Development and Psychometric Validation of the Korean Version of the Stressors in Breast Cancer Scale: An Application of Rasch Analysis

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한국어판 유방암 스트레스 측정도구(K-SBCS)의 개발 및 심리계량적 타당도 검증: 라쉬 모델의 적용

김성해

Abstract

Breast cancer-related stress among survivors is multifaceted and shaped by sociocultural context; however, no Korean version of a breast cancer-specific stress measure has yet been psychometrically validated.This study aimed to translate and culturally adapt the Stressors in Breast Cancer Scale (SBCS) into Korean and to evaluate the psychometric properties of the Korean version of the Stressors in Breast Cancer Scale (K-SBCS) among Korean breast cancer survivors (BCS). A methodological study was conducted with 235 Korean breast cancer survivors between February and May 2025. The SBCS was translated using forward translation, back-translation, expert review, and pilot testing. Construct validity was examined using exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and Rasch model analysis. Results of analysis, the final K-SBCS consisted of 16 items across four factors: 'Role and Health related Psychological Burden', 'Concerns and Future Uncertainty', 'Family and Interpersonal Strain', and 'Body Image and Perceived Attractiveness Changes'. EFA supported the four-factor structure, explaining 61.59% of the total variance. CFA showed acceptable model fit (χ^2/df = 2.34, comparative fit index = .94, Tucker-Lewis index = .93, incremental fit index = .94, and root mean square error of approximation = .07). Construct reliability (.86-.89) and average variance extracted (.58-.67) supported convergent validity, and discriminant validity was also confirmed. Concurrent validity was supported by a significant correlation with the Korean version of the Depression Anxiety Stress Scale-21 (K-DASS-21) (r = .66, p < .001). Rasch analysis indicated acceptable person reliability (.85), item reliability (.97), and internal consistency (Cronbach's α = .86). The K-SBCS is a valid and reliable instrument for measuring multi-dimensional stressors in Korean breast cancer survivors. The instrument may be useful in clinical practice and research for identifying culturally relevant stressors and guiding supportive interventions.

1. Introduction

Breast cancer is the most commonly diagnosed cancer among women worldwide, and the growing number of survivors has shifted attention from survival alone to long-term psychosocial well-being and quality of life [1,2]. Breast cancer survivors (BCS) often encounter multiple stressors across the disease trajectory, including fear of recurrence, changes in body image, role limitations, interpersonal difficulties, and future uncertainty [2,3].

Although general psychological distress scales are frequently used, they do not fully reflect stressors that are unique to the breast cancer experience [3,4]. To address this gap, Cerezo et al. developed the Stressors in Breast Cancer Scale (SBCS), a multidimensional instrument designed to assess breast cancer-specific stress [3]. However, because the original scale was developed in a Western cultural setting, direct application to Korean survivors may be limited without linguistic and cultural adaptation [5,6].

This study therefore aimed to develop the Korean version of the Stressors in Breast Cancer Scale (K-SBCS) and to examine its psychometric properties among Korean breast cancer survivors.

2. Methods

2.1 Study design

This was a methodological study conducted to translate, culturally adapt, and psychometrically validate the K-SBCS.

2.2 Translation

The translation procedure followed established recommendations for cross-cultural adaptation of self-report instruments [5,6]. Two translators whose native language was Korean independently translated the original SBCS into Korean. After reconciliation of the two translations, the Korean draft was back-translated into English by two bilingual nursing professors whose native language was English and who were blinded to the original scale. The translated versions were compared with the source instrument to ensure semantic and conceptual equivalence.

Content validity was reviewed by an expert panel of eight specialists. The scale-level content validity index/average was .93. Three items that did not meet the recommended item-level criterion were excluded, leaving a 21-item preliminary Korean version. A pilot test with 10 breast cancer survivors confirmed the clarity and comprehensibility of the translated items.

2.3 Participants

Participants were recruited between February and May 2025 through online breast cancer survivor communities and related networks in South Korea. Eligible participants were women aged 20-69 years who had been diagnosed with breast cancer, were able to complete a Korean-language questionnaire, and agreed to participate voluntarily. Of 245 collected questionnaires, 10 were excluded because of insufficient responses. Thus, 235 participants were included in the final analysis. The study was approved by the institutional review board (IRB No. 202409-HR-003).

2.4 Measures and analysis

The original SBCS contains 24 items covering five domains: physical appearance and sex strains, health and daily difficulties, interpersonal relationship strains, healthcare strains, and worries and concerns about the future [3]. Psychological distress was measured using the Korean version of the Depression Anxiety Stress Scale-21 (K-DASS-21) [4].

