



Original Article

Validation and psychometric properties of the multidimensional scale of perceived social support among Korean breast cancer survivors

Mijung Kim^b, Hyun-E Yeom^{a,*}, Mi Sook Jung^a^a Department of Nursing, Chungnam National University, Daejeon, Republic of Korea^b Department of Nursing, Catholic Kkottongnae University, Chungju, Republic of Korea

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ABSTRACT

Objective: Social support plays a key role in dealing with various challenges accompanying cancer treatment and survivorship. The multidimensional scale of perceived social support (MSPSS) is a valid measurement used globally to assess general support from social interpersonal relations. This study aims to validate the psychometric properties of the Korean version of the MSPSS among Korean women with breast cancer.

Methods: Two independent cross-sectional studies collected data from 349 non-metastatic breast cancer survivors. Statistical analyses of confirmatory factor analyses, *t*-test, and Pearson correlation were performed to test construct validity, including factorial structure, concurrent validity, and known-group comparisons. Internal consistency and test–retest reliability were used to evaluate the reliability.

Results: Factor analysis confirmed a three-factor construct (i.e., family, friends, and spouse) with good fit indices. Concurrent validity was verified by correlations with social well-being and interpersonal relationships, which are theoretically relevant concepts. Known-group validity was also confirmed by different MSPSS scores according to depression and symptom distress levels. Reliability was supported by good internal consistency and acceptable test–retest correlation coefficients.

Conclusions: The findings demonstrate the MSPSS is a valid and reliable measurement to assess the extent to which women with breast cancer perceive social support from spouses, other family members, and friends in Korea. Further studies should verify the psychometric properties of the MSPSS in patients with other cancers beyond breast cancer. Health professionals could administer the MSPSS to evaluate the diverse resources of social support among cancer survivors.

Introduction

Recent statistics indicate that breast cancer is the most common cancer in women worldwide but has a relatively high five-year survival rate.¹ Breast cancer survivors face multifaceted challenges in cancer diagnosis and treatment that cause physical and psychosocial distress, such as fatigue, pain, depression, anxiety, social isolation, and loneliness.² These problems could accelerate functional declines that limit social engagement based on interpersonal interactions³ and threaten cancer patients' health-related quality of life.⁴

Social support refers to a broad range of psycho-emotional and material resources given to individuals based on interpersonal relationships and interactions.⁵ A substantial body of literature has addressed the pivotal role of social support in improving intrapersonal competencies to cope with cancer-related distress, such as a fighting temperament,⁶

resilience,⁷ psychological adjustment,⁸ posttraumatic growth,⁹ and quality of life.¹⁰ More importantly, social support and integration based on interpersonal connections were beneficial in prolonging the survival of cancer patients and reducing their risk of death.¹¹ Despite their critical role, there is limited information regarding the reliable and valid measurement applicable to assess social support perceived by cancer patients from diverse interpersonal sources within social contexts.

The multidimensional scale of perceived social support (MSPSS) is a globally valid instrument used to measure the extent to which an individual perceives support in interpersonal relationships from family, friends, and significant others.^{12–16} The MSPSS has been applied in diverse clinical populations and caregivers who might need social support to deal with personal and family problems related to health-related crises, such as stroke, Parkinson's disease, Alzheimer's disease, and depression, across different countries.^{13–16} There are currently 22

* Corresponding author.

E-mail address: yeom@cnu.ac.kr (H.E. Yeom).<https://doi.org/10.1016/j.apjon.2022.01.004>

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translated versions of the MSPSS adapted for populations in non-English speaking countries.¹⁴ However, a systematic review underscored some limitations concerning insufficient evidence about the factor structure, partly linked to interpretational and translational issues rooted in cultural and linguistic diversity.¹⁴ Regarding this apparent critique, it is necessary to evaluate the psychometric properties of the Korean version of the MSPSS, validated for a specific population with diabetes in prior research,¹⁷ to build empirical evidence of it being a reliable and valid measure applicable to the Korean population.

