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Original Article

Translation and validation of the Chinese version of the BCPT Eight Symptom Scale (BESS) in patients with breast cancer

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ABSTRACT

Objective: This study aimed to translate the Breast Cancer Prevention Trial Eight Symptom Scale (BESS) into Chinese and subsequently examine the latent constructs and psychometric properties of the Chinese BESS (C-BESS) among patients with breast cancer.

Methods: In Phase 1, the BESS was translated from English into Chinese using the FACIT translation method. An expert panel was convened to assess the content validity, and pilot testing was performed with 20 patients with breast cancer. In Phase 2, a total of 427 patients with breast cancer from four Grade-A public hospitals in China were recruited to examine psychometric properties of the C-BESS. The internal consistency was evaluated based on the Cronbach's α, and the construct validity was tested using confirmatory factor analysis, convergent validity, and discriminant validity.

Results: The C-BESS demonstrated satisfactory content validity index (item-level content validity index [I-CVI]: 0.8–1.0; scale-level content validity index [S-CVI]: 0.97). The Cronbach's α value for the entire C-BESS scale was 0.92. Confirmatory factor analysis indicated that eight-factor structure of the C-BESS was a good fit to the data (CFI = 0.959, AGFI = 0.904, RMSEA = 0.05, RMR = 0.029). The scale exhibited good convergent validity and discriminant validity.

Conclusions: This study translated and validated the C-BESS for use in the Chinese population. The results demonstrate that the C-BESS exhibits good reliability and validity, with ideal psychometric properties for assessing the symptom burden in Chinese patients with breast cancer. This tool can be effectively integrated into the routine symptom monitoring of patients with breast cancer in China, helping Chinese clinical professionals in conducting comprehensive assessments of symptom burden.

Introduction

According to the 2020 global cancer statistics published by the International Agency for Research on Cancer, female breast cancer has become the highest incidence of cancer in the world, surpassing lung cancer with 2.26 million new cases. Breast cancer is also the most common type of cancer and the leading cause of cancer-related death in women.[1] Due to the large population base and the rapid increase in breast cancer incidence, China has one of the highest rates of new cases and deaths globally.[2] In 2020, there were 416,000 new cases and 117,000 deaths from female breast cancer in China, ranking first in incidence and fourth in mortality among female cancers in the country, and the trend shows an increase in both incidence and mortality.[3] The increasing burden of breast cancer poses a significant risk to women's physical and mental well-being.[3]

Although the combined treatment of breast cancer with surgery, chemotherapy, radiotherapy, endocrine therapy, and biological targeted therapy has significantly improved the survival rate of patients, patients with breast cancer after diagnosis and primary treatment often experience a range of symptomatic distress throughout their disease trajectory due to the treatment and the disease itself, such as fatigue, depression, cognitive impairment, changes in body image, and changes in interpersonal relationships, which may bring a heavy symptom burden for patients with breast cancer.[4–6] Symptom burden is a comprehensive concept that

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describes the number, severity, distress, and duration of a patient's symptoms. Moreover, symptoms often appear simultaneously, forming symptom clusters that produce negative synergistic effects and cause physiological, psychological, and social impacts on patients.[7–10] It may not only lead to the interruption of treatment, affect the overall rehabilitation effect, but also seriously affect the quality of life.[11,12] Studies have shown that at least 25% of patients with breast cancer report high symptom burden and reduced health-related quality of life after diagnosis and initial treatment.[13] Therefore, how to identify and manage the symptom burden is critical.[14]

Optimal symptom management depends on frequent and accurate symptom assessment and communication between patients and healthcare providers. The use of valid and reliable symptom measurement tools for patient-reported outcomes can help to monitor and identify symptom burden, improving the efficiency of symptom management.[6] Therefore, standardized, validated, multidimensional symptom assessment instruments play an important role in assessing the presence of symptoms and evaluating the effects of the provided management.[15–17]

