (0.920) was higher than the Cronbach's alpha coefficient (0.916) in the original study. In addition, as a result of the split-half analysis, the coefficients were found to be above 0.70, indicating that there was a strong and statistically significant correlation between the two halves of the scale (Chakrabarty, 2013). In the item-total correlation analysis performed to determine how accurately the items in the scale measure the targeted variable, a value exceeding 0.30 is generally accepted (Hair, 2010). The results obtained in our study exceeded the 0.30 threshold, confirming a positive relationship.

In our research, we used Hotelling's *T*-squared test to examine response bias. This test checks the equality of means of the scale items with each other and evaluates the homogeneity

of responses to scale items among the sample. For there to be no response bias, the statistical result obtained from the test must be significant (Özdamar, 2019; Rattray and Jones, 2007). The results indicated that there was no response bias in the scale and that the responses were distributed homogeneously (Hotelling $T^2 = 1294.497$; $p < 0.001$). The Tukey Additivity test conducted to evaluate whether the interaction between two factors is additive has shown that the interaction is indeed additive. The additivity of this interaction between factors indicates that the sum of the effects of each factor alone fully explains the result.

The latent variables' CR value in the measurement model should be above 0.70, while the AVE value should be above 0.50 (Hair, 2010). The findings of the study indicate that the AVE of direct fear is 0.47, and that of indirect fear is 0.40; the CR of direct fear is 0.87, and that of indirect fear is 0.86. Although the critical value is met for CR, it is not met for AVE. However, in the literature, it has been reported that an AVE below 0.50 is acceptable when other reliability measures are at a sufficient level (Berthon et al., 2005). As a result, when all reliability criteria are evaluated, it can be said that the Turkish version of FOCS is a valid and reliable scale.

Cancer fear is a significant concern in Turkish society, similar to many other cultures, due to the high prevalence of cancer cases and associated psychological distress. In Turkey, fear of cancer is not only influenced by personal health concerns but also shaped by familial and societal perceptions, as family structures are strong, and health-related anxieties often extend beyond the individual to include family members. Given this cultural context, the FOCS was adapted using standard linguistic and content validation procedures, ensuring that the translated items were conceptually equivalent and culturally relevant. The high CVI scores obtained from expert evaluations support the scale's appropriateness for use in Turkey. Additionally, the scale's psychometric properties, including its factor structure and reliability

indices, indicate that it functions effectively in measuring cancer fear among Turkish individuals. Therefore, the Turkish version of the FOCS is considered a valid and culturally appropriate instrument for assessing cancer-related fears in Turkey.

However, this study has several limitations. Firstly, the sample, which focused on adapting the scale to Turkish, consisted solely of students from a health services vocational school, limiting the generalizability of the findings to this specific group. Additionally, although the total sample size was 285, only 170 participants were included in the main application, which may be considered a limitation. Secondly, the scale was not translated directly from its Chinese version; instead, the adaptation was based on an existing English version. Future studies should consider testing the cross-cultural face validity. Lastly, since the study did not aim to explore the relationship between cancer fear and various factors, the exclusion of demographic variables may also be a limitation. These factors could impact the generalizability of the study's results, emphasizing the need for future research to include a broader and more diverse sample, as well as an examination of demographic variables.

Conclusions

In this study, it was observed that the Turkish FOCS meets the validity and reliability criteria at an acceptable level. Considering the absence of another measurement tool in the Turkish literature aimed at measuring cancer fear, it is believed that this scale could fill this gap. The FOCS could be a valuable tool for understanding and assessing the facets of cancer fear in individuals without a history of cancer. The findings obtained could contribute to the development of effective strategies for identifying and managing cancer fear, adopting a more comprehensive approach to addressing this issue. By accurately measuring cancer fear, researchers can gain insights into how such fears influence not only mental health but also

physical health outcomes, such as stress-related disorders and chronic conditions. This understanding is crucial for developing holistic interventions that address both psychological and physical aspects of health, ultimately enhancing patient care and health outcomes.

This research could be considered an important step toward understanding and reducing cancer fear, serving as a foundation for future studies. For future research, it would be beneficial to expand the sample to include a more diverse population beyond health services vocational school students. This could involve including participants from different educational backgrounds, ages, and socioeconomic statuses to ensure the findings are more representative and generalizable to the broader population. Additionally, investigating the relationship between cancer fear and various demographic factors such as age, gender, educational level, and personal or family history of cancer could provide valuable insights into how these factors influence fear levels.

Author Contributions

Conceptualization: Mehmet Halil Öztürk, Ahmet Doğan Kудay; **Resources:** Mehmet Halil Öztürk, Ahmet Doğan Kудay; **Methodology:** Mehmet Halil Öztürk, Ahmet Doğan Kудay; **Formal analysis and investigation:** Mehmet Halil Öztürk; **Visualization:** Ahmet Doğan Kудay; **Writing—original draft preparation:** Mehmet Halil Öztürk, Ahmet Doğan Kудay; **Writing—review and editing:** Ahmet Doğan Kудay, Mehmet Halil Öztürk.

Data sharing statement

The data generated during and/or analysed during the current study are not publicly available as it was stated that the data collected while obtaining institutional permission will not be shared with any other person/platform.

Declaration of conflicting interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Ethics approval

This study was approved by the Ethics Committee of Pamukkale University, Noninvasive Clinic Ethics Committee (Date: 25.10.2022; No: 277843)

Informed consent

All participants gave their informed consent before participating in this study.

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Appendix

Kanser Korkusu Ölçeği (KKÖ)

- No 0 – Kesinlikle katılmıyorum
1 – Katılmıyorum
2 – Kararsızım
3 – Katılıyorum
4 – Kesinlikle katılıyorum

1	Bir gün kanser olacağımdan korkuyorum.	0 1 2 3 4
2	Yakınlarımla kanser olacağımdan korkuyorum.	0 1 2 3 4
3	Kanserin bulaşıcı olmasından korkuyorum.	0 1 2 3 4
4	Kanser kelimesini duyduğumda korkuyorum.	0 1 2 3 4
5	Başka insanlara kanser teşhisi konulduğunu duyduğumda, kanser olduğumdan şüpheleniyorum.	0 1 2 3 4
6	Hasta olduğumda, hastalık nedenimin kanser kaynaklı olmasından korkuyorum.	0 1 2 3 4
7	Kanser hastalarını görmekten korkuyorum.	0 1 2 3 4
8	Birinin hayatını tehlikeye atabileceği için kanserden korkuyorum.	0 1 2 3 4
9	Çok büyük bir ekonomik yüke neden olabileceği için kanserden korkuyorum.	0 1 2 3 4
10	Çok acı verici olabileceği için kanserden korkuyorum.	0 1 2 3 4
11	Kanser hastaları ve tedavisi için özellikle hastaneye veya sağlık kurumlarına gitmekten korkuyorum.	0 1 2 3 4
12	Hastaneye sağlık kontrolü için gittiğimde, kanser teşhisi konulmasından korkuyorum.	0 1 2 3 4
13	Yakınlarımla çok üzeceği için kanserden korkuyorum.	0 1 2 3 4
14	Kanser hastaları ile yakınlık kurmaktan korkuyorum.	0 1 2 3 4
15	İnsanlardan kendimi izole etmek zorunda kalacağım için kanserden korkuyorum.	0 1 2 3 4
16	Kanserin kalıtsal olmasından korkuyorum.	0 1 2 3 4
17	İnsanlara kanser teşhisi konulduğunu duyduğumda, kanser taraması (muayenesi) için hastaneye giderim.	0 1 2 3 4