ORIGINAL ARTICLE

DOI: 10.4274/nkmj.galenos.2025.68725
Nam Kem Med J 2025;13(3):322-332

Breast Cancer Surgery Quality of Life Scale: Turkish Validity and Reliability Study

Meme Kanseri Cerrahisi Yaşam Kalitesi Ölçeği: Türkçe Geçerlik ve Güvenirlik Çalışması

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ABSTRACT

Aim: This study aimed to evaluate the validity and reliability of the Turkish version of the breast cancer surgery quality of life scale (BCSQOL) among patients who underwent surgical treatment for breast cancer.

Materials and Methods: The study sample consisted of 250 female patients who had undergone breast cancer surgery. Following the translation of the scale into Turkish, content and face validity analyses were conducted. Construct validity was assessed using confirmatory factor analysis. For reliability testing, the test-retest method was employed. Additionally, omega and Cronbach's alpha coefficients were calculated for the subdimensions of the scale.

Results: The chi-square/DF ratio was found to be 1.064, and the root mean square error of approximation value was 0.017. The comparative fit index, adjusted goodness-of-fit index, normed fit index, Tucker-Lewis index, and incremental fit index values indicated a "good fit", while the standardized root mean square residual and goodness of fit index values indicated an "acceptable fit" according to confirmatory factor analysis results. Cronbach's alpha coefficients for the subdimensions ranged between 0.79 and 0.95, and omega coefficients ranged between 0.97 and 1.00. The total Cronbach's alpha coefficient of the scale was 0.79. The scale comprises 49 items across 8 subdimensions: physical activity, pain, feelings, body image, physical health, sexual function, general health, and relationships with others.

Conclusion: Based on the findings, the Turkish version of the BCSQOL scale is a valid and reliable instrument for assessing quality of life in breast cancer patients following surgical treatment.

Keywords: Breast cancer, breast surgery, validity and reliability, quality of life

ÖZ

Amaç: Bu araştırmanın amacı meme kanseri nedeniyle cerrahi tedavi uygulanan hastalarda meme kanseri cerrahisi yaşam kalitesi ölçeğinin (MKCYKÖ), Türkçe versiyonunun, geçerlik ve güvenirliğini test etmektir.

Gereç ve Yöntem: Meme kanseri nedeniyle ameliyat olan 250 kadın hasta çalışmanın örneklemini oluşturdu. Ölçeğin Türkçe tercümesi yapıldıktan sonra kapsam ve yüzey geçerliği hesaplandı. Ölçeğin yapı geçerliği için doğrulayıcı faktör analizi uygulandı. Ölçeğin güvenirlik analizinde test-tekrar test yöntemi kullanıldı. Ayrıca ölçeğin ve alt boyutlarının omega ve Cronbach alfa katsayısı hesaplandı.

Bulgular: Çalışmada ki-kare istatistik değeri 1,064, yaklaşık hataların kök ortalama kare değeri ise 0,017 olarak elde edildi. Doğrulayıcı faktör analizi sonucunda elde edilen diğer uyum indekslerinden karşılaştırmalı uyum indeksi, ayarlanmış iyilik hızı indeksi, normlaştırılmış uyum indeksi, Tucker-Lewis indeksi ve artışlı uyum indeksi değerlerinin "mükemmel uyum", standartlaştırılmış kök ortalama kare artık ve iyilik uyum testi değerlerinin

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Received: 24.03.2025 **Accepted:** 14.07.2025 **Publication Date:** 07.10.2025

Cite this article as: Korkmaz S, Esen E, Sönmez M. Breast cancer surgery quality of life scale: Turkish validity and reliability study. Nam Kem Med J. 2025;13(3):322-332

ise "kabul edilebilir düzeyde uyum" sağladığı tespit edildi. Alt boyutlara ait Cronbach alfa katsayısının 0,79-0,95 arasında ve omega katsayısının ise 0,97-1,00 arasında değiştiği saptandı. Ölçeğin toplam Cronbach alfa değeri 0,79'dur. Ölçek toplam 49 madde ve fiziksel aktivite, ağrı, duygular, beden imajı, fiziksel sağlık, cinsel işlev, genel sağlık ve diğerleriyle ilişkiler olmak üzere 8 alt boyuttan oluşmaktadır.

Sonuç: Çalışma verileri değerlendirildiğinde; MKCYKÖ, Türkçe versiyonunun, meme kanseri hastalarda cerrahi tedavi sonrası yaşam kalitesinin değerlendirilmesinde geçerli ve güvenilir bir ölçüm aracı olduğu sonucuna varılmıştır.

