

Breast Cancer Screening Beliefs Questionnaire: psychometric properties of the Persian Version

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Abstract

Background: Cancer-related personal beliefs, attitudes, and knowledge can significantly determine cancer screening behaviors. Valid and reliable instruments are needed to assess such beliefs, attitudes, and knowledge. This study aimed to translate Breast Cancer Screening Beliefs Questionnaire into Persian and evaluate its psychometric properties among Iranian women. **Methods:** In this methodological study, the twelve-item Breast Cancer Screening Beliefs Questionnaire was translated into Persian and filled out by 1256 Iranian women. Sampling was purposively done from June 2017 to March 2018. Face, content, convergent, and discriminant validity were evaluated and exploratory and confirmatory factor analyses were performed for construct validity evaluation. Reliability was also evaluated through calculating Cronbach's alpha, McDonald's omega, Average inter-item correlation, and test-retest intraclass correlation coefficient and finally, composite reliability was estimated. **Results:** Three factors were extracted in factor analysis which included screening attitude, screening knowledge and perception, and screening practice. These factors explained 55.71% of the total variance of breast cancer screening beliefs. This three-factor model was confirmed in confirmatory factor analysis based on model fit indices (PCFI = 0.703, PNFI = 0.697, CMIN/DF = 2.127, RMSEA = 0.30, GFI = 0.980, AGFI = 0.998, and CFI = 0.991). Convergent and discriminant validity were also confirmed. Composite reliability and test-retest intraclass correlation coefficient were more than 0.7. **Conclusion:** With a three-factor structure, the Persian Breast Cancer Screening Beliefs Questionnaire has acceptable validity and reliability and hence, can be used to evaluate Iranian women's breast cancer screening beliefs.

Introduction

Breast cancer (BC) is the most prevalent malignancy and the first leading cause of cancer-related death among women worldwide ¹⁻². It is among the most costly cancers in the world with the annual financial burden of 88 billion dollars. Its annual cost per afflicted woman is estimated to be around 1.5 million dollars ³. BC is also the most prevalent cancer among Iranian women and accounts for 25.4% of all female malignancies ⁴. Besides, the age of affliction by BC in Iran is around ten years lower than other developed countries ⁵.

Delay in cancer diagnosis is a major factor behind its high mortality rate because survival is directly associated with the stage of cancer at diagnosis ⁶. The five-year survival rate of BC in developed countries such as the United States and England is 85%–95% ⁷. However, two third of Iranian women with BC experience early death due to the delays in the diagnosis of BC ⁸.

The major reasons behind delayed diagnosis of BC in Iran may be women's lack of knowledge, delays in seeking medical help, and failure to participate in BC screening programs ⁹ such as breast self-examination, periodical medical visits, and mammography ¹⁰. Women's participation in screening programs is affected by different factors, chiefly their health beliefs ¹¹ and health-related knowledge ¹², so that positive health beliefs and adequate health-related knowledge can increase participation in such

programs¹². In western countries, people have adequate health-related knowledge and positive health beliefs; thus, periodical health assessment in the absence of any health problem is a known concept to the public and a routine practice¹³. However, this is an unfamiliar concept for people in most Asian countries¹⁴. Qualitative studies in Iran showed that due to cultural reasons, Iranian women are inattentive to and neglectful of their health (3) and have misconceptions about BC¹⁵. Accordingly, educational interventions on BC can positively affect women's screening-related behaviors¹⁶ and thereby, contribute to early cancer diagnosis and improvements in quality of life and survival¹⁷.

Accurate assessment of women's beliefs about BC screening requires valid and reliable instruments. Such instruments help generate more reliable and conclusive results and develop more effective BC screening and prevention programs¹⁸. However, previous studies on Iranian women's knowledge, attitudes, and practice respecting BC screening used instruments that their validity and reliability had not been evaluated using standard methods¹⁹. Moreover, some studies used the Champion's Health Belief Model Scale which has limitations such as large number of items (57 items)²⁰.