There have been several symptom assessment instruments designed for patients with cancer, including the MD Anderson Symptom Inventory (MDASI),[18] the Memorial Symptom Assessment Scale (MSAS),[19] the Symptom Distress Scale (SDS),[20] the Edmonton Symptom Assessment System (ESAS),[21] the Rotterdam Symptom Checklist (RSCL),[22] the Therapy-Related Symptoms checklist (TRSC),[23] the Symptom Experience Index (SEI),[24] and the Canberra Symptom Scorecard (CSS),[25] etc., but these tools are applicable to patients with cancer in general and may not include some specific symptoms associated with breast cancer, such as lymphedema symptoms.[15] Some symptom assessment instruments specifically designed for patients with breast cancer are the Breast Cancer Treatment Response Inventory (BCTRI)[26] and the Breast Cancer and Lymphedema Symptom Experience Index (BCLE-SEI),[27] and the MDASI for Breast Cancer (MDASI-Br),[6] but these tools also do not adequately assess cognitive problems, urogenital and musculoskeletal symptoms, and weight concerns.[17] There are also some other breast cancer-specific tools, such as the Functional Assessment of Cancer Therapy-Breast (FACT-B)[28] and the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Breast Cancer Module (EORTC QLQ-BR23),[29] which are more biased toward assessing health-related quality of life (HRQOL) in patients with breast cancer. HRQOL is often too general a concept to be sensitive to identifying important changes caused by disease and treatment, and symptom burden is a subset of HRQOL.[6] In contrast to existing HRQOL measurement methods, the measurement of symptom burden allows a focus on the domains most relevant to a single disease and treatment, so that the impact of the disease and treatment on the patient can be judged.[6] Therefore, symptoms experienced by patients with breast cancer may not be fully assessed using the tools described above.

In 1991, the National Surgical Adjuvant Breast and Bowel Project conducted the Breast Cancer Prevention Trial (BCPT), during which the BCPT Symptom Checklist (BCPT SCL) was developed to evaluate symptoms among participants in ongoing clinical trials and healthy postmenopausal women.[30] The BCPT SCL comprised a total of 42 items.[30] Subsequently, the BCPT SCL was refined into the BCPT Symptom Scale,[31] Shortened BCPT Symptom Checklist,[32] and the BCPT Eight Symptom Scale (BESS).[33] Previous studies have examined the psychometric properties of these instruments, including the internal consistency and content/construct validity.[33] These instruments have demonstrated validity in assessing symptom presence in women at risk for or who received a diagnosis of breast cancer receiving various treatment (e.g., surgery, chemotherapy, radiation, targeted therapy, and endocrine therapy)[17] and have shown good discriminant validity relative to the more general HRQOL measure.[31]

Among these instruments derived from the BCPT SCL, the BESS offers a more comprehensive assessment compared to the Shortened BCPT Symptom Checklist. Additionally, research has shown that the eight-factor structure of the BESS is superior to the seven-factor structure of the BCPT Symptom Scale.[34] The BESS consists of a total of 30 items, comprising eight clinically interpretable symptom clusters along with nine supplementary symptoms, designed for assessing common adverse effects related to treatments in women at risk for or diagnosed with breast cancer.[33] The BESS instrument can identify unique symptom clusters that are reproducible across treatment arms, age groups, and time of assessment, and can be used in a variety of research and clinical settings, and as such has utility for future studies.[33]

Currently, no scholar has translated and tested the reliability and validity of the BESS among patients with breast cancer in mainland China. Although Tsai et al.[17] translated the BCPT Symptom Scale into traditional Chinese and examined the latent structure and psychometric properties of the Chinese version, they did not evaluate the content validity or conduct confirmatory factor analysis (CFA). Furthermore, given the cultural differences between Taiwan and Mainland China, it is imperative to reassess the translation and cultural adaptation process. Additionally, research indicated that the structure of the BESS demonstrates superior efficacy compared to that of the BCPT symptom scale. Therefore, it is necessary to translate the BESS into Chinese and validate its cultural adaptation and psychometric properties among patients with breast cancer in mainland China.

An appropriate Chinese symptom assessment tool can fully assess the symptoms of patients with breast cancer and provide Chinese healthcare providers with accurate symptom information to facilitate symptom management.[17] Currently, the Chinese symptom burden measurement tools are mainly focused on patients with general cancer, and there is a lack of comprehensive symptom burden assessment tools designed specifically for patients with breast cancer.[17] We chose BESS for translation and testing because of its ease of administration, simplicity, psychometric properties, and coverage of many aspects of symptoms.[33] The aim of this study was to translate the BESS into Chinese and then examine the latent constructs and psychometric properties of the Chinese BESS (C-BESS) among Chinese patients with breast cancer.