In addition, measurement invariance based on gender has been emphasized as an essential consideration in interpreting MSPSS scores.¹⁸ Regarding the gender-specific characteristics of interpersonal relations, several studies have shown that compared to men, women are more likely to engage in social integration and be attached to social support based on their interactive, intimate relationships.^{19–21} In particular, findings in the cancer literature have noted a critical impact of psycho-emotional intimacy with partners on the adjustment to sexuality and quality of life changes during cancer therapy and survivorship among patients with sexual hormone-related cancers, such as prostate,²² breast,²³ and cervical cancer.²⁴ Furthermore, a comparative study examining partner support in cancer patients found that the mental and physical quality of life of female cancer patients was more strongly dependent on their partners' support than those in male cancer patients.²⁵ The findings indicate the need for an exhaustive investigation of the MSPSS concerning specific sociocultural characteristics and health-related crises across diverse populations. Although a few studies have reported the psychometric properties of the MSPSS among the cancer population,^{10,13,18,26} evidence is still lacking to confirm the psychometric properties of MSPSS in female cancer survivors.

Given the continuing growth in the incidence and prevalence of breast cancer, it is crucial to validate the psychometric properties of the MSPSS to provide sufficient social support through strategies tailored to patients' psychosocial and interactive needs. Therefore, the current study aimed to examine the psychometric properties of the adapted version of the MSPSS among breast cancer survivors in Korea.

Methods

Previous studies and samples

This study included multi-aspect examinations of female breast cancer survivors. Data from two independent cross-sectional studies conducted between June and September 2016 (Study 1) and between January and March 2021 (Study 2) were used for this study. Study 1 aimed to evaluate physical, psychological, and social factors that affect neurotoxic symptomatology in 190 breast cancer survivors. Study 2 explored the theory-based interconnections between interpersonal and behavioral characteristics and health-related quality of life among 220 breast cancer patients survivors. Although both studies were conducted for female cancer survivors treated for non-metastatic breast cancer, we assembled the data from Study 1 and Study 2 based on the following criteria.

The inclusion criteria for this study were women: (1) aged at least 19 years, (2) diagnosed with non-metastatic breast cancer, (3) completed adjuvant chemotherapy or radiation therapy for breast cancer, and (4) had a spouse. Individuals were excluded if they had uncontrolled cognitive disorders (confirmed through medical chart review) because of the possible effect of cognitive dysfunction on the ability to respond to the survey questionnaires. Based on the criteria, the data of 61 participants were omitted for this study; 15 participants in Study 1 and 44 participants in Study 2 were categorized under "no spouse" and two were duplicate participants in Study 1 and 2. Finally, the data from 349 participants (175 from Study 1 and 174 from Study 2) were used for this study. The methodological guideline suggests that ten samples for a single item are appropriate to reach statistical power for confirmatory factor analysis.²⁷ Therefore, the sample size is sufficient to evaluate the construct validity of the MSPSS.

Ethical considerations and procedures

The purposes and procedures for studies 1 and 2 were approved by the Institutional Review Board, where a principal investigator was affiliated (Approval No. 2-1046881-A-N-01-201605-HR-016-01-03 for Study 1 and 202101-SB-009-01 for Study 2).

Participants of studies 1 and 2 were recruited at a cancer center of a university hospital located in a central region of South Korea. To recruit the study participants, the principal investigator and research assistants (trained by a principal investigator) spoke to a potential participant in the outpatient division and provided information regarding the purpose of the study and procedures for the participation. Notably, the explanation of ethical considerations, including potential benefits, risks, and a right to protect the participants' privacy, was provided to every participant. In addition, all participants who voluntarily agreed to participate signed the informed consent form.

Data of both studies 1 and 2 were collected through self-administered surveys in an independent room to maintain privacy. Research assistants helped clarify accurate meaning and understand any ambiguous expression if a participant had any questions. It is beneficial to reduce missing values and methodological bias in collecting data via self-administered surveys.²⁸ The average time to complete the survey took 10–15 min.

Measures

Multidimensional scale of perceived social support (MSPSS)

We used the Korean version of the MSPSS validated in middle-aged women with diabetes in Korea.¹⁷ The original MSPSS was validated as a reliable measure to assess the general perception of social support in various populations, and translated versions into different languages have been validated globally.^{13–16} The original MSPSS consists of 12 items asking about the levels of perceived support from family (four items), friends (four items), and a special someone (four items). As done previously with the Korean version validated for women with diabetes,¹⁷ we changed "a special someone" into "a spouse" to assess social support, notably including spouses' support. The term special person implies an individual rather than a marital status, which tends to be vague and unspecified, especially when considering the interpersonal relations within the Confucian ethics in Korean culture.²⁹

Respondents scored the level of agreement for each item on a seven-point Likert scale ranging from 1 (*very strongly disagree*) to 7 (*very strongly agree*). The scores of 12 items were summed, and the possible score ranged from 12 to 84 for overall perceived social support. The scores of three domains composed of four items, respectively, ranged from 4 to 28. The Cronbach's alpha of the MSPSS was .88 for the original scale and 0.90 for the Korean-translated scale. In this study, the internal consistency (Cronbach's alpha) was 0.91 for the full scale, and the three domains regarding spouse, family, and friends were 0.96, 0.90, and 0.90, respectively.