Data were analyzed using SPSS 25.0, AMOS 30.0, and Winsteps. Construct validity was examined using exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and Rasch model analysis. Convergent validity was assessed using standardized factor loadings, construct reliability (CR), and average variance extracted (AVE). Discriminant validity was examined by comparing AVE values with squared inter-factor correlations [7]. Concurrent validity was tested using Pearson's correlation coefficient between the K-SBCS and the K-DASS-21. Reliability was evaluated using Cronbach's α and Rasch person/item reliability indices.

3. Results

3.1 General demography of participant

The mean age of participants was 47.54 ± 8.09 years. Most participants were married. Clinically, stage I breast cancer was the most common, followed by stage II and stage 0. The largest proportion had been diagnosed within 1 to <3 years, and breast-conserving surgery was the most frequent surgical treatment.

3.2 Exploratory factor analysis

The first EFA was conducted on the 21-item preliminary version using maximum likelihood extraction with promax rotation. A four-factor solution was identified and explained 61.59% of the total variance. However, five items did not meet the retention criteria. Items 15 and 21 were excluded because their communalities were below .40, whereas Items 6, 13, and 14 were removed because their factor loadings were below .50.

A second EFA was then performed on the remaining 16 items. The data were suitable for factor analysis, with a Kaiser-Meyer-Olkin value of .87 and a significant Bartlett's test of sphericity ($\chi^2 = 3274.83$, $df = 210$, $p < .001$). The final four-factor structure was interpreted as follows: 1) Role and Health related Psychological Burden,

[Table 1] Final items and factor structure of the Korean Version of the Stressors in Breast Cancer Scale (K-SBCS)

Factor	No.	Item	1	2	3	4	AVE	C.R.
Role- and Health-Related Psychological Burden	20	Thinking about how the disease will affect my family	0.87	-0.08	0.05	0.05	0.63	0.89
	10	Finding it hard to take care of family members who depend on me (e.g., children, grandchildren, parents)	0.86	0.05	-0.04	-0.07		
	16	Feeling that healthcare providers do not offer sufficient solutions for my symptoms	0.73	-0.14	-0.02	0.02		
	4	Feeling distress in general	0.65	0.11	0.10	0.01		
	8	Being restricted in meeting with friends	0.59	0.17	0.19	0.02		
Concerns and Future Uncertainty	19	Thinking about how the disease will affect my work	0.17	0.89	-0.30	0.01	0.58	0.87
	5	Feeling tired	-0.03	0.85	-0.02	-0.03		
	7	Finding it hard to engage in hobbies or leisure activities	-0.29	0.79	0.16	-0.02		
	17	Thinking that I may have a relapse	0.02	0.64	0.14	0.01		
	18	Finding it difficult to make plans for the future	0.16	0.61	0.07	0.03		
Family and Interpersonal Strain	11	Having conflicts with close family members (e.g., spouse, children, parents)	-0.06	0.08	0.91	0.02	0.67	0.86
	9	Feeling that some friends are not interested in me	0.15	-0.10	0.72	-0.04		
	12	Feeling that my family members do not pay enough attention to what I say or think	0.14	0.01	0.69	0.00		
Body Image and Perceived Attractiveness Changes	1	Experiencing changes in physical appearance	-0.06	0.09	0.01	0.93	0.67	0.86
	2	Having my breast removed or deformed	-0.01	-0.02	0.02	0.83		
	3	Feeling less attractive	0.09	-0.11	-0.05	0.68		
Eigen Value			6.48	2.32	1.80	1.14		
Explained variance (%)			38.32	12.46	8.91	5.26		
Kaiser-Meyer-Olkin (KMO) = .87, Bartlett's test of sphericity = 3274.83, p <.001								

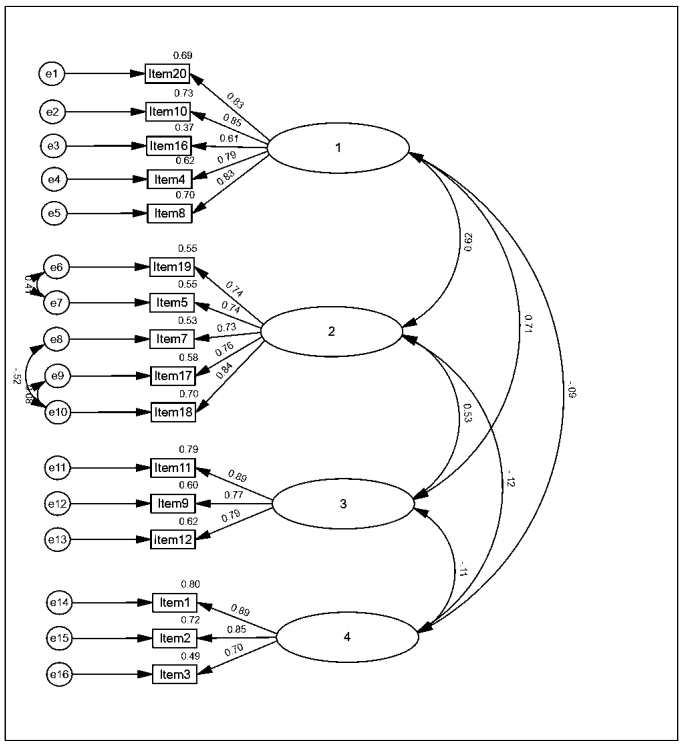
2) Concerns and Future Uncertainty, 3) Family and Interpersonal Strain, and 4) Body Image and Perceived Attractiveness Changes (Table 1).