Methods

Study design

This study included two phases. In the first phase, the original version of the BESS was translated from English to Chinese according to the Functional Assessment of Chronic Illness Therapy (FACIT) double-back-translation method,[35] and then the content validity was tested. In the second phase, certain crucial psychometric properties of the C-BESS were examined, including internal consistency and construct validity. Permission to translate and validate the BESS was obtained from the scale's author. Because BESS is a measurement tool based on patient-reported outcomes, reporting in this study followed COSMIN (consensus-based standards for the selection of health measurement instruments) Reporting Guideline for studies on measurement properties (Supplementary file 1).

Phase 1: translation and content validation

Prior to the translation process, we sought approval to utilize the FACIT Measurement System. The double-back translation method suggested in the FACIT translation method was followed,[35] which is a common translation approach for successfully producing universally applicable translations of self-reported instrument used in multiple countries worldwide. This ensures that the translation process is exhaustive, rigorous and less biased.[36] The process included forward translation, reconciliation, back-translation, quality control, independent reviews, finalization, and pretesting.[35] First, two native Chinese and bilingual graduate students with good English skills (all with nursing backgrounds) independently translated BESS into Chinese. Second, a third bilingual health professional (oncologist), who had not reviewed the scale and had not participated in the forward translation, selected a better version from the two versions and resolved the differences

between them, modifying it to a coordinated version. Third, a native Chinese speaker, proficient in English, and not involved in the above steps of the nursing specialist independently translated the coordinated version. Fourth, the back-translated version of the scale was reviewed by a fifth bilingual interpreter with a nursing background and compared to the original English version to ensure linguistic and cultural equivalence. Each of these steps was documented and sent to FACIT.org.

A panel of five expert professionals (three healthcare providers and two nursing faculty members, all holding a master's degree or higher and possessing over 8 years of relevant experience in the field) was invited to assess the items' relevance to the scale and the local clinical context. Each item was rated on a four-point scale (1 = not relevant, 2 = somewhat relevant, 3 = relevant, 4 = highly relevant). The scale's content validity index was determined based on both the scale-level content validity index (S-CVI) and the item-level context validity index (I-CVI) calculated.[37] The I-CVI was calculated as the proportion of experts who rated an item as 3 or 4, while the S-CVI was determined as the mean of the I-CVI scores. A score of 0.78 for the I-CVI and 0.90 for the S-CVI was considered acceptable thresholds for demonstrating content validity.[37]

Finally, 20 Chinese patients with breast cancer who met the inclusion criteria were invited to participate in the integrated version of the pretest. The patients completed the questionnaire without any assistance, and then we used the cognitive reporting interview method to assess the understanding and acceptance of the Chinese version.

Phase 2: psychometric testing of C-BESS

Participants and study setting

The sample for psychometric testing was drawn from a longitudinal study conducted in China that assessed the changing trajectory of symptom burden and financial toxicity among patients with breast cancer (ClinicalTrials registration number: NCT05964816). Prior to the longitudinal study, the preliminary translation, back translation, cross-cultural adaption and pre-investigation of the BESS had been completed. We used data from the second time point of the longitudinal study to examine the reliability and validity of C-BESS in a large population. A total of 427 patients were recruited from four Grade-A public hospitals in Shanghai, Shenyang, Wuhan and Xi'an in China by convenient sampling method. Based on the power analysis for the statistical test, which involved CFA in this study, the recommended minimum sample size is at least five participants per parameter estimate.[38] Therefore, the sample size of 427 allowed for accurate estimation of the model parameters.

The inclusion criteria comprised patients who: (1) were aged 18 or above, (2) had been diagnosed with breast cancer and undergone surgery, (3) were receiving or had received one or more antitumor treatments (e.g., chemotherapy, radiotherapy, endocrine therapy, immunotherapy), and (4) provided informed consent. The exclusion criterion was the inability to complete the self-rating scale due to severe comorbidities and/or cognitive impairment.

Measurements

A structured, self-reported questionnaire was developed for data collection. The questionnaire consisted of two sections: (1) sociodemographic and disease-related characteristics and (2) C-BESS.