Social and family-related well-being

Social and family well-being was assessed using the Korean version of Functional Assessment of Cancer Therapy-General (FACT-G).³¹ The FACT-G consists of 27 items categorized into four domains: physical, social or family, emotional, and functional well-being. The social or family domain was assessed in this study. Respondents scored each item on a five-point Likert scale from 0 (*not at all*) to 4 (*very much*), with higher scores indicating a better health-related quality of life. The Korean version of FACT-G showed a good internal consistency (Cronbach's alpha) with 0.86 in a previous study³⁰ and 0.85 in this study.

Positive relations with others

Relationships with others were measured with one sub-dimension of the validated Korean version of the psychological well-being scale.³¹ The dimensions of positive relations were assessed using seven items on a six-point Likert scale. A higher score indicates that an individual has

warm and trusting relationships with others. The internal consistency in this study was Cronbach's alpha 0.77.

Depression

The Korean version of the Patient Health Questionnaire-9 (PHQ-9) was used to assess participants' depressive mood levels.³² The PHQ-9 consists of nine items scored on a four-point Likert scale ranging from 0 (*not at all*) to 3 (*nearly every day*). Higher scores indicate a more depressed mood. The internal consistency (Cronbach's alpha) ranged from 0.86 to 0.89 in previous studies,³² and 0.85 in the present study.

Cancer-related symptom distress

Symptom distress related to breast cancer was assessed using the Korean version of the Condensed Memorial Symptom Assessment Scale (CMSAS).³⁴ The CMSAS consists of 14 items asking about the frequency and severity of physical and psychological symptoms rated on a five-point Likert scale. Prior study about cancer patients has confirmed the reliability of the Korean version of CMSAS,³³ and the internal consistency in this study was Cronbach's alpha 0.89.

Demographic and breast cancer-related clinical characteristics

Sociodemographic characteristics included age, living status, years of education, and employment status. The breast cancer-related clinical features included cancer stage, types of therapies for treating breast cancer, chemotherapy status, and the months since the surgery. This information was obtained from electronic medical records.

Data analysis

Data analysis was performed using the SPSS 26.0 and Amos 23.0 software packages (IBM Corp., Armonk, NY, USA). Preliminary and descriptive statistics were computed to describe participants' demographic and breast cancer-related clinical characteristics and measures. The psychometric properties of the MSPSS were tested by construct validity and reliability in terms of structure validity, convergent and discriminant validity, concurrent validity, known-group validity, internal consistency, and test-retest reliability.

First, the structural validity of the three-factor structural model was tested using confirmatory factor analysis (CFA) with maximum likelihood estimation. The goodness of fit was evaluated using multiple indices: χ^2/df (<3), comparative fit index (CFI >0.90), Tucker Lewis index (TLI >0.90), root-mean-square error of approximation (RMSEA <0.08), and standardized root-mean-square residual (SRMR <0.08).²⁸

For convergent and discriminant validity, average variance extracted (AVE) was calculated based on CFA using the formula noted by Fornell and Larcker.³⁴ A cut-off value of 0.50 was considered to evaluate the adequacy for convergent validity, and the AVE square root for each sub-dimension should be greater than the correlation coefficients between sub-dimensions to verify discriminant validity.³⁴

Concurrent validity was evaluated using Pearson's correlation coefficients between the MSPSS and social or family well-being or positive relations with others. The two concepts were chosen as the criterion to assess conceptual relevance with the MSPSS since evidence suggests an association between social support, psychosocial quality of life, and interpersonal relations.^{7,10,31} In particular, the quality of life is considered one of the most expected health outcomes in cancer patients,^{35,36} and a large body of cancer literature has demonstrated social support as a key related to a better quality of life.^{7,10} Moreover, the concept of positive relations with others reflects the extent to which individuals perceive belonging to social ties and satisfaction with the quality of interaction with others.³¹ This implies that the view toward positive relations with others reflects concordant perspectives with the social support regarding the interpersonal link.

