Body Image after Breast Cancer Questionnaire: psychometric properties of the Persian version

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Abstract

Background: Assessing body image among breast cancer survivors is essential to the development of good treatment and rehabilitation plans. Culturally-appropriate methods and instruments are needed for body image assessment. The aim of this study was to assess the psychometric properties of the Persian version of Body Image after Breast Cancer Questionnaire. Methods: In this methodological study, the Body Image after Breast Cancer Questionnaire was translated into Persian through forward-backward translation. Then, its content validity was assessed by twelve experts, and 400 women with breast cancer completed the questionnaire. The construct validity of the questionnaire was evaluated through exploratory and confirmatory factor analyses and its convergent and discriminant validity were evaluated using Fornell and Larcker's approach. The reliability of the questionnaire was also evaluated through Cronbach's alpha, McDonald's omega, and composite reliability. Results: In exploratory factor analysis, five factors were extracted, namely vulnerability, body stigma, body-related shame, body satisfaction, and physical disability stigma. Confirmatory factor analysis also confirmed the fit of the five-factor model (χ^2 = 466.95; N = 241; P < 0.001; PCFI = 0.728; PNFI = 0.624; CMIN/DF = 1.938; RMSEA = 0.068; AGFI = 0.808; IFI = 0.838). Second-order factor analysis also revealed that the subscales of the questionnaire measured an overarching concept which was labeled "Body image stigma". The questionnaire had acceptable content and convergent validity and composite reliability. Conclusion: The Persian version of Body Image after Breast Cancer Questionnaire measures the broad concept of "Body image stigma". The Persian BIBCQ has acceptable validity and reliability and hence, can be used for assessing body image among breast cancer survivors. Keyword: Body image, Breast cancer, Psychometric evaluation, Validity, Reliability

Background

Breast cancer (BC) is the most common cancer and the second leading cause of death among women (1). In Iran, eight thousand women annually develop BC, resulting in prevalence rate of 30−35 cases per 100000 women (2). According to the GLOBOCAN database, there are significant differences between global and Iranian population with respect to the prevalence, incidence, and mortality rates of BC so that the five-year prevalence rates of BC in Iran and in the world are 37.7% and 36.4%, respectively (3). Moreover, in developed countries, only 7% of BC-afflicted women age less than forty, while around 25% of the afflicted women in Iran are under forty (4).

BC treatments (including surgery, chemotherapy, radiation therapy, and hormone therapy) are associated with changes in appearance such as breast asymmetry, lymphedema, hair loss, and skin changes (5) as well as functional changes such as impaired sexual function or altered feminine identity (6). These changes may cause concerns over body image (7, 8). As a multidimensional construct, body image consists of perceptions, thoughts, feelings, and behaviors related to the appearance, abilities, and functions of the body (8). Changes in physical, psychological, and social functions can affect body image (9). In most societies and cultures, breasts are considered as part of feminine body and hence, their loss may be perceived as the loss of feminine identity (4). A study showed that more than 77% of

women with BC experienced some levels of distress in relation to their body image (10). Altered body image negatively affects quality of life and the health-related aspects of people's lives (11, 12).

Body image is determined by sociocultural ideals and hence, its criteria vary according to the immediate context (13). For instance, the necessity of full body coverage in Islamic cultures may affect satisfaction with body or inattentiveness to it among women with BC (14). People with religious beliefs usually have better body image and body satisfaction due to the attribution of life events to spiritual concepts (15). Moreover, body image is affected by the type of BC treatment. For instance, people who receive chemotherapy experience hair and weight loss, while those who receive radiation therapy experience skin discoloration, dermatitis or skin lesions. Hormone therapy also can cause premature menopause, bodily pain, and vasomotor symptoms (9).

Body image assessment is the first step to the promotion of body image among women with BC. However, BC measurement tools in most previous studies were either non-specific or included subscales which were appropriate for body image assessment during the acute phase of cancer (16–18). These measurement tools provide no reliable information about body image among women with BC (19).

The Body Image after Breast Cancer Questionnaire (BIBCQ) is a BC-specific tool for body image assessment which measures the long-term effects of BC on different aspects of body image among women with mastectomy or breast-conserving surgeries (20). However, despite the necessity of considering sociocultural context in body image assessment (21), BIBCQ had not yet been translated into Persian and validated for the sociocultural context of Iran. Therefore, this study was conducted to fill this gap. The aim of the study was to assess the psychometric properties of the Persian version of BIBCQ.

Methods

This methodological study was conducted in 2018. Study participants were 400 women with BC who fulfilled the following criteria: definite diagnosis of BC at least three months before the study or receiving BC treatments (i.e. surgery, radiation therapy, or hormone therapy), stable health status, no cognitive disorder, and no history of metastasis, recurrent cancer, or psychiatric disorders. Because of the dramatic effects of chemotherapy on body image, women who were receiving chemotherapy were not included.

Participants were conveniently recruited from Shahid Rajaei leading cancer care center, Babolsar, Iran.