Anahtar Kelimeler: Meme kanseri, meme cerrahisi, geçerlik ve güvenirlik, yaşam kalitesi

INTRODUCTION

Breast cancer is the most common type of cancer in women in Türkiye, as elsewhere around the world[1-3]. According to Global Cancer Statistics 2020 data for 36 cancer types in 185 countries, breast cancer takes place on the top in all age groups with a rate of 24.5% in women and 23.9% in Türkiye[4,5]. According to the report of the International Agency for Research on Cancer (2022), on the other hand, approximately 2.3 million new cases were detected worldwide in 2020, and the rate of new cases is increasing day by day[1,6]. However, the survival rate of breast cancer patients has increased in recent years due to developments in diagnosis and treatment[1]. One of the most important treatment methods for breast cancer is surgical treatment[3]. However, although surgical treatment increases the survival rate in patients, this may cause some problems[2] such as physical activity limitations, fatigue, pain, sleep disturbances and psychosocial issues (e.g., anxiety, depression). In particular, it leads to a decrease in self-esteem, aesthetic losses, sexual dysfunction, deterioration of body image[1,4]. These problems experienced after breast cancer surgeries may significantly reduce the postoperative quality of life of patients[3,7,8].

It is recommended to use a valid and reliable measurement tool to assess the quality of life of patients. In the literature, the Turkish adaptation, validity, and reliability study of the "functional assessment of cancer therapy-breast" scale was conducted by Yalçın and Gürkan[9] for this purpose. However, this scale primarily focuses on the general impact of cancer treatment rather than specifically targeting the postoperative experiences of patients who have undergone breast cancer surgery. Therefore, there is a need for a specific scale to assess the quality of life of patients who have undergone breast cancer surgery. Breast cancer surgery quality of life scale (BCSQOL), developed by El Farrah[10], is specifically designed to address the physical and psychosocial problems experienced by individuals undergoing breast cancer surgery. This scale allows for a more comprehensive assessment of postoperative changes affecting quality of life, including physical activity, pain, aesthetic concerns, and emotional difficulties. Therefore, the use of the BCSQOL in this study provides a more accurate and relevant assessment of quality of life for this patient population.

The Turkish adaptation of the BCSQOL scale has not been conducted to date. In this regard, it is both clinically and academically significant to translate and validate the quality of life scale, specifically developed for individuals who have undergone breast cancer surgery, into Turkish. The aim of this research was to evaluate BCSQOL the validity and reliability of its Turkish version.

Research Questions

Is the Turkish version of the BCSQOL scale valid?

Is the Turkish version of the BCSQOL scale reliable?

MATERIALS AND METHODS

Research Type

This study is methodological research aimed at the adaptation of a measurement scale. The data were collected between November 2022 and April 2023 at the breast clinic of a training and research hospital in Ankara.

Study Design and Eligibility Criteria

In scale validity and reliability studies, it is recommended to include a sample size that is 5 to 10 times the number of items in the scale[11]. Accordingly, the minimum required sample size was calculated as 245 participants, based on the 49 items of the BCSQOL (49 items × 5). To account for a potential 10% data loss, the target sample size was increased to 270 participants. Ultimately, the study was completed with 250 participants who met the inclusion criteria and were selected through a non-probability sampling method.

The inclusion criteria were as follows: female individuals aged 18 years or older; those who had undergone surgical treatment for a breast cancer diagnosis; were on the third postoperative day; had no central nervous system metastasis; had no psychiatric or neurological diagnoses (such as psychosis, depression, or delirium); were able to communicate in Turkish; voluntarily agreed to participate; and provided both verbal and written informed consent.

Exclusion criteria included: individuals who were receiving treatment for another type of cancer or had a previous breast cancer diagnosis and treatment; those who had only

undergone a breast biopsy; individuals with impaired cognitive functions; and those who declined to participate in the study.

Data were collected from eligible female patients on the third day after breast cancer surgery through face-to-face interviews conducted in the surgical clinic. Each data collection session lasted approximately 10 to 15 minutes.

To assess the test-retest reliability of the Turkish version of the scale, it was re-administered to 75 patients from the same sample group during their outpatient clinic follow-up visits 15 days later. Data were collected using the "Patient Information Form" and the Turkish version of the BCSQOL scale.

The form includes two items designed to collect demographic and clinical information, specifically the patient's age and the type of surgical procedure performed.

Breast Cancer Surgery Quality of Life Scale

The scale was developed by El Farrah in 2003 to evaluate the quality of life of individuals who had undergone breast cancer surgery. The scale includes 49 items and 8 subdimensions. Each subdimension is measured with a different Likert-type frequency. The subdimensions of the scale, the number of items, and the minimum and maximum scores that may be obtained from each subdimension are given in Table 1. Physical activity consists of 8 questions, each scored between 0 and 2, resulting in a total score range of 0-16. Pain includes 7 questions, each scored between 0 and 3, with a total score range of 0-21. The feelings subdimension consists of 6 questions, each scored between 0 and 3, with a total score range of 0-18. Body image includes 3 questions, with each scored between 0 and 3, resulting in a total score range of 0-9. Physical health consists of 7 questions, each scored between 0 and 1, with a total score range of 0-7. Sexual functioning includes 4 questions, each scored between 0 and 1, with a total score range of 0-4. General health consists of 7 questions, each scored between 0 and 2, resulting in a total score range of 0-14. Finally, the relationships with others subdimension includes 7 questions, each scored between 0 and 3, with a total score range of 0-21. The subdimension scores are obtained by dividing the score from each subdimension by the maximum score for that subdimension. This process converts the scores obtained for each subdimensions into a value between 0 and 1 (for instance, suppose the total score derived from the physical activity subdimensions is 10. This score is divided by 16, which is the maximum score that can be obtained from the subdimensions, and a value between 0 and 1 is found for that subdimensions. So the score for the physical activity subdimensions is 10/16=0.625). This process is repeated for each subdimensions. The result is a total score between 0 and 8, obtained by summing the scores from the eight subdimensions. A higher score indicates a better quality of life for the individual who has undergone breast cancer surgery. The items in the scale [post-surgical symptoms and physical functioning (5.2), sexuality (6, 6.4), General health (7.B.1, 7.B.2, 7.B.3, 7.B.4, 7.B.5] are reverse coded[10].