Known-group validity was examined using an independent *t*-test to evaluate whether the MSPSS could discriminate individuals with different depressive condition levels (i.e., depression versus non-

depression groups) and symptom distress (i.e., symptom distress versus non-symptom distress groups). Empirical evidence has shown that social support is negatively associated with depressed mood and symptom distress in patients with cancer.¹⁰ We classified depression and non-depression groups based on a cut-off score of 5 based on previous research that noted an optimal cut-off point of the PHQ-9 in Korean psychiatric patients.³⁷ We hypothesized that the scores of the whole MSPSS and its sub-dimensions would differ according to depressive conditions and symptom distress levels.

Internal consistency was examined with Cronbach's alpha coefficients of the MSPSS and the sub-dimensions, composite reliability (CR) using CFA, and item-total and inter-item correlations. Cronbach's alpha of 0.70 considers an acceptable level of reliability, which means items measure the same underlying construct.³⁸ The acceptable CR value is greater than 0.70.³⁹ Acceptable ranges for item-total correlations (0.30–0.80) and inter-item correlations (0.15–0.50) are considered.⁴⁰

Test-retest reliability was evaluated using Pearson's correlation coefficients of the MSPSS scores between pre-and post-test. Moderate correlation ($0.5 \leq r \leq 0.7$) indicates good reliability between the test and retest.²⁸

Results

Sample characteristics

Table 1 presents participants' demographic and breast cancer-related characteristics. The mean age was 50.95 years (*SD* = 8.32). Most participants were well-educated with average years of schooling (*M* = 13.40, *SD* = 2.79) and currently unemployed (*n* = 225, 64.5%). For breast cancer-related clinical characteristics, 40.4% (*n* = 141) were diagnosed with stage II, followed by stage I (*n* = 123, 35.2%). More than half of the participants underwent mastectomy (*n* = 211, 60.5%) and chemotherapy (*n* = 278, 79.7%). The average duration after surgical therapy was 21.14 months (*SD* = 10.28).

Item analysis of the MSPSS

The overall sum score of MSPSS was 71.24 (*SD* = 13.20) and the sum scores of three sub-dimensions were 23.45 (*SD* = 6.80) for the spouse, 24.94 (*SD* = 4.50) for family, and 22.85 (*SD* = 5.44) for friends. The mean score of every single item within a whole MSPSS ranged from 5.15 (*SD* = 1.80) to 6.34 (*SD* = 1.19) (Table 2). The mean scores of items within three sub-dimensions ranged from 5.72 to 5.93 for the spouse,

Table 1
Demographic and breast cancer-related characteristics of the participants (*n* = 349).

	Mean ± SD (Range)	<i>n</i> (%)
Age (years)	50.95 ± 8.32 (31–73)	
Living		
With spouse only		83 (23.8)
With spouse and another family member		266 (76.2)
Education (years)	13.40 ± 2.79 (6–23)	
Employment status		
Employed		124 (35.5)
Unemployed		225 (64.5)
Stage of cancer		
0		32 (9.2)
I		123 (35.2)
II		141 (40.4)
III		53 (15.2)
Type of surgery		
Lumpectomy		138 (39.5)
Mastectomy		211 (60.5)
Chemotherapy treatment		
Yes		278 (79.7)
No		71 (20.3)
Since operation (months)	21.14 ± 10.28 (1–62)	

6.14–6.34 for family, and 5.15–5.96 for friends. The rate of missing values was .0%, and the ceiling effect for each item ranged 30.4%–65.0%, and the floor effect ranged 0.9%–7.4%. In addition, skewness for ranged –0.74(–)2.35, and kurtosis for ranged 0.45–5.75 for all items, indicating an acceptable range.²⁷

Construct validity

Structural validity

Confirmatory factor analysis confirmed the goodness of fit of the three-factor structural model of the MSPSS (Table 2). All MSPSS items were allocated to three factors that were the same as the original structure of the MSPSS. Specifically, the subscales of support sources, including four items of spouse, family, and friends, respectively, were assigned. The model demonstrated a good fit to the data: $\chi^2/df = 3.496$, $CFI = 0.966$, $TLI = 0.956$, $RMSEA = 0.085$, and $SRMR = 0.038$.

Convergent and discriminant validity

The AVE values for the three factors of the MSPSS were 0.67 for a spouse, 0.59 for family, and 0.48 for friends. The AVE for spouses and families, over a cut-off of 0.5, was acceptable. The AVE of the friend, less than 0.5, was not sufficient, but the CR was satisfactory at over 0.7, indicating adequacy.³⁹ Thus, the convergent validity was verified.