Data collection

Data were collected using a demographic questionnaire and BIBCQ. The demographic questionnaire included items on age, length of affliction by BC, marital status, type of surgery (mastectomy or breast-conserving surgery),as well as satisfaction with financial status, health status, sexual function, and quality of life. Satisfaction-related items were scored on a three-point scale as "Good", "Moderate", or "Low". BIBCQ contains 53 items in the six main subscales of vulnerability, body stigma, transparency,

body limitations, body concerns, and arm concerns. Items are scored on a five-point Likert scale from "Completely agree" to "Completely disagree" for items 1–23 and from "Never' to "Always" for items 24–53. Items 1–23 and 29–50 are the same for patients with mastectomy or breast-conserving surgery, while items 24 and 51 are specific for patients with mastectomy and items 25–28, 52, and 53 are specific for those with breast-conserving surgery (20).

Forward- back ward translation

Initially, we contacted the developer of BIBCQ and obtained her permission for using the questionnaire. Then, the questionnaire was translated using the World Health Organization standard protocol for instrument translation (22). Accordingly, the questionnaire was translated into Persian by two English-Persian translators, one of whom was familiar with medical concepts and terminology. Their translations were combined to produce a single Persian BIBCQ. Then, the Persian BIBCQ was back-translated into English by two other translators and their translations were combined to produce a single English BIBCQ. The final English BIBCQ was sent to the developer of the original BIBCQ. She approved the soundness of the translation.

Psychometric evaluation

Content validity evaluation

The content validity of BIBCQ was evaluated both qualitatively and quantitatively. In qualitative content validity evaluation, twelve experts in BC and body image (including two oncologists, two gynecologists, two psychologists, four reproductive health specialists with PhD degree, and two nurses with PhD degree) were asked to evaluate the grammar, wording, and allocation of the BIBCQ items. BIBCQ was revised based on their comments (23). In quantitative content validity evaluation, content validity ratio (CVR) and index (CVI) were calculated to respectively determine the essentiality and the relevance of the items. Accordingly, BIBCQ was provided to the same twelve experts to evaluate the essentiality of each item on a three-point scale with the following three points: 1: "Not essential"; 2: "Useful but not essential"; and 3: "Essential". Then, CVR of each item was calculated using the following formula: $CVR = (Ne − N/2) / (N / 2)$, where Ne was the number of experts who considered the intended item essential and N was the total number of experts (24). Items with a CVR of more than 0.56 were considered appropriate (25). The same experts were also asked to rate the relevance of each item on a four-point scale as the following: 1: "Irrelevant"; 2: "Somewhat relevant"; 3: "Relatively relevant"; and 4: "Completely relevant". Then, the CVI of each item (i.e. I-CVI) was calculated through dividing the number of experts who rated that item 3 or 4 by

the total number of experts. Then, the average scale-level CVI (S-CVI/Ave) was calculated through dividing the sum of I-CVIs by the total number of the items. S-CVI/Ave value more than 0.90 was considered appropriate (24).

Construct validity evaluation

The construct validity of BIBCQ was evaluated through factor analysis. Sample size for factor analysis was estimated using the rule of thumb in methodological studies which considers 100–200 participants adequate (26). Thus, 200 participants were recruited for exploratory factor analysis and 200 for confirmatory factor analysis.

Exploratory factor analysis was conducted using the maximum-likelihood method and with Promax rotation. Sample adequacy was tested through the Kaiser-Meyer-Olkin (KMO) and the Bartlett's tests. KMO values of 0.7–0.8 and 0.8–0.9 were interpreted as good and excellent, respectively (27). The presence of an item in a factor was determined based on a factor loading of almost 0.3, which was calculated using the following formula: $CV = 5.152/ \sqrt{(n - 2)}$, where CV was the number of extractable factors and n was the sample size (28). The number of latent factors was estimated using parallel analysis (29). Items with communalities less than 0.2 were excluded from exploratory factor analysis (30). After factor extraction, the Pearson correlation analysis was employed to test the correlations of the extracted factors with items 24 and 51 (which were specific for patients with mastectomy) and items 25–28, 52, and 53 (which were specific for those with breast-conserving surgery). Each of these items was loaded on the factor with which it had the strongest significant correlation.

After exploratory factor analysis, first-order confirmatory factor analysis was conducted using the maximum-likelihood method and the most common goodness of fit indices in structural equation modeling. Then, second-order confirmatory factor analysis was conducted with the presumption that the latent factors extracted in the first-order analysis reflected another level of the intended concept and could indicate a broader concept at a higher level (31).

Convergent and discriminant validity evaluation

The convergent and discriminant validity of BIBCQ were evaluated using Fornell and Larcker's approach and through the Average Variance Extracted (AVE), the Maximum Shared Squared Variance (MSV), and the Average Shared Squared Variance (ASV) (32). An AVE of more than 0.5 reflects acceptable convergent validity and an AVE greater than MSV and ASV confirm discriminant validity (33, 34).