Breast Cancer Screening Beliefs Questionnaire (BCSBQ) is a short twelve-item instrument for the assessment of BC screening beliefs. It is easy to use and has appropriate scoring system and high sensitivity; hence, it is considered a good instrument for the assessment of BC screening beliefs²¹. However, it has no valid and reliable Persian version. Thus, the present study was conducted to translate BCSBQ into Persian and evaluate its psychometric properties among Iranian women.

Methods

This cross-sectional methodological study was carried out in 2017–2018.

Sample

There is no universal consensus over sampling adequacy in psychometric studies. However, samples greater than 1000 are considered adequate²². Therefore, sample sizes for exploratory and confirmatory factor analyses in the present study were considered to be 800 and 500, respectively. Sampling was purposively done from June 2017 to March 2018 in three central cities in Mazandaran province, Iran, namely Amol, Babol, and Sari. Inclusion criteria were ability to read and write in Persian, an age of more than eighteen and no history of BC among family members (i.e. mother, sister, or daughter).

Instrument

The instrument of the study was BCSBQ developed by Kwok et al. in 2010. BCSBQ has twelve items on women's attitudes towards general health assessment, their knowledge, attitudes, and perceptions regarding BC, and their screening practice in the area of mammography. BCSBQ items are scored using a Likert-type scale from 1 ("Completely agree") to 5 ("Completely disagree"). The total score of the

questionnaire is changed into a 0–100 scale. The developers of the questionnaire found that it has three subscales and reported a Cronbach's alpha of 0.84 for it ²¹

Translation

After obtaining necessary permissions for using BCSBQ from professor Kwok, the questionnaire was translated into Persian based on the forward-backward translation protocol proposed by the World Health Organization ²³. Initially, a reproductive health specialist and an English expert independently translated the questionnaire into Persian and then, the authors developed a single Persian translation of BCSBQ based on their translations. After that, two other translators (a reproductive health specialist and an English expert) independently back-translated the final Persian version of the questionnaire into English. The authors used these two English translations to develop a single English translation. Finally, the final English translation was sent to professor Kwok for the purpose of approval. She approved that our English BCSBQ was similar to her original questionnaire.

Psychometric evaluation

Face validity evaluation

Twenty women were provided with the Persian BCSBQ and were asked to assess the clarity and simplicity of its items. None of them reported ambiguities in BCSBQ items.

Content validity evaluation

Content validity was evaluated through qualitative and quantitative methods ²⁴. In qualitative content validity evaluation, the questionnaire was given to ten experts in instrument development and healthcare (six reproductive health specialists with PhD degree, one health education specialist with master's degree, two midwives with master's degree, and one clinical psychologist with PhD degree). They were asked to evaluate appropriate wording and placement of the items. They recommended some linguistic amendments to the questionnaire items. Quantitative content validity evaluation was performed through calculating content validity ratio (CVR) and content validity index (CVI) for the questionnaire. For CVR calculation, the aforementioned ten specialists rated the essentiality of BCSBQ items as "Essential" (scored 1), "Not essential, but useful" (scored 2), and "Not essential" (scored 3). Items which were considered essential by nine specialists were kept. Among ten specialists, nine determined that all items were essential and therefore, no item was removed. For CVI calculation, the specialists were asked to rate the relevance of the items on the following scale: 1: "Irrelevant"; 2: "Somewhat relevant"; 3: "Acceptably relevant"; 4: "Completely relevant". Subsequently, CVI of each item was calculated through dividing the

number of specialists who had rated that item 3 or 4 by ten. CVI values of 0.78 and more were considered acceptable²⁵.

Construct validity evaluation

Construct validity was evaluated through factor analysis. Initially, maximum likelihood exploratory factor analysis with varimax rotation was performed. Kaiser-Meyer-Olkin (KMO) test was run to determine sample adequacy, while Bartlett's test was run to evaluate homogeneity of variance. Then, latent factors were extracted based on Horn's Parallel Analysis, and scree plot²⁶. According to the three-indicator rule, each factor had to have at least three items. All these analyses were performed in SPSS₂₅ and JASPO.9.0.1. After exploratory factor analysis, confirmatory factor analysis with maximum likelihood estimation was performed using the AMOS₂₄ software to test the fit of the extracted model based on the most commonly used indices for model fit. These indices were Parsimonious Comparative Fit Index (PCFI), Parsimonious Normed Fit Index (PNFI), Minimum Discrepancy Function divided by Degrees of Freedom (CMIN/DF), Root Mean Square Error of Approximation (RMSEA), Adjusted Goodness of Fit Index (AGFI), and Comparative Fit Index (CFI).