Sociodemographic characteristics encompassed age, region, marital status, education level, and other relevant factors. Disease-related characteristics involved time since diagnosis, stage of disease, treatment received, and other pertinent aspects.

C-BESS was utilized to evaluate the symptom burden experienced by patients with breast cancer, featuring 30 scored items and one open-ended response item.[33] It encompasses 21 symptoms distributed across eight clinically interpretable clusters: cognitive symptoms, musculoskeletal pain, vasomotor symptoms, gastrointestinal symptoms, sexual problems, bladder problems, body image, and vaginal symptoms, along with nine additional complementary symptoms. Participants were asked to rate the degree to which they had been troubled by each symptom over the past 4 weeks using a 5-point Likert-type scale, ranging from "0, not at all" to "4, extremely." A total symptom score is obtained by summing the ratings of all items, and a higher total symptom score indicates a greater degree of symptom-related annoyance. Additionally, a factor score is derived by summing item scores respective to that factor. Supplementary file 2 shows the detailed items of the BESS.

Data collection

Data for this phase were collected from February 2023 to June 2023. Two trained researchers were assigned to each center for data collection. All researchers received uniform and professional training, including specific research content and data collection methods. Eligible participants were invited to join this study and given instructions by the researchers, including the study objectives, methods, and content. After collecting written informed consent, the participants were invited to complete the demographic questionnaire and the C-BESS. It took approximately 5–10 min for each participant to complete the questionnaire assessment. The questionnaires were returned to the researcher as soon as they were completed. The researchers then carried out a quality check immediately to check the validity of the questionnaire.

Data analysis

All data were analyzed using the SPSS Version 22.0 (IBM, New York) and AMOS Version 24.0 (IBM Corp, New York). Participants' demographic and disease-related characteristics were summarized and reported in mean, standard deviation (SD), median, 25%–75% percentiles, frequency, and percentage, as appropriate. The scale's internal consistency reliability was estimated by means of Cronbach' α, where a coefficient > 0.7 was considered to indicate satisfactory internal consistency.[37] In order to examine whether the eight-factor structure in the original scale[33] was adequately consistent with our sample data, we performed CFA on the 21 items contained in the eight-factor structure of the original scale. The robust diagonally weighted least-squares method was used to estimate the parameters of the CFA, which allows for the violation of the multivariate normality assumption of the data.[39] Because chi-square tests were sensitive to sample size and violation of the multivariate normality assumption, we used the following indices to estimate the appropriateness of the model: the ratio of chi-square and degrees of freedom (χ^2/df), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), root mean square residual (RMR), root mean square error of approximation (RMSEA), incremental fit index (IFI), Tucker–Lewis index (TLI), comparative fit index (CFI), and normed fit index (NFI). Model fit was considered acceptable when $\chi^2/df < 3.0$, GFI > 0.90, AGFI > 0.9, RMR < 0.05, RMSEA < 0.08, IFI > 0.9, TLI > 0.90, CFI > 0.90, and NFI > 0.90.[39,40] Average variance extracted (AVE) and composite reliability (CR) were used to evaluate the convergent validity of the scale. The criteria were AVE > 0.5 and CR > 0.7.[41] The discriminant validity of the scale was evaluated by using the relationship between the inter-dimensional correlation coefficient and the corresponding square root of the AVE for each dimension.[41] The correlation coefficient less than the corresponding AVE square root indicated that there was a certain correlation between each latent variable and a certain degree of differentiation between each them, and the discrimination validity of the scale was ideal.[41]

Ethical considerations

Ethical approval for the general protocol of this study was initially granted by the Clinical Research and Ethics Committee of Shanghai Cancer Center, Fudan University in November 2022 (IRB No. 2211264-24). Then, the protocol has been approved by clinical departments in other four hospitals. All eligible participants received an informed consent form outlining the study's details, their right to participate or withdraw, and the confidentiality of their information. Subsequently, all participants signed the informed consent form and returned it to the clinical field researcher along with a completed questionnaire. The

researchers also requested permission to access patients' medical records, ensuring strict confidentiality of all information collected during the study.