Statistical Analysis

SPSS version 26.0 (Armonk, NY: IBMCorp) package program and R-Project program were used to analyze the data[12]. Descriptive statistics for continuous variables were given with mean and standard deviation. Whether the data were normally distributed or not was evaluated using the Kolmogorov-Smirnov test as well as Skewness-Kurtosis values. In the literature, if the skewness and kurtosis values are between +2 and -2, it is accepted that the data show a normal distribution[13]. The content validity index (CVI) was calculated using the Davis technique to assess content validity. The conformity of the scale to construct validity was evaluated with Kaiser-Meyer-Olkin sampling adequacy (KMO) and Barlett sphericity tests. KMO and Bartlett's sphericity test are two essential tests used in multivariate statistical analyses, such as factor analysis. These tests are employed to assess whether the data are suitable for analysis prior to conducting factor analysis. Confirmatory factor analysis (CFA) was conducted using the lavaanPlot package in the R-Project software to evaluate construct validity[14]. The diagonal weighted least squares (DWLS) technique was used because scale items were defined categorically in CFA. DWLS is a statistical method used for estimating parameters in models. Fit indices values were calculated. No improvements were made to the CFA model, and error covariances were not freed. The graphical summary of the CFA was made in R-Project software with the lavaanPlot package. In the reliability analysis of the scale, item-total correlation coefficient, standardized Cronbach alpha (α), and omega (w) coefficients were calculated. Correlation analyses were conducted to assess the test-retest reliability. A significance level of $p<0.05$ was considered.

Permission to translate the scale into Turkish and to confirm its validity and reliability was obtained via e-mail from El Farrah, the researcher who developed the original scale. Ethical approval for the study University of Health Sciences Türkiye Gülhane Faculty of Medicine Clinical Research Ethics Committee (decision no: 2022/36, date: 25.10.2022). Prior to data collection, all participants were informed about the purpose and procedures of the study, and both written and verbal informed consent were obtained. The study was conducted in accordance with the principles outlined in the Declaration of Helsinki.

RESULTS

The mean age of the participants was 50.06±12.33 years. 17.2% (n=43) of individuals had surgery due to modified radical mastectomy+axillary lymph node dissection, 31.2% (n=78) breast conserving surgery+axillary lymph node dissection, 36.8% (n=92) breast conserving surgery+sentinel lymph node dissection, 14.8% (n=37) modified radical mastectomy+sentinel lymph node dissection.

Language Validity Results

The translation-back translation technique was used for the language validity of the BCSQOL. The original English statements were independently translated into Turkish by two native Turkish-speaking linguists proficient in English. The authors reviewed both translations and, with the assistance of a linguist, consolidated the statements that best reflected the meaning and scope of each item into a single version. An expert in Turkish language and literature further evaluated the suitability of the Turkish version. The finalized Turkish form was then back-translated into English by two different linguists proficient in English, who had not seen the original questionnaire. The researchers controlled both languages and made the necessary corrections and finalized the scale.

Content and Face Validity of Scale

Nine faculty members, who are experts in their respective fields, along with a nurse working in the breast care clinic, were consulted to evaluate the Turkish version of the scale. Their feedback focused on assessing whether the items in the scale adequately cover all relevant aspects of the subject, including the clarity and appropriateness of the expressions, as well as the content validity. Content validity was evaluated using the Davis technique. A minimum CVI of 0.80 is accepted for items[15]. In the study, the CVI of each item in the scale was calculated to be between 0.85 and 1.00. The scale items were modified based on the recommendations provided by the experts. After the content validity of the scale, a pilot study was conducted. To assess face validity, a pilot application was conducted with 10 individuals who had undergone breast cancer surgery and met the same criteria as the sample intended for the scale application. In the pilot study, no negative feedback was received regarding the expressions in the scale. Individuals participating in the pilot study were not included in the research sample.

It is important to determine the sample adequacy of the data set in scale adaptation studies. KMO and Bartlett's test of Sphericity are statistical tests used to evaluate whether your data set is suitable for factor analysis. In the study, the KMO value was calculated as 0.77, and it was determined that the sample size was sufficient for factor analysis and the data were homogeneously distributed. Bartlett's test value was calculated as χ^2=5055.721; p<0.001 and it was determined that there was sufficient correlation between the items for factor analysis.