Convergent and discriminant validity evaluation

Based on Fornell and Larcker's criteria²⁷, convergent and discriminant validity and construct reliability were evaluated through calculating Average Variance Extracted (AVE), Maximum Shared Squared Variance (MSV), Average Shared Squared Variance (ASV), and Composite Reliability (CR). In order to confirm convergent validity, AVE should be greater than 0.5 and CR should be greater than AVE. On the other hand, to ensure discriminant validity, AVE should be greater than MSV²⁸. Moreover, a scale has acceptable convergent validity when all its items are close together and share a large amount of variance, while it has acceptable discriminant validity when the extracted factors are completely independent from each other²⁹.

Relative reliability evaluation

Relative reliability was evaluated through the test-retest method, in which twelve participants filled out BCSBQ twice with a two-week period in between. Then, intraclass correlation coefficient (ICC) was calculated using two-way mixed effects model. Moreover, Cronbach's alpha, McDonald's omega, and Average inter-item correlation were calculated for internal consistency evaluation²⁸. Then, construct reliability (CR) was evaluated. CR value greater than 0.7 was considered as acceptable reliability³⁰.

Absolute reliability evaluation

ICC provides no accurate information about the accuracy of the scores. Therefore, absolute reliability was estimated by calculating standard error of measurement (SEM) using the following formula, $SEM = SD\sqrt{1 - ICC}$ (37).

Ethics consideration

This study is approved by the Ethics Committee of Health Research Institute in Babol University of Medical Sciences. [Grant number: MUBABOL, HRI.REC.1396.10].

Result

In total, 1300 women were recruited to fill out BCSBQ, 1256 of them completely filled out and returned their questionnaires (response rate: 96%). Women's age mean was 33.23 ± 9.22 . Most women were married (87.5%) and lived in urban areas (65.7%). More than one third of them had university degrees and was employed (Table 1).

Qualitative content validity of the questionnaire was approved after making revisions recommended by the specialists. Moreover, quantitative content validity evaluation showed that all items had CVRs greater than 0.8 and CVIs greater than 0.78. Therefore, none of the items were removed.

In exploratory factor analysis, KMO test value was 0.78 and Bartlett's test value was 3349.82 ($P < 0.001$). Three factors were extracted and named as *screening attitude, screening knowledge and perception, and screening practice*. These three factors explained 55.71% of the total variance of BC screening beliefs (Table 2).

In confirmatory factor analysis, after correcting the model, the Chi-square model fit index was calculated which was equal to 82.93 ($P < 0.001$). The model was corrected through drawing the correlations between the measurement errors of items 1 and 2 (e3 and e4) and between the measurement errors of items 7 and 8 (e7 and e8), (Figure 1). Then, other model fit indices were calculated as the following, PCFI = 0.703, PNFI = 0.697, CMIN/DF = 2.127, RMSEA = 0.30, GFI = 0.980, AGFI = 0.998, and CFI = 0.991. These values confirmed the good fit of the final model (Table 3).

Convergent and discriminant validity evaluations revealed that all factors had acceptable convergent and discriminant validity.

Internal consistency evaluation revealed that the Cronbach's alpha, McDonald's omega, and Average inter-item correlation were greater than 0.7 and 0.4 respectively. Moreover, CR was more than 0.75 and ICC was more than 0.7 (Table 4). SEM was estimated to be ± 2.14 .

Discussion

This study aimed to translate BCSBQ into Persian and evaluate its psychometric properties among Iranian women. Findings revealed a three-factor structure for the questionnaire which explained 55.71% of the total variance of BC screening beliefs. This finding denotes the appropriateness of the questionnaire for assessing BC screening beliefs among Iranian women because an explained variance of more than 50% is indicative of the appropriateness of the extracted factors³¹. In line with the findings of the present study, previous studies on Arab, Chinese Australian^{13,21}, Indian Australian³², African Australian³³, and Korean women³⁴ also reported that the questionnaire had three factors.