Results

Phase 1: Translation and content validation

The researchers identified any discrepancies in items between the translated Chinese, back-translated English and original versions of BESS, and then clarified them through discussion. Minor wording changes were made in two items, including changing "Body aches and pains" to "General aches and pains" in item six, and changing "Dissatisfied with the body appearance" to "Unhappy with the appearance of my body" in item 16. Otherwise, no additional amendments were made to the scale.

The content validity of C-BESS was confirmed by all five expert panel members with no missing answer. They agreed that C-BESS is clearly written, easy to understand, and culturally and conceptually relevant to measure symptom burdens in Chinese women with breast cancer. The I-CVI of the 30 items ranged from 0.8 to 1.0, and the S-CVI was 0.97, indicating that the scale has excellent content validity.

All 20 patients agreed that the C-BESS was clear and easily understood, with no difficulty understanding and answering the questions.

Table 1
Characteristics of participants ($N = 427$).

Characteristics	*n* (%) or Mean ± SD (IQR)
Age (years)	49.04 ± 10.00 (42–57)
Gender	
Female	427 (100.0)
Ethnicity	
Han	397 (93.0)
Minority	30 (7.0)
Marital status	
Married	408 (95.6)
Widowed/divorced/single	19 (4.4)
Living status	
Alone	15 (3.5)
Living with partner	179 (41.9)
Living with partner and children	191 (44.7)
Living with others	30 (7.0)
Education attainment	
Primary school or below	68 (15.9)
Secondary school	177 (41.5)
Postsecondary	75 (17.6)
University or above	107 (25.1)
Health insurance	
Yes	422 (98.8)
No	5 (1.2)
Household monthly income (Chinese yuan)	
< 5000	122 (28.6)
5000–9999	139 (32.6)
10,000–19,999	103 (24.1)
≥ 20,000	63 (14.8)
Stage of cancer	
0	16 (3.7)
I	115 (26.9)
II	180 (42.2)
III	66 (15.5)
IV	11 (2.6)
Not clear	39 (9.1)
Time since diagnosis in years	
< 1	274 (64.2)
1–2	152 (35.6)
> 2	1 (0.2)
Whether to accept chemotherapy	
Yes	253 (59.3)
No	174 (40.7)
Whether to accept radiotherapy	
Yes	51 (11.9)
No	376 (88.1)
Whether to accept endocrine therapy	
Yes	100 (23.4)
No	327 (76.6)
Whether to accept biological targeted therapy	
Yes	67 (15.7)
No	360 (84.3)
Whether to accept immunotherapy	
Yes	2 (0.5)
No	425 (99.5)
Type of surgery	
Breast conserving surgery	88 (20.6)
Radical mastectomy	256 (60.0)
Breast reconstruction	23 (5.4)
Other	60 (14.1)
Comorbidities	
Yes	111 (26.0)
No	316 (74.0)

IQR, interquartile range.

Phase 2: Psychometric testing of C-BESS

Participant characteristics

Table 1 shows the characteristics of participants. A total of 427 patients with breast cancer consented to participate in this phase of the study and completed the questionnaire. The response rate was 100%. All participants were female and ranged in age from 26 to 74 years, with a mean age of 49.04 years (SD, 10.00). 64.2% of participants were within 1 year since their first diagnosis of disease. All participants completed surgery, and 59.3% received chemotherapy following surgery.

Internal consistency

The Cronbach's α value for the entire C-BESS scale was 0.92, indicating that it has good internal consistency. Removing any item from the scale does not have a significant impact on the overall α value. As shown in Table 2, the Cronbach's α coefficients for the eight factors ranged from 0.565 to 0.884.

Construct validity

Confirmatory factor analysis. CFA was performed on 427 participants to test the eight-factor model including 21 items identified by the original scale.[33] The results of the CFA showed a good fit: $\chi^2/df = 2.051$, GFI = 0.933, AGFI = 0.904, RMR = 0.029, RMSEA = 0.05, IFI = 0.959, TLI = 0.946, CFI = 0.959, and NFI = 0.923. Thus, the eight-factor model is acceptable. As for the standardized estimated, the factor loadings ranged from 0.42 to 0.96 and all the factor loadings were statistically significant. Fig. 1 shows the standardized estimates of the model.