Confirmatory Factor Analysis

CFA was performed to assess how well the prespecified factors were consistent with the observed data. According to CFA, it was determined that the structural equation model result of the scale was statistically significant at p<0.001 level, the standardized factor loads were positive in eight subdimensions of the scale, and 49 items and eight subdimensions constituting the scale were correlated to the scale structure (Table 2).

Table 1. Scoring breast cancer surgery quality of life scale

BCSQOL subdimensions	Number of items	Minumum score	Maximum score	Total score per items	Total score per subdimensions
Physical activity	8	0	2	0-16	16/16=1
Pain	7	0	3	0-21	21/21=1
Feelings	6	0	3	0-18	18/18=1
Body image	3	0	3	0-9	9/9=1
Physical health	7	0	1	0-7	7/7=1
Sexual functioning	4	0	1	0-4	4/4=1
General health	7	0	2	0-14	14/14=1
Relationship with others	7	0	3	0-21	21/21=1
Overall score	49				0-8

The answers were scored using a positively valued unipolar scale, with the value of 0 assigned to the worst Health related quality of life status, and 3 to the maximum on the 4-point scale. On the 3-point scale, the score ranged from 0 for the minumum to 2 for the maximum. On the 2-point scale, the score ranged from 0 for the minimum to 1 for the maximum

BCSQOL: Breast cancer surgery quality of life

Table 2. Results of confirmatory factor analysis

	Estimate	SE	Z-value	p-value	β_0
A1<---F1	1.000				0.372
A2<---F1	1.971	0.336	5.863	<0.001	0.804
A3<---F1	1.634	0.279	5.853	<0.001	0.708
A4<---F1	1.134	0.219	5.172	<0.001	0.472
A5<---F1	1.488	0.262	5.689	<0.001	0.638
A6<---F1	0.693	0.152	4.554	<0.001	0.296
A7<---F1	0.858	0.166	5.171	<0.001	0.442
A8<---F1	0.563	0.124	4.528	<0.001	0.265
P9<---F2	1.000				0.691
P10<---F2	1.278	0.065	19.616	<0.001	0.760
P11<---F2	1.844	0.089	20.797	<0.001	0.880
P12<---F2	1.459	0.072	20.269	<0.001	0.868
P13<---F2	1.547	0.079	19.652	<0.001	0.777
P14<---F2	1.478	0.074	20.034	<0.001	0.775
P15<---F2	1.705	0.082	20.724	<0.001	0.886
F16<---F3	1.000				0.693
F17<---F3	0.960	0.064	14.900	<0.001	0.621
F18<---F3	1.361	0.080	16.992	<0.001	0.849
F19<---F3	1.396	0.083	16.883	<0.001	0.841
F20<---F3	1.082	0.066	16.332	<0.001	0.758
F21<---F3	0.990	0.067	14.883	<0.001	0.626
B22<---F4	1.000				0.645
B23<---F4	1.101	0.191	5.774	<0.001	0.765
B24<---F4	0.915	0.159	5.762	<0.001	0.660
H25<---F5	1.000				0.469
H26<---F5	1.110	0.276	4.022	<0.001	0.611
H27<---F5	1.135	0.286	3.966	<0.001	0.572
H28<---F5	1.189	0.320	3.715	<0.001	0.540
H29<---F5	1.045	0.280	3.738	<0.001	0.527
H30<---F5	1.273	0.342	3.718	<0.001	0.519
H31<---F5	0.876	0.265	3.308	<0.001	0.386
S32<---F6	1.000				0.602
S33<---F6	1.508	0.431	3.500	<0.001	0.785
S34<---F6	1.621	0.453	3.574	<0.001	0.902
S35<---F6	0.579	0.214	2.712	<0.001	0.260
G36<---F7	1.000				0.485
G37<---F7	1.278	0.166	7.701	<0.001	0.852
G38<---F7	1.210	0.159	7.609	<0.001	0.765
G39<---F7	1.160	0.153	7.567	<0.001	0.715
G40<---F7	1.145	0.152	7.541	<0.001	0.739
G41<---F7	1.056	0.143	7.359	<0.001	0.590
G42<---F7	0.277	0.053	5.212	<0.001	0.252
R43<---F8	1.000				0.522
R44<---F8	1.069	0.147	7.250	<0.001	0.612
R45<---F8	1.128	0.153	7.388	<0.001	0.651
R46<---F8	1.083	0.149	7.274	<0.001	0.552
R47<---F8	0.981	0.141	6.944	<0.001	0.492
R48<---F8	1.187	0.158	7.510	<0.001	0.663
R49<---F8	1.149	0.153	7.531	<0.001	0.640

p<0.05 SE: Standard error, β_0: Standardized coefficient, F1: Physical activity, F2: Pain, F3P: Feelings, F4: Body image, F5: Physical health, F6: Sexual functioning, F7: General health, F8: Relationship with others

Figure 1 presents the CFA model of the scale. The diagram illustrates eight latent factors (F1-F8) and their associated items, with regression coefficients displayed between each factor and its corresponding items. The loadings for physical activity (F1), pain (F2), feelings (F3), body image (F4), physical health (F5), sexual functioning (F6), general health (F7), and relationship with others (F8) are all statistically significant ($p<0.001$). Correlations between latent factors are indicated by double-headed arrows, and the figure provides a visual representation of the multidimensional structure of the scale (Figure 1).