Screening attitude was the first extracted factor of BCSBQ in the present study. The four items of this factor had high correlation with the factor. This factor deals with Iranian women's attitudes towards general health screening. In other words, it assesses women's attitudes towards the necessity of periodical health assessment despite feeling healthy. This factor seems to be in line with the perceived susceptibility construct of the Health Belief Model. The model is used to assess people's beliefs about screening behaviors³⁵. The perceived susceptibility construct of this model refers to person's beliefs about the risk or the chance of developing a disease such as BC³⁵.

The second factor of the Persian BCSBQ was screening knowledge and perception. This factor includes four items on knowledge and perceptions about screening. The multi-component PEN-3 (Person, Extended family, and Neighbor) model also includes a perception component. Perception in that model encompasses knowledge, beliefs, and values which can enhance or reduce motivation for behavioral modification³⁶. The items of the knowledge and perception domain of the Persian BCSBQ deal with women's knowledge and perception about the probability of reducing BC complications or postponing BC-induced death through appropriate screening. Accurate assessment of knowledge and perception can help develop effective interventions for health promotion³⁷.

Study findings revealed significant correlations between the measurement errors of items 1 and 2 (e3 and 34) and between the measurement errors of items 7 and 8 (e7 and e8). Measurement error happens when items are not well understood or are not directly measured or happens due to the conceptual similarity of two items or words³⁸. Items 1 and 7 convey almost the same meaning as respectively items 2 and 8; thus, correlations between the measurement errors of items 1 and 2 and between the measurement errors of items 7 and 8 are justifiable.

Screening practice was the third factor of the Persian BCSBQ. This factor assesses mammography-related behavior and its barriers. Behavior is one of the most important components of screening programs. In other words, the behavior dimension of these programs assesses whether knowledge improvement and attitude change have been effective in modifying screening behavior³⁹. After assessing knowledge and attitudes in the first and the second dimensions, the screening practice dimension of BCSBQ assesses women's mammography-related behavior, which is the most important BC screening behavior.

Cronbach's alpha, McDonald's omega, AIC, test-retest ICC, and CR values revealed that the Persian BCSBQ has acceptable reliability. Previous studies on Arab, Indian Australian, and African Australian women also showed a Cronbach's alpha of more than 0.8 for BCSBQ^{13, 21, 32-34}. AIC of the factors were greater than 0.4. The AIC of the items should be ranged between 0.2-0.4, while ideals in the range 0.1-0.5 are acceptable⁴⁰. The AIC for the three sub-scales were greater than 0.4, respectively, thus demonstrating reasonable reliabilities.

Among the limitations of this study were imprecise answering to BCSBQ items by some participants as well as their sociocultural wide diversity.

Conclusion

The Persian BCSBQ has acceptable factor structure and internal consistency. Therefore, it can be used as a valid and reliable tool for assessing BC screening beliefs among Iranian women.

Implications for clinical practice

The Persian BCSBQ can be used in healthcare centers and gynecology clinics to assess Iranian women's beliefs about BC screening. The results of such assessment can help develop and use educational and counseling interventions for correcting women's misconceptions and improving their knowledge about BC screening.

Declaration

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Conflicting interests

The authors declare that they have no competing interests

Authors' contributions

All of the authors contributed to the concept and purpose of the study. MN and HSN performed most experiments, analyzed data, and helped draft the manuscript. MF and FB helped draft the manuscript. CK and AE revised the manuscript. All authors approved the final version of the manuscript.

Ethical Statement and Consent to participate

This study was approved by the Ethics Committee of Babol University of Medical Sciences, Babol, Iran (code: MUBABOL.HRI.REC.1395.58). Informed consent was obtained from all participants and they were informed about the confidential management of the study data.

Availability of data and materials

The data are available from the corresponding author on reasonable request.