The AVE square root for each sub-dimension was 0.82 for spouses, 0.77 for families, and 0.69 for friends, which were greater than the correlation coefficients ($r = 0.36, 0.49, 0.52$) between sub-dimensions (Figure 1). The results verify discriminant validity.

Concurrent validity

As shown in Table 3, the whole scale of the MSPSS and three sub-dimensions were moderately correlated with social or family well-being and positive relationships with others ($r = 0.56$ to $0.59, P < 0.001$). In particular, the sub-dimension of friends was the most strongly correlated with interpersonal relationships ($r = 0.60, P < 0.001$), while the sub-dimension of spouse was the most weakly correlated with social or family well-being ($r = 0.31, P < 0.001$).

Known-group validity

The results of independent *t*-tests showed significant differences in the whole MSPSS and sub-dimensions between groups categorized by the levels of depressive state and symptom distress (Table 4). The full scale and two sub-dimensions, including family and friends, significantly differed by depressive state ($P < 0.01$). However, the spouse sub-dimension was not entirely different according to depressive state ($P = 0.253$). Additionally, the scores of the whole MSPSS and the three sub-

dimensions significantly differed between the symptom distress and non-symptom distress groups.

Reliability

Internal consistency for the whole of the MSPSS and three sub-dimensions (i.e., spouse, family, and friends) was sufficient, with Cronbach's alpha coefficients of 0.91 for all items, 0.96 for a spouse, 0.90 for family, and 0.90 for friends. The CR values for the three sub-dimensions of the MSPSS were 0.89 for a spouse, 0.85 for family, and 0.78 for friends, which were satisfactory over the cut-off of 0.70.³⁹ The item total scale correlation coefficients ranged from 0.56 to 0.74, with a mean value of 0.65 (see Table 2). Item-to-item correlation coefficients ranged from 0.26 to 0.90, with an average item-to-item correlation of 0.46. The result was satisfactory for the criteria in an adequate range ($0.15 \leq r \leq 0.50$) of the average inter-item correlation coefficient.⁴⁰

The correlation coefficients for 17 days (range = 7–29 days, $n = 14$) verified the test–retest reliability. The correlation coefficients were 0.79 for the whole scale, and each sub-dimension was .62 for a spouse, .55 for family, and 0.71 for friends.

Discussion

This study demonstrated the psychometric properties of the MSPSS, which captures multidimensional interpersonal support, in terms of the spouse, family, and friends of breast cancer survivors, based on the evidence of structural validity, concurrent validity, know-group validity, and internal consistency.

The CFA proved a specific three-factor structure with appropriate fit indices, which was consistent with the empirical findings of the original MSPSS.¹² However, some studies reported a unifactorial structure⁴¹ or a two-factor structure in which the dimension of “special someone” merged into the dimension of either friends or family.^{42–44} Dambi et al.¹⁴ addressed this inconsistency concerning linguistic and socio-contextual variances in cross-cultural translations. The original version of the MSPSS did not precisely identify who a special someone is. Therefore, the meaning of this term could be differently interpreted or modified in a manner culturally appropriate.^{44,45} Consequently, the subscale reflecting a special someone was changed in several versions depending on the sociocultural context.^{17,44,46,47}

Based on the influence of Confucian values emphasizing interpersonal relationships, the term “special someone” tends to be used as an extended meaning to indicate someone that has a significant impact on an individual's daily life within all interpersonal networks allowed in the Confucian perspective.²⁹ This cultural perspective may prevent individuals

Table 2
Construct validity and reliability of the MSPSS ($n = 349$).

Sub-dimensions	Items	Scores	SD	Skewness	Kurtosis	FL	EE	CR	AVE	ITC	Cronbach's α
Spouse		23.45	6.80								
	There is a spouse who is around when I am in need.	5.93	1.78	–1.79	2.11	0.91	0.55	0.67	0.89	0.69	0.96
	There is a spouse with whom I can share joys and sorrows.	5.89	1.76	–1.70	1.82	0.94	0.35			0.72	
	I have a spouse who is a real source of comfort to me.	5.91	1.76	–1.74	1.93	0.96	0.27			0.74	
Family	There is a spouse in my life who cares about my feelings.	5.72	1.86	–1.49	1.03	0.92	0.54			0.71	
		24.94	4.50								
	My family really tries to help me.	6.31	1.20	–1.99	3.74	0.89	0.29	0.59	0.85	0.63	0.90
	I get the emotional help & support I need from my family.	6.14	1.32	–1.71	2.44	0.88	0.39			0.60	
Friends	I can talk about my problems with my family.	6.15	1.40	–1.95	3.35	0.76	0.81			0.66	
	My family is willing to help me make decisions.	6.34	1.19	–2.35	5.75	0.83	0.45			0.64	
		22.85	5.44								
	My friends really try to help me.	5.80	1.50	–1.38	1.43	0.82	0.74	0.48	0.78	0.59	0.90
All items	I can count on my friends when things go wrong.	5.15	1.80	–0.74	0.45	0.77	1.29			0.56	
	I have friends with whom I can share my joys and sorrows.	5.95	1.45	–1.66	2.31	0.87	0.53			0.60	
	I can talk about my problems with my friends.	5.96	1.46	–1.56	1.95	0.87	0.50			0.60	
		71.24	13.20								0.91