When the goodness-of-fit indices of the scale were examined, it was found that it showed a good fit with the chi-square test of fit (χ^2/df)=1.064, root mean square errors of approximation (RMSEA)=0.017, comparative fit index (CFI)=0.99, adjusted goodness-of-fit index (AGFI)=0.92, standardized root mean square residual (SRMR)=0.065, normed fit index (NFI)=0.99, trucker-lewis index (TLI)=0.99 and incremental fit index (IFI)=0.99; as well as acceptable fit with goodness of fit test (GFI)=0.93 (Table 3).

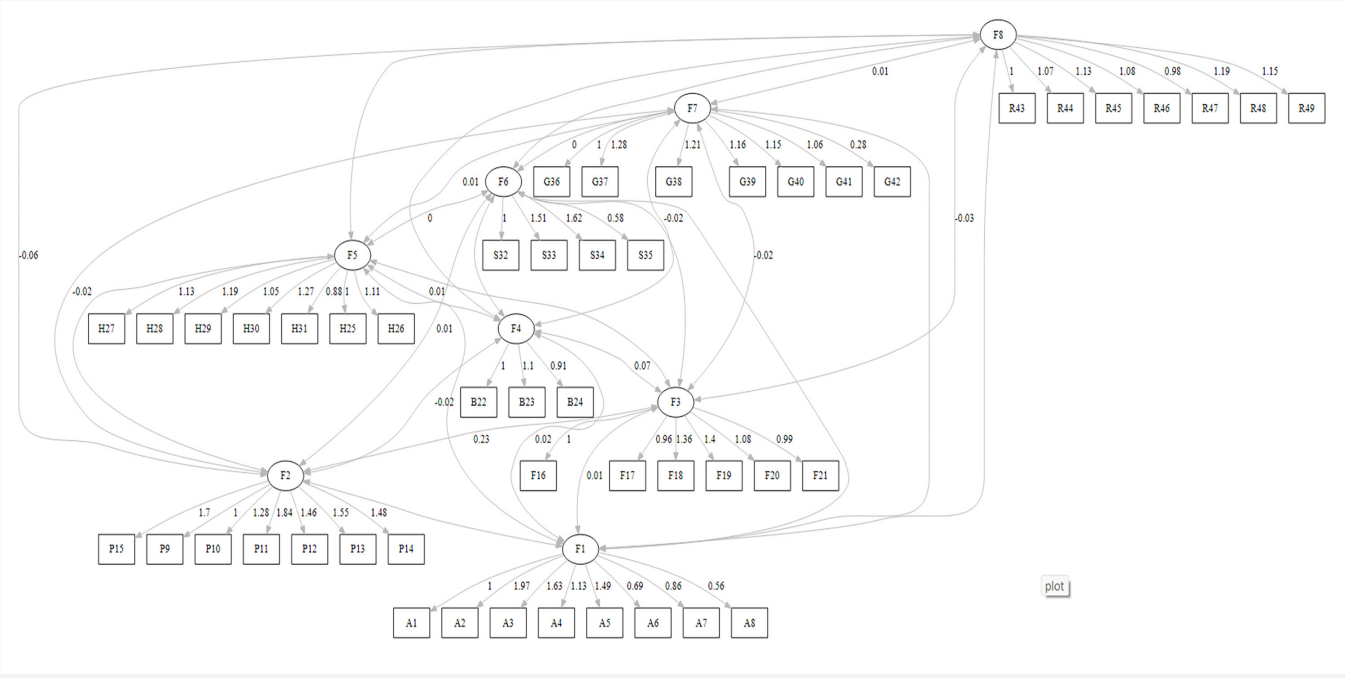

Figure 1. Confirmatory factor analysis results of the BCSQOL scale

BCSQOL: Breast cancer surgery quality of life

Table 3. Fit indices of CFA findings of the BCSQOL scale

Goodness of fit indices	Perfect fit indices	Acceptable fit indices	Fit index values	Obtained in the model
χ^2/df	$0\leq\chi^2/df\leq 3$	$3<\chi^2/df\leq 5$	1.064	"Perfect fit"
GFI	$0.95\leq GFI\leq 1$	$0.90\leq GFI\leq 0.95$	0.930	"Acceptable fit"
AGFI	$0.90\leq GFI\leq 1$	$0.85\leq AGFI\leq 0.90$	0.922	"Perfect fit"
CFI	$0.97\leq CFI\leq 1$	$0.95\leq CFI\leq 0.97$	0.991	"Perfect fit"
IFI	$0.95\leq IFI\leq 1.00$	$0.90\leq IFI\leq 0.95$	0.991	"Perfect fit"
TLI	$0.95\leq TLI\leq 1.00$	$0.90\leq TLI\leq 0.95$	0.990	"Perfect fit"
NFI	$0.95\leq NFI\leq 1.00$	$0.90\leq NFI<0.95$	0.990	"Perfect fit"
RMSEA	$0<RMSEA<0.05$	$0.05<RMSEA<0.08$	0.017	"Perfect fit"
SRMR	$0\leq SRMR\leq 0.05$	$0.05\leq SRMR\leq 0.10$	0.065	"Acceptable fit"