Reliability evaluation

The internal consistency of BIBCQ was evaluated via calculating average inter-item correlation (AIC), Cronbach's alpha, and McDonald's omega (35). Cronbach's alpha value of more than 0.6 (36), McDonald's omega value of more than 0.7 (25), and AIC value of 0.2–0.4 (37) were considered acceptable. Moreover, composite reliability was calculated in confirmatory factor analysis (29, 38). Composite reliability is a substitute for Cronbach's alpha in structural equation modeling. Composite reliability of more than 0.7 is acceptable (39).

Normal distribution of the data, outliers, and missing data

Univariate distribution of the data was evaluated using the skewness coefficient (±3) and the kurtosis coefficient (±3), while multivariate distribution of the data was evaluated using the Mardia coefficient (more than 8). Moreover, the existence of multivariate outliers was evaluated through Mahalanobis distance (P < 0.001). The rate of missing values was evaluated through multiple imputations and then, missing values were replaced with the mean of participants' responses (25). All data analyses were performed using the SPSS Amos (v. 25.0) and the JASP (v. 0.9.2.0).

Results

The mean of participants' age was 48.34±10.73. Around 24% of participants aged less than forty, 84% of them were married, 52% of them had poor sexual function, 37% of them reported good quality of life, 33% were satisfied with their financial status, and 46% reported good health status.

The results of content validity evaluation

The twelve experts who assessed the content validity of BIBCQ confirmed the appropriate wording, grammar, and allocation of its items. However, twelve items were excluded because their CVR values were less than 0.56 and one item was excluded due to a low CVI value.

The results of construct validity evaluation

In exploratory factor analysis, KMO test value was 0.796 and Bartlett's test value was 1684.5 (P < 0.001). Exploratory factor analysis revealed a five-factor structure for BIBCQ with the five factors of vulnerability, body stigma, body-related shame, body satisfaction, and physical disability stigma. The eigenvalues of these five factors were 3.728, 3.836, 3.430, 3.385, and 3.004, respectively. These factors explained 66.72% of the total variance of the BIBCQ scores (Table 1). The greatest correlation coefficients of the five factors of BIBCQ with items 24–28 and 51–53 are shown in Table 2.

In the first-order confirmatory factor analysis, all goodness of fit indices confirmed the model fit (χ^2 = 466.95; N = 241; P < 0.001; PCFI = 0.728; PNFI = 0.624; CMIN/DF = 1.938; RMSEA = 0.068; AGFI = 0.808; IFI = 0.838) (Table 3 and Figure 1). After the first-order confirmatory factor analysis, the second-order factor analysis was performed to identify whether all factors can be placed under a broader concept (Table 3). Figure 2 shows the structural model and the results of the second-order confirmatory factor analysis together with the standardized factor loading values. The factor loading values of all items were more than 0.3 and were significant at a P value of less than 0.001.

The results of convergent and discriminant validity evaluation

As Table 4 shows, only the AVE of the factor 3 was more than 0.5 in the first-order factor analysis, while the AVE values of the other factors were less than MSV and hence, divergent validity was not confirmed and the second-order was indicated. After performing the second-order factor analysis, AVE was 0.57, confirming the convergent validity of BIBCQ.

The results of reliability evaluation

The McDonald's omega and the AIC values of the five extracted factors were 0.7−0.779 and 0.291−0.342, respectively. The composite reliability values of three factors were acceptable (0.7−0.8), while the composite reliability values of two factors were unacceptable (Table 4).

Discussion

The present study evaluated the psychometric properties of the Persian BIBCQ. Study findings revealed that the concept of post-BC body image has different subscales. The first subscale of the Persian BIBCQ was vulnerability. Vulnerability occurs due to increased sensitivity to threats or reduced ability to deal with others as an independent person. It is known as dignity-related negative experiences which threaten body image and self-respect (40). Although vulnerability can be considered as part of the biological conditions of human beings and depends on people's life experiences, it can also be considered as a deep feeling rooted in the past which is based on a serious life threat, particularly when a person feels that he/she is unable to cope with that threat (41). The highest factor loading in the vulnerability subscale was related to the item, "I need to be reassured about the appearance of my bust". BC survivors have a great sense of vulnerability and loss of control with respect to BC (42). Permanent physical changes induced by BC treatments remind women, particularly the younger ones, of BC and worry them about its recurrence and hence, significantly affect their body image (6). They also lose their hope for change in life, have clearer memories of negative life events, and always feel worry about the recurrence of those events (43).

Body stigma was the second subscale of the Persian BIBCQ in the present study. As a psychosocial crisis, stigma has negative effects on health (44) and hence, its diagnosis and management are of great importance (43). Some studies reported that some people with cancer consider it as the aftermath of their sins. This belief isolates them from their families and societies (43). Stigma starts as a powerful social process and results in isolation and discrimination (45). The greatest factor loading in the body stigma subscale was related to the item, "I avoid close physical contact such as hugging". In this