SD: standard deviation; AVE: average variance extracted; CR: composite reliability; EE: error estimate; FL: factor loading; ITC: item-total correlation

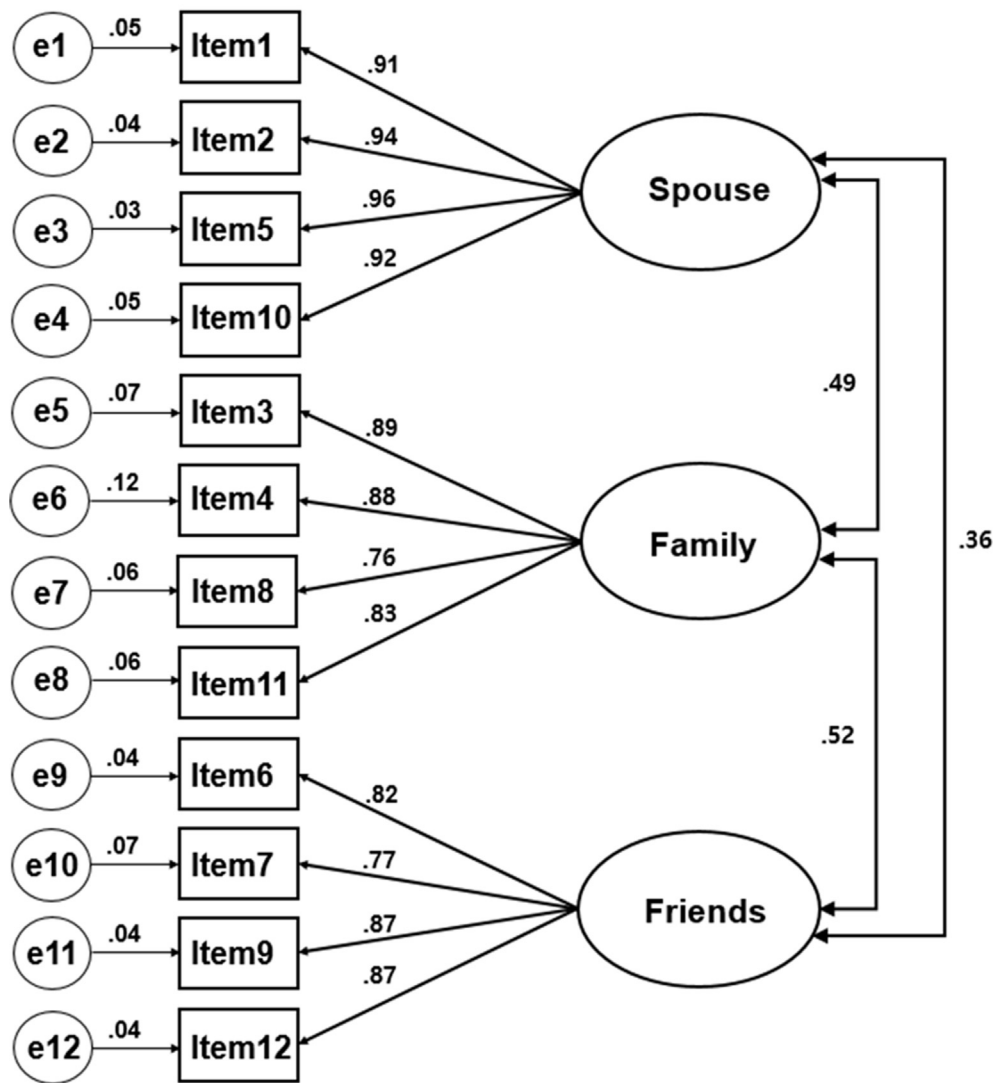


Figure 1. Standardized parameter estimates for the three-factor structure of the MSPSS among breast cancer survivors.