χ^2: Chi-square, df: Degrees of freedom, GFI: Goodness of fit index, AGFI: Adjusted goodness of fit index, IFI: Incremental fit index, TLI: Turker-Lewis index, CFI: Comparative fit index, NFI: Normed fit index, SRMR: Standardized root mean square residual, RMSEA: Root mean square error of approximation, CFA: Confirmatory factor analysis, BCSQOL: Breast cancer surgery quality of life

Reliability Analysis

In the study, coefficient values for an item-total correlation of the scale were 0.35-0.67 for the "physical activity" dimension, 0.70-0.91 for the "pain" dimension, 0.69-0.84 for "feelings" dimension, 0.56-0.69 for "body image" dimension, and 0.59-0.78 for "physical health" dimension, 0.54-0.93 for "sexual functioning" dimension, 0.32-0.85 for "general health" dimension, and 0.51-0.59 for "relationship with other" dimension.

Cronbach's alpha and omega coefficients of subdimensions were examined to measure the internal consistency of the BCSQOL scale. Cronbach's alpha for physical activity subdimensions was 0.81, omega coefficient was 0.87; Cronbach's alpha for pain subdimensions was 0.95, omega coefficient was 0.97; Cronbach's alpha for Feelings subdimensions was 0.90, omega coefficient was 0.95; Cronbach's alpha for body image subdimensions was 0.79, omega coefficient was 1.00; Cronbach's alpha for physical health subdimensions was 0.90, omega coefficient was 1.00; Cronbach's alpha for sexual functioning subdimensions was 0.90, omega coefficient was 1.00; Cronbach's alpha for general health subdimensions was 0.86, omega coefficient was 1.00; Cronbach's alpha for relationship with other subdimensions was 0.81, omega coefficient was 1.00. The total Cronbach's alpha coefficient of the scale is 0.79 (Table 4).

Test-retest Reliability

In the study, test-retest reliability was evaluated with the test-retest method. In this context, the scale was reapplied to 75 people from the same sample group, with an interval of 2 weeks. According to test-retest analysis results; it was found that there was no statistically significant difference between the mean scores of scale factors and total scale ($p>0.05$), the correlation coefficient ranged between 0.27-0.99, and there was a strong correlation between the two measurements ($p<0.001$) (Table 5).

In summary, CFA indicated that the scale structure demonstrated a statistically significant model fit, with all 49 items and eight subdimensions showing positive and meaningful factor loadings. The goodness-of-fit indices supported the validity of the model, with indicators reflecting both good and acceptable fit. The scale also exhibited strong internal consistency across subdimensions, as reflected by high Cronbach alpha and omega coefficients. Furthermore, the test-retest results showed that the scale was stable over time, as there were strong correlations between the two measurements and no significant changes in the average scores.

DISCUSSION

In this study, the psychometric properties of the Turkish version of the BCSQOL were examined for cross-cultural adaptation and validation. The language validity of the Turkish and English versions of the scale was assessed using the translation-back translation method in this study. Reverse-translated English scale was decided to be compatible with the original English scale. Thus, the language adaptation of the Turkish scale was provided.

Content Validity

Scale validity is defined as the ability of a measurement tool to accurately measure the concept or feature it wants to measure[16]. In this study, the content and construct validity of the scale were examined per validity analysis of the scale.

Although different methods are used in the evaluation of content validity, the most preferred method is to ask for an expert's opinion[17]. In the study, a total of 10 experts were asked for their opinions to evaluate the content validity. In the study, the CVI value of the scale items was found to be between 0.85-1.00, and the total CVI value was found to be 0.90. The values obtained from the study showed that the scale adapted to Turkish was sufficient in terms of quantity and quality to evaluate the quality of life of individuals who had undergone surgery for breast cancer and that the scale met the desired criteria for content validity.

Construct Validity

To assess the construct validity the number of samples should be sufficient, and data should be collected from participants 5 or 10 times the number of items in the scale to ensure construct validity[11]. KMO test is performed to evaluate sample fitness. Bartlett's test is performed to assess the normality of the data, and its chi-square result should be statistically significant. In the study, the KMO value was calculated as 0.77, and it was determined that the sample size was "good" for factor analysis and the data were homogeneously distributed. Bartlett's value was calculated as $\chi^2=5055.721$; $p<0.001$ and it was determined that there was sufficient correlation between the items for construct validity analysis.