Abbreviations

BC: Breast cancer, BCSBQ: Breast Cancer Screening Beliefs Questionnaire, RMSEA: root mean square error of approximation, CFI: comparative fit index, PCFI: parsimony comparative fit index, GFI: goodness of fit index, AGFI: adjusted goodness of fit index, CMIN/DF: minimum discrepancy function divided, NFI: degrees of freedom, normed fit index, PNFI parsimony normal fit index.

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Tables

Table 1. Participants' demographic characteristics.

Characteristics	Mean	Standard deviation	Total
Age (Years)	33.23	9.22	1047
Age at menarche (Years)	13.26	1.56	1010
Characteristics	N	%	Total
Educational status	Below diploma	29	1183
	Diploma	33.1	
	University	37.9	
Place of residence	Urban areas	65.7	1162
	Rural areas	34.3	
Employment status	Housewife	67	1155
	Employed	25.4	
	Student	7.6	
Marital status	Single	10	1169
	Married	87.7	
	Widowed	2.5	
Income level	High	27.3	1185
	Moderate	62.7	
	Low	10	
Number of children	0	18.2	1008
	1	27.1	
	2	38.6	
	≥ 3	43.5	

Table 2. The three factors of the Persian BCSBQ and their items

Eigen value	Variance	Item communality	Factor loading	Items	Factors
2.51	22.81	0.61	0.78	Q ₄ . <i>I do not see a doctor when I am healthy.</i>	Screening attitude
		0.57	0.76	Q ₃ . <i>I see a doctor or get a checkup whenever I have a health problem.</i>	
		0.55	0.75	Q ₁ . <i>I do not need any checkups when I feel good.</i>	
		0.52	0.72	Q ₂ . <i>I do not need any checkups when I have a healthy lifestyle, a balanced diet and regular fitness activities.</i>	
1.97	17.36	0.62	0.79	Q ₆ . <i>Breast cannot be cured, the only thing you can do is to prolong the suffering period.</i>	Screening knowledge and perception
		0.29	0.56	Q ₅ . <i>Breast cancer is lethal and if you get breast cancer you will certainly die.</i>	
		0.33	0.55	Q ₈ . <i>If a woman's fate is to get breast cancer, she will and she can do nothing to change her fate.</i>	
		0.23	0.53	Q ₇ . <i>Even if breast cancer is diagnosed in its early stages, there is very little chance of survival for the patient.</i>	
1.71	15.54	0.68	0.83	Q ₁₂ . <i>Mammography makes me feel shamed and embarrassed.</i>	Screening practice
		0.30	0.52	Q ₁₀ . <i>It is hard for me to commute for mammography.</i>	
		0.23	0.49	Q ₁₁ . <i>I do not want to get a mammography because I have to take of my clothes and expose my breasts.</i>	

Table 3. The model fit indices in confirmatory factor analysis

CFI	GFI	AGFI	PNFI	PCFI	RMSEA	CMIN/DF	P value	df	χ^2	Indices
0.991	0.998	0.980	0.697	0.703	0.030	2.127	< 0.001	39	82.93	Values after correction

DF: Degree of freedom; PCFI: Parsimonious Comparative Fit Index; PNFI: Parsimonious Normed Fit Index; CMIN/DF: Minimum Discrepancy Function divided by Degrees of Freedom; RMSEA: Root Mean Square Error of Approximation; AGFI: Adjusted Goodness of Fit Index ; and CFI: Comparative Fit Index

Table 4. The indices of the convergent and discriminant validity, internal consistency, and stability of BCSBQ

	Indices	ASV	MSV	AVE	CR	(Alpha (CI95%	AIC	Omega	
Factors									
Screening attitude		0.069	0.078	0.537	0.821	(to 0.850 0.820)	0.836	0.560	0.836
Screening knowledge and perception		0.117	0.156	0.452	0.757	(to 0.768 0.721)	0.745	0.438	0.766
Screening practice		0.108	0.156	0.594	0.808	(to 0.806 0.765)	0.786	0.556	0.808