Table 3
Relationships of the MSPSS full-scale and sub-dimensions with theoretically relevant concepts.

	Social/family Well-being ^a	Positive Relations with Others ^b
	r (P)	r (P)
MSPSS Full-scale	0.56 (<0.001)	0.59 (<0.001)
Sub-dimensions		
Spouse	0.31 (<0.001)	0.46 (<0.001)
Family	0.56 (<0.001)	0.45 (<0.001)
Friends	0.47 (<0.001)	0.60 (<0.001)

MSPSS: Multidimensional scale of perceived social support.

^a Study 1 (n = 175).

^b Study 2 (n = 174).

from interpreting the meaning of “special someone” in the same way accepted in other cultures. Additionally, a study by Prezza et al⁴⁸ found that a majority of the participants responding to the MSPSS, particularly a married individual, recognized the special someone as a spouse. Considering the sociocultural context of our participants being rooted in Confucianism and Asian familism,³⁵ this study used “spouse” instead of “special someone” to capture gender-related unique characteristics of female cancer patients who had a spouse at the time of assessment.

Notably, the factor structure in the current study was consistent with those underlying the original scale, as factor loadings of the items about spouses were almost identical to those regarding a special someone in the original scale. Our findings were also concordant with prior evidence on middle-aged Korean women with diabetes.¹⁷ Additionally, the AVE values were sufficient to verify convergent and discriminant validity. It is also notable that the values of the spouse domain (AVE = 0.67, CR = 0.89) were relatively high compared to family and friends (AVE = 0.59 and 0.48, CR = 0.85 and 0.78). Taken together, the three-factor structure underlying the Korean MSPSS (i.e., family, friends, and spouse) was convincing, and the use of a spouse instead of a special person was valid.

Consistent with prior findings,⁴¹ the comparisons between groups according to depression and symptom distress levels demonstrated differences in the MSPSS total and sub-dimensions except for the spouse sub-dimension. Specifically, the scores of the spouse sub-dimension between the depression and non-depression groups did not show a significant difference. There are two possible explanations for these results. First, this information may suggest that participants perceived somewhat strong support from their spouses, but this support resource may not have affected the depression levels of married women with breast cancer. Second, this finding may be related to participants’ homogeneous characteristics in terms of marital status and depression levels. All participants in this study were married, and their depression levels were low

Table 4

Comparison of the full-scale and sub-dimension scores of the MSPSS according to the level of depression and symptom distress.

	Depression (n = 55)	Non-depression (n = 120)	t (P)	Symptom Distress (n = 95)	Non-symptom Distress (n = 79)	t (P)
MSPSS full-scale	65.96 (15.54)	72.92 (10.51)	3.47 (0.001)	68.28 (15.53)	75.90 (9.69)	−3.94 (<0.001)
Sub-dimensions						
Spouse	21.85 (7.79)	23.25 (7.32)	1.15 (0.253)	22.60 (7.09)	25.89 (3.63)	−3.94 (<0.001)
Family	23.73 (5.30)	26.23 (2.82)	3.29 (0.002)	23.72 (5.64)	25.29 (3.86)	−2.18 (0.031)
Friends	20.38 (6.63)	23.44 (4.87)	3.06 (0.003)	21.97 (5.73)	24.72 (4.04)	−3.70 (<0.001)

MSPSS: Multidimensional scale of perceived social support.

overall, making it challenging to identify a clear picture of spouse-dependent differences. However, previous research highlighted the critical role of a spouse as the primary resource for interpersonal support in buffering distressful impacts, such as cancer diagnosis and treatment.^{22–25} Therefore, a further study including larger samples and more varied sociodemographic characteristics is warranted to understand the relationship clearly.

Additionally, this study confirmed the concurrent validity of the MSPSS based on the significant correlations of the MSPSS whole and sub-dimensions with social or family well-being and positive relations with others. It should be noted that the spouse sub-dimension showed a relatively weak correlation ($r = 0.307$) with social-family well-being compared to the other two (i.e., family and friends) ($r = 0.452$ – 0.595). This finding may be associated with the typological interpretation of social support. Social support often implies a broad range of emotional, instrumental, and informational supports.⁵ Social or family well-being refers to the quality of diverse interactive relations, including family and friends.³⁰ However, the items under the spouse sub-dimension focus on emotional support only from a spouse, which possibly captures a narrower view of interpersonal support than family members and friends. However, the relationships between spousal support and overall social and family-related quality of life were acceptable, based on theoretical and empirical evidence. Thus, these findings warrant further investigation to clarify the spouse sub-dimension.