Table 4. Descriptive statistics of the scale and Cronbach's alpha (α) and omega coefficient (ω) reliability analysis (n=250)

Subdimensions	Items	Mean ± SD	Corrected item-total correlation	Cronbach's alpha if item deleted	Std Cronbach's alpha	Omega coefficient (ω)
Physical activity	A1	1.14±0.69	0.38	0.81	0.81	0.87
	A2	1.38±0.62	0.67	0.76		
	A3	1.41±0.60	0.62	0.77		
	A4	1.66±0.63	0.54	0.78		
	A5	1.50±0.6	0.66	0.76		
	A6	1.22±0.61	0.39	0.80		
	A7	1.21±0.50	0.57	0.78		
	A8	0.87±0.55	0.35	0.81		
Pain	P9	1.55±0.85	0.70	0.95	0.95	0.97
	P10	1.47±0.98	0.81	0.94		
	P11	1.60±1.23	0.91	0.93		
	P12	1.67±1.0	0.84	0.94		
	P13	1.62± 1.16	0.78	0.94		
	P14	1.45±1.10	0.78	0.94		
	P15	1.73±1.13	0.90	0.93		
Feelings	F16	1.35±0.94	0.72	0.89	0.90	0.95
	F17	1.29±1.00	0.69	0.89		
	F18	1.18±1.04	0.84	0.87		
	F19	1.17±1.07	0.73	0.89		
	F20	1.08±0.92	0.72	0.89		
	F21	1.13±1.02	0.70	0.89		
Body image	B22	1.78±0.69	0.56	0.78	0.79	1.00
	B23	1.65±0.64	0.69	0.65		
	B24	1.59±0.62	0.64	0.70		
Physical health	H25	0.94±0.25	0.64	0.89	0.90	1.00
	H26	0.96±0.21	0.77	0.87		
	H27	0.95±0.22	0.78	0.87		
	H28	0.94±0.25	0.68	0.88		
	H29	0.95±0.22	0.76	0.87		
	H30	0.92±0.27	0.69	0.88		
	H31	0.93±0.25	0.59	0.89		
Sexual functioning	S32	0.93±0.25	0.93	0.81	0.90	1.00
	S33	0.90±0.30	0.87	0.83		
	S34	0.92±0.27	0.78	0.87		
	S35	0.87±0.34	0.54	0.85		
General health	G36	2.05±0.90	0.42	0.87	0.86	1.00
	G37	1.40±0.66	0.85	0.80		
	G38	1.39±0.69	0.74	0.82		
	G39	1.36±0.71	0.70	0.83		
	G40	1.51±0.67	0.73	0.82		
	G41	1.26±0.79	0.65	0.83		
	G42	0.68±0.48	0.32	0.88		
Relationship with other	R43	1.60±0.90	0.52	0.79	0.81	1.00
	R44	2.14±0.83	0.59	0.77		
	R45	2.20±0.82	0.58	0.77		
	R46	1.81±0.95	0.51	0.79		
	R47	1.89±0.94	0.51	0.79		
	R48	2.06±0.84	0.53	0.78		
	R49	1.94±0.86	0.54	0.78		
Total Cronbach's alpha					0.79	

SD: Standart deviation, Std: Standardized

Table 5. Test-retest statistical analysis results of the scale (n=75)

Subdimensions	Test Mean ± SD	Re-test Mean ± SD	Test value	p	r	p
Physical activity	11.51±2.38	11.47±2.61	0.115[t]	0.909	0.268[p]	0.020
Pain	6.75±4.22	6.81±4.07	-0.962[t]	0.339	0.990[p]	p<0.001
Feelings	6.21±3.88	6.27±3.88	-1.424[t]	0.159	0.997[p]	p<0.001
Body image	5.73±1.29	5.77±1.26	-1.000[t]	0.321	0.963[p]	p<0.001
Physical health	6.52±0.95	6.43±1.04	-1.097[w]	0.273	0.700[s]	p<0.001
Sexual functioning	3.56±0.93	3.57±0.93	-0.577[w]	0.564	0.971[s]	p<0.001
General health	8.88±4.05	8.80±4.00	1.621[t]	0.109	0.994[p]	p<0.001
Relationship with other	15.28±1.80	15.31±1.82	-0.497[t]	0.620	0.967[p]	p<0.001

[t]: Paired-samples t-test, [w]: Wilcoxon, [p]: Pearson correlation coefficient, [s]: Sperman correlation coefficient, SD: Standart deviation

CFA was used for construct validity in its adaptation to Turkish. CFA is performed to investigate the fit of an existing scale or model in a new data set, in other words, to test whether the factor structure is verified[18]. CFA was not performed at the original scale. However, model fit indices, which were not examined in the original article, were examined in our study. The fit of the data to the model is tested using chi-square fit statistics. If the Chi-square value (χ^2/df =1.064) of the BCSQOL scale is less than 2, this indicates that the model has an acceptable goodness of fit. In this scale adaptation study, the RMSEA score was below 0.05, indicating a perfect fit (Table 3). Among the other fit indices obtained as a result of CFA; CFI, AGFI, NFI, TLI, and IFI values were found to be a perfect fit of the model, while GFI and SRMR values were found to be an acceptable fit. In the study, the goodness of fit indices of the scale was found at the desired level, generally showing an excellent fit.

Reliability

Reliability is the power to obtain the same results when the scale measures the concept or dimension repeatedly[11]. The reliability of the scale adapted in the study was evaluated with test-retest reliability, Cronbach's alpha, and omega coefficients. Test-retest reliability is measured by comparing the results obtained from the same participants of the same scale at different times. In this study, the scale was re-applied to 75 individuals with an interval of 2 weeks to evaluate the test-retest reliability of the scale, and a significant positive correlation was found between them (p<0.001).