ASV: Average Shared Squared Variance; MSV: Maximum Shared Squared Variance; AVE: Average Variance Extracted; CR: Composite Reliability; Alpha: Cronbach's alpha; AIC: Average Inter-item Correlation; Omega: McDonald's omega coefficient

Figures

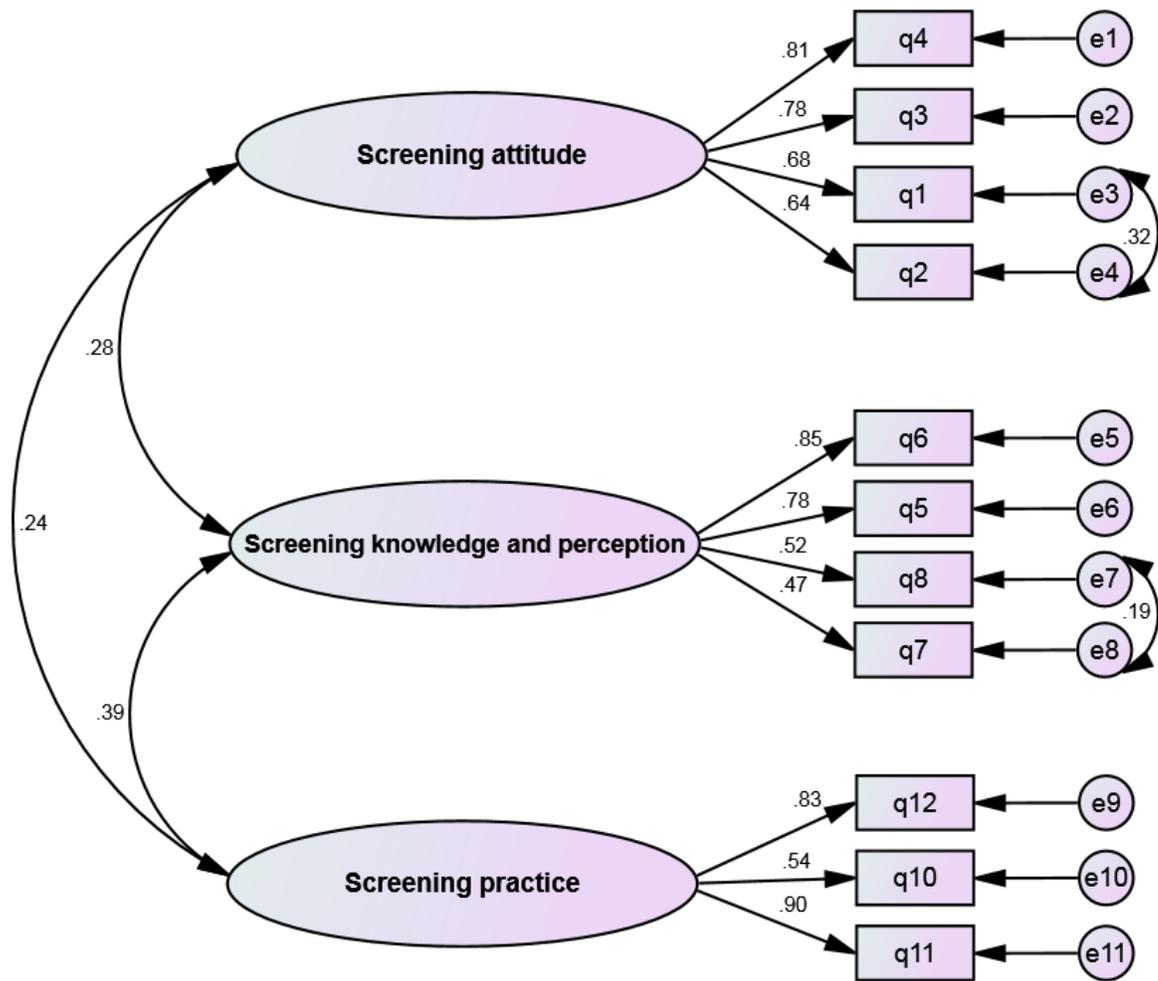


Figure 1

The final factor analysis model for BCSBQ