Convergent validity and discriminant validity. As shown in Table 3, the AVE values ranged from 0.358 to 0.746 and the CR values ranged from 0.589 to 0.897, indicating that the scale had good convergent validity except for factor six and factor eight. As shown in Table 4, the $\sqrt{AVE}$ values were all greater than the correlation coefficients, which indicated that the scale had good discriminant validity.

Table 2
Internal consistency reliability of the C-BESS ($N = 427$).

Subscale	No. of Items	Cronbach's α
Cognitive symptoms	3	0.884
Musculoskeletal pain	3	0.775
Vasomotor symptoms	3	0.851
Nausea	3	0.732
Sexual problems	2	0.833
Bladder problems	2	0.801
Body image	2	0.565
Vaginal symptoms	3	0.601
Other supplemented nine symptoms	9	0.792
Total scale	30	0.920

C-BESS, Chinese Breast Cancer Prevention Trial Eight Symptom Scale.

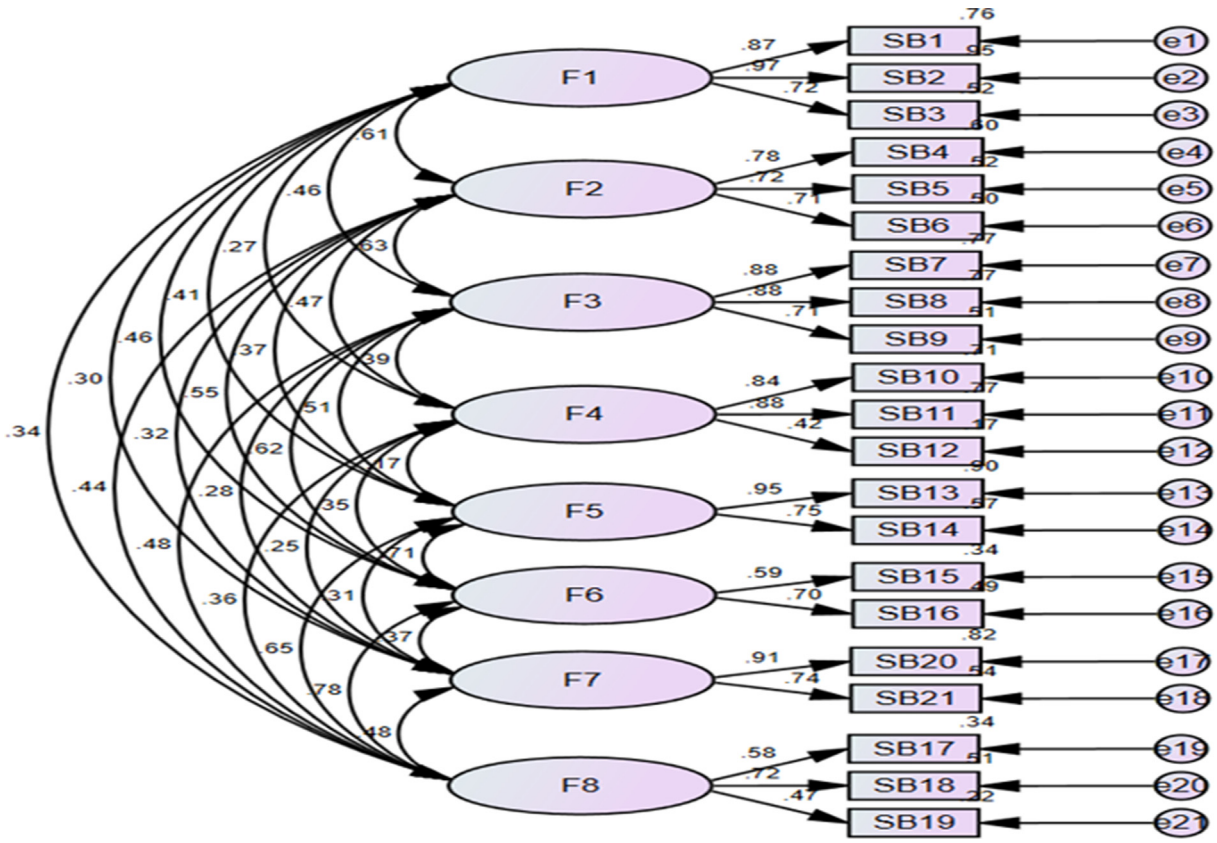

Fig. 1. CFA model for the C-BESS. F1: Cognitive symptoms; F2: Musculoskeletal pain; F3: Vasomotor symptoms; F4: Nausea; F5: Sexual problems; F6: Body image; F7: Bladder problems; F8: Vaginal symptoms. CFA, confirmatory factor analysis; C-BESS, Chinese Breast Cancer Prevention Trial Eight Symptom Scale.