However, the test-retest correlation for the physical activity subdimensions was relatively low (r=0.268), indicating a weak positive relationship between the test and retest scores. Although this correlation was statistically significant, several factors may explain the low stability. The time interval between the test and retest could have contributed to genuine changes in participants' physical activity levels. Moreover, individual differences in postoperative recovery processes, including variations in physical limitations and pain levels, may have influenced physical activity behaviors during the study period. Psychosocial factors, particularly emotional states such as depression and anxiety, might also have limited participants' physical activity levels. These findings suggest that the low correlation reflects the natural variability in physical activity during recovery rather than a limitation of the scale itself. Future studies may benefit from exploring these factors in more detail to better understand their impact on the stability of physical activity measurements.

"Item-total score correlation analysis" is applied to determine how much the items in the scale are related to the measured theoretical structure following reliability analysis. In the literature, it is stated that the item-total score correlation coefficient values should be positive and above 0.30[19]. In the study, the values in which the item-total score correlation coefficients ranged from 0.32 to 0.93 indicate that the items in the scale are a reliable measurement tool for assessing the quality of life of individuals who had undergone surgery for breast cancer.

Cronbach's alpha coefficient measures the correlations between the items of the scale and evaluates the internal consistency of the scale. In scales with multifactorial items, the omega reliability coefficient is more recommended than the Cronbach's alpha value[20]. Like Cronbach's alpha coefficient, the omega coefficient measures the correlations between the items of the scale and gives information about the consistency[20]. In the study, the Cronbach's alpha coefficient of the subdimensions of the scale ranged from 0.79 to 0.95; the omega coefficient was found between 0.87 and 1.00. In addition, all corrected item correlation values for all subdimensions of the scale were positive as a result of the reliability analysis. There was no significant increase in the reliability coefficients for all eight subdimensions when the item was removed from the subdimensions. Finally, when

Cronbach alpha and omega coefficients of all subdimensions of the scale are evaluated, it can be said that the scale has "highly reliable" internal consistency.

The adaptation of the BCSQOL scale into Turkish has important clinical and academic implications. Clinically, having a culturally and language validity appropriate tool enables healthcare professionals to more accurately assess the specific physical and psychosocial challenges faced by patients undergoing breast cancer surgery in Türkiye. This, in turn, facilitates the development of individualized care plans and targeted interventions aimed at improving patients' quality of life during the postoperative period. Academically, the adapted scale provides researchers with a valid and reliable instrument to investigate quality of life outcomes in this population, supporting future studies and contributing to the national and international literature on breast cancer survivorship. Furthermore, the availability of this scale in Turkish may promote multicenter or cross-cultural research collaborations focused on enhancing the well-being of breast cancer patients.

Study Limitations

The limitations of the study include the failure to evaluate the quality of life of male patients who underwent surgery for breast cancer, as the sample consisted exclusively of female patients. Additionally, the inability to generalize the research findings is another limitation, as the data were collected from a single center. This single-center design may limit the representativeness of the sample, as it may not fully capture the diversity of patient populations in different geographic locations or healthcare settings. Therefore, the results may not be applicable to broader or more heterogeneous populations, and caution should be taken when attempting to apply the findings outside the context of the study. Future research with multi-center designs is needed to enhance the generalizability and external validity of the results.

CONCLUSION

As a result of the psychometric analysis, it was determined that the BCSQOL scale, consisting of 49 items and 8 subdimensions, adapted to Turkish, has adequate psychometric properties. Only a Turkish adaptation of the scale was carried out in this research. An adapted scale may be used in clinical settings and academic studies to evaluate the postoperative quality of life of women who had surgery for breast cancer.

This adapted scale has been specifically designed to assess the quality of life of patients undergoing breast cancer surgery. Using this scale enables healthcare professionals, particularly nurses, to gain a more accurate and comprehensive assessing of these patients' quality of life in the early postoperative period. This includes identifying factors such as pain, body image, physical activity and emotional distress that directly impact recovery and well-being. Furthermore, the obtained data can be used to plan interventions aimed at improving patients' quality of life. This facilitates the implementation of care strategies tailored to both physical and psychosocial needs. Consequently, using this scale enhances the quality of patient care, helps to manage the challenges encountered during recovery more effectively, and ultimately improves patient satisfaction.

Ethics

Ethics Committee Approval: Ethical approval for the study University of Health Sciences Türkiye Gülhane Faculty of Medicine Clinical Research Ethics Committee (decision no: 2022/36, date: 25.10.2022).

Informed Consent: Prior to data collection, all participants were informed about the purpose and procedures of the study, and both written and verbal informed consent were obtained.

Acknowledgment

We would like to thank all the patients who agreed to participate in the study.

Footnotes

Authorship Contributions

Concept: S.K., E.E., Design: E.E., M.S., Data Collection or Processing: S.K., E.E., Analysis or Interpretation: M.S., Literature Search: S.K., M.S., Writing: S.K., M.S.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

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