3.3 Confirmatory factor analysis

CFA was performed to test the four-factor model derived from the EFA. The initial model showed acceptable but suboptimal fit. After model refinement guided by modification indices, the final model demonstrated acceptable fit: χ^2 = 222.57, df = 95, p < .001, χ^2/df = 2.34, CFI = .94, TLI = .93, IFI = .94, NFI = .91, and RMSEA = .07. Standardized factor loadings ranged from .61 to .89 (Figure 1).

3.4 Convergent, discriminant, and concurrent validity

Convergent validity was supported by CR values ranging from .86 to .89 and AVE values ranging from .58 to .67. Discriminant validity was confirmed because the AVE values of all factors exceeded the squared inter-factor correlations, which ranged from .01 to .51. Concurrent validity was supported by a significant positive correlation between the K-SBCS and the K-DASS-21 (r = .66, p < .001).

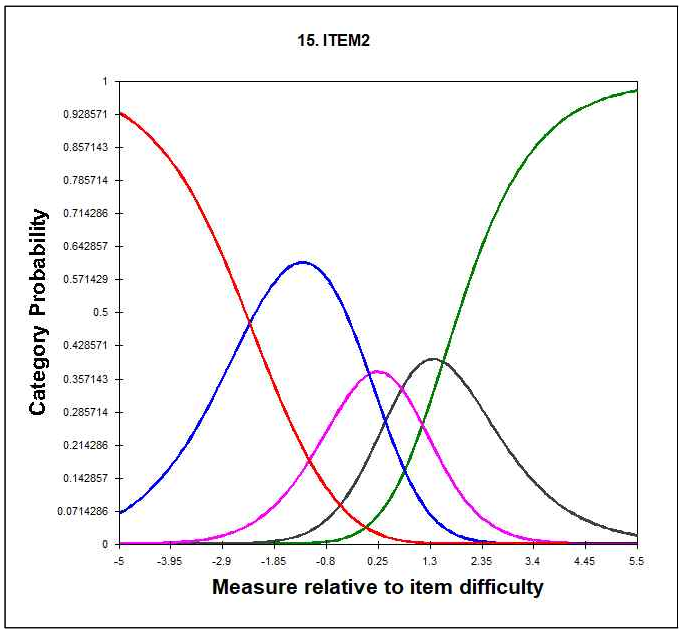


[Fig. 1] Final model of the K-SBCS

3.5 Rasch model analysis and reliability

Rasch analysis showed acceptable person reliability (.85) and item reliability (.97), indicating stable item hierarchy and adequate differentiation of participant stress levels. Item difficulty estimates ranged from −1.04 to 0.81 logits.

The person-item map showed that both items and participants were concentrated mainly in the middle range of the latent continuum, suggesting that the K-SBCS is particularly sensitive to moderate levels of breast cancer-related stress (Figure 2). Most items demonstrated acceptable fit, although several body image-related items showed relatively high fit statistics and may require further monitoring. Internal consistency was satisfactory, with Cronbach's α = .86.



[Fig. 2] Item-person map for K-SBCS

4. Discussion and Conclusion

This study developed and validated the K-SBCS for Korean breast cancer survivors. The final scale consisted of 16 items across four factors, rather than the original five-domain structure. This difference suggests that breast cancer-related stress in Korean survivors may be organized somewhat differently, potentially reflecting culturally embedded experiences of family role burden, health-related burden, interpersonal strain, and future uncertainty.

Overall, the K-SBCS demonstrated acceptable construct validity, concurrent validity, Rasch-based measurement properties, and internal consistency. The findings suggest that this instrument can be used to identify multidimensional and culturally relevant stressors in Korean breast cancer survivors and may support psychosocial assessment and tailored supportive care.

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