Discussion

Accurate assessments of the symptoms of patients with cancer, including those with breast cancer, have been highly concerned by scholars. Only by accurately evaluating and grasping the symptom characteristics of patients, can targeted intervention be carried out.[15–17] In this study, we employed a standard translation process and a systematic validation approach to translate the BESS and verify its psychometric properties among patients with breast cancer, supporting the validity and reliability of the C-BESS. Our psychometric evaluation results indicated that C-BESS demonstrates sufficient validity and satisfactory internal consistency reliability. This implies that the C-BESS can comprehensively assess and deeply understand the symptom burden of patients with breast cancer at various stages of treatment in China. It also provides valuable references for the localization of symptom burden assessment tools, facilitating the provision of accurate symptom information for clinicians, so as to aid healthcare providers in conducting effective symptom management and improve patient's quality of life.

Table 3
Convergent validity of the C-BESS ($N = 427$).

Item		Factor	Estimate	AVE	CR
SB1	<—	F1	0.874	0.746	0.897
SB2	<—	F1	0.975		
SB3	<—	F1	0.724		
SB4	<—	F2	0.775	0.542	0.780
SB5	<—	F2	0.724		
SB6	<—	F2	0.707		
SB7	<—	F3	0.877	0.682	0.864
SB8	<—	F3	0.877		
SB9	<—	F3	0.712		
SB10	<—	F4	0.842	0.551	0.772
SB11	<—	F4	0.877		
SB12	<—	F4	0.417		
SB13	<—	F5	0.948	0.733	0.844
SB14	<—	F5	0.753		
SB15	<—	F6	0.587	0.419	0.589
SB16	<—	F6	0.702		
SB20	<—	F7	0.908	0.684	0.811
SB21	<—	F7	0.737		
SB17	<—	F8	0.582	0.358	0.620
SB18	<—	F8	0.715		
SB19	<—	F8	0.473		

C-BESS, Chinese Breast Cancer Prevention Trial Eight Symptom Scale; AVE, average variance extracted; CR, composite reliability.

This study examines the reliability of C-BESS in terms of internal consistency reliability. Our findings revealed that the Cronbach α of the whole scale was 0.92, surpassing the reference value 0.7, indicating a high internal consistency. This value was higher than the internal consistency results reported for the BCPT Symptom Checklist by Standon et al.[31] and Tsai et al.[17] However, for the eight subscales, the internal consistency estimates for body image and vaginal symptoms were below 0.7, which is similar to the findings of Standon et al.[31] and Terhorst et al.[34] suggesting a potential need for further improvement. In addition, the difference in vaginal symptoms from the source scale may be attributed to the lower mean age of patients included in this study, the smaller proportion of postmenopausal women, and the smaller proportion of patients in this study who were receiving endocrine therapy.[34]

In this study, the scale's validity was assessed in terms of both content validity analysis and structural validity analysis. Content validity reflects whether the items fulfill the purpose and requirements of measurement, while structural validity describes the extent to which the theoretical

Table 4
Discriminant validity of the Chinese version of C-BESS ($N = 427$).