The reliability of the MSPSS was verified using internal consistency and a test–retest technique. Cronbach's alpha coefficient of the whole scale showed a sufficient value of 0.91, consistent with the value (0.90) reported for middle-aged Korean women with diabetes using the same scale, including a spouse sub-dimension.¹⁷ On the other hand, the value was relatively higher than the findings (i.e., 0.74 for the whole, 0.89 for spouse, 0.80 for family, and 0.73 for friends) about an Arab immigrant women living in the US using the adapted MSPSS including spouse sub-dimension.⁴⁶ Thus, the findings supported the reliability of the revised MSPSS, which assesses a spouse's support instead of a special person. Comparably, previous results on an original scale⁴⁵ ranged from 0.84 to 0.92. Additionally, the internal reliability of the three sub-dimensions was acceptable (Cronbach's alpha coefficients: 0.96 for a spouse, 0.90 for family, and 0.90 for friends). Moreover, a test–retest technique added evidence of adequate reliability by showing moderate to high correlation coefficients (i.e., 0.794 for the whole, 0.615 for spouse, 0.549 for family, and 0.711 for friends) between the initial and repeated examinations. Additionally, the CR values beyond the cut-off of 0.70 (i.e., 0.89 for spouse, 0.85 for family, and 0.78 for friends) also support the reliability. In sum, the findings supported good internal reliability of the whole scale of the MSPSS and the three sub-dimensions.

The issues pertaining to the ceiling effects were found to be possibly related to the skewed distributions of the scores. This may be due to the homogeneity of the sample—all the participants were married and reported moderate to high levels of perceived social support, and most of them lived with a spouse and another family member. This result was consistent with that of a previous study regarding the MSPSS' Swedish version—which reported an issue regarding the ceiling effects related to the overall high support from family members.⁴⁹ However, there are limited empirical studies that report on the ceiling and floor effects for the MSPSS. Further studies which include samples with more diverse

sociodemographic characteristics are needed to confirm the MSPSS' sensitivity in discriminating the sample's characteristics.

We need to be cautious when interpreting our findings. This study analyzed cross-sectional data collected through self-administered surveys. Although we used data from diverse participants in two independent studies, it was inconclusive if the sample represents the entire breast cancer population. In particular, participants relatively had a moderate to a high level of education with an average of over 13 years of schooling. Therefore, it limits the generalization of the findings. Moreover, a self-administered survey was a valid and valuable method for socio-behavioral research; however, it is vulnerable to self-report bias related to social desirability.

Regardless of these limitations, our findings verified the adequacy of the psychometric properties of the MSPSS among Korean female breast cancer survivors based on a multifaceted examination of validity and reliability. However, further studies that target diverse sociodemographic conditions in terms of the male population and different cancer patients, including larger samples, are warranted to determine a more concrete application of the MSPSS in the Korean population.

Conclusions

This study demonstrated that the adapted Korean version of the MSPSS was a valid and reliable measure for assessing social support among Korean breast cancer survivors. Notably, this study modified the term “special someone” to “spouse” based on Korean sociocultural norms and population-specific characteristics. This study also demonstrated the construct validity of the MSPSS based on intimate relationships with theoretically and empirically relevant issues in terms of social well-being, depression, and symptom distress in breast cancer patients. The test for reliability, including internal consistency and test–retest reliability, showed good values, and the structural robustness was confirmed through acceptable levels of construct and concurrent validity. Taken together, the MSPSS was appropriate for assessing social support in women with breast cancer in Korea. The findings implied the applicability of the MSPSS to evaluate social support and thereby develop an intervention for psychological support and symptom management tailored by patients' social resources.

Author contributions

Conceptualization, M.K., H.Y. and M.S.J.; methodology, M.K. and H.Y.; investigation, M.K., H.Y. and M.S.J.; formal analysis, M.K. and H.Y.; validation, M.K., H.Y. and M.S.J.; writing—original draft preparation, M.K. and H.Y.; writing—review and editing, M.K., H.Y. and M.S.J.; supervision, H.Y.; project administration, H.Y. and M.S.J.; funding acquisition, H.Y. and M.S.J.

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Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to their containing information that could compromise the privacy of research participants.

Declaration of competing interest

None declared.

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