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
Factor 1	**0.746**							
Factor 2	0.608**	**0.542**						
Factor 3	0.459**	0.633**	**0.682**					
Factor 4	0.273**	0.468**	0.391**	**0.551**				
Factor 5	0.405**	0.371**	0.508**	0.165**	**0.733**			
Factor 6	0.455**	0.549**	0.625**	0.349**	0.713**	**0.419**		
Factor 7	0.303**	0.318**	0.277**	0.251**	0.306**	0.373**	**0.684**	
Factor 8	0.342**	0.443**	0.478**	0.359**	0.653**	0.776**	0.481**	**0.358**
$\sqrt{AVE}$	0.864	0.736	0.826	0.742	0.856	0.648	0.827	0.598

Figures in bold represent AVE; $^{**}P < 0.01$.
C-BESS, Chinese Breast Cancer Prevention Trial Eight Symptom Scale; AVE, average variance extracted.

assumptions of the scale match the actual measurement.[42] The results showed high I-CVI and S-CVI scores, indicating the relevance of the measured concepts and the sociocultural relevance of the tool used in the local population and environment, providing good evidence for the effectiveness of the content. This study employed CFA, convergent validity and discriminant validity to test the construct validity of the scale. In the CFA, we found that the original eight-factor structure was supported by results, confirming the adequate fit of the C-BESS to Chinese patients with breast cancer. The convergent validity was deemed good for all subscales, with the exception of body image and vaginal symptoms. Additionally, the results of discriminant validity were satisfactory, indicating that the scale has moderate correlation and can distinguish various symptom dimensions of female patients with breast cancer.

There are a total of 30 items in this study, clearly expressed. Content analysis of the open-ended item "any other problems" suggested four items that may be included in future tool revisions: numbness/tingling, dry mouth, rash, and insomnia. Among these, numbness/tingling and dry mouth are already included in the BCPT Symptom Scale and can be used at the researcher's discretion based on clinical relevance.[33] As radiotherapy and chemotherapy may be associated with the development of insomnia and rash in women with breast cancer, the lack of items related to insomnia and rash in the BCPT Symptom Scale will limit the assessment of these common symptoms.[17] As proposed by Standon et al.[31] and Tsai et al.[17] Proposed, quantitative or qualitative studies could be conducted to explore additional symptoms in women with breast cancer in different ethnic groups or with different treatment statuses, contributing to a more comprehensive list of symptoms. Additionally, this study did not conduct exploratory factor analysis. In the future, relevant items can be included as needed, and exploratory factor analysis can be revisited.

Limitations

This study has several limitations. First, due to the cross-sectional design of the study, test-retest reliability was not checked. Second, although the original scale model is supported, there are still some items with low factor loads and large residual errors. In addition, no other scale was used in this study to test convergent validity. Future research should consider incorporating other relevant scales as validity measures to further verify the reliability of the scale and facilitate cross-sectional comparisons among multiple scales.

Implications for nursing practice

The results of this study suggest that C-BESS is a reliable and effective assessment tool for providing an objective and precise scale for evaluating symptoms in Chinese patients with breast cancer. Moreover, C-BESS can be utilized to monitor the symptoms of patients with breast cancer at different stages of treatment, assisting to detect changes, and providing accurate symptom management strategies. In addition, this study provides a standardized form that avoids subjective judgments of clinical symptoms by different healthcare providers.

Conclusions

This study translated and verified the applicability of C-BESS in the Chinese population. The results demonstrate that the C-BESS exhibits good reliability and validity, with ideal psychometric properties for assessing the symptom burden in Chinese patients with breast cancer. This scale has a total of 30 items, including an eight-factor structure, and each item is clearly articulated. This tool can be effectively integrated into the routine symptom monitoring of patients with breast cancer in China, which will help Chinese clinical professionals in conducting comprehensive assessments of symptom burden at each stage, facilitating targeted symptom management.

Ethics statement

This study was approved by the Clinical Research and Ethics Committee of Shanghai Cancer Center, Fudan University (IRB No. 2211264-24). All participants provided written informed consent.

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CRediT authorship contribution statement

Conceptualization: W.X.; formal analysis: Y.K. and F.J.; investigation: Y.K. and F.J.; methodology: W.X.; project administration: W.X., J.Q. and L.T.; supervision: W.X. and J.Q.; visualization: Y.K.; writing – original draft: Y.K.; writing – review & editing: W.X. All authors had full access to all the data in the study, and the corresponding author had final responsibility for the decision to submit for publication. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

Declaration of competing interest

The corresponding author, Prof. Xing, is an editorial board member of *Asia–Pacific Journal of Oncology Nursing*. The article was subject to the journal's standard procedures.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Declaration of Generative AI and AI-assisted technologies in the writing process

No AI tools/services were used during the preparation of this work.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.apjon.2024.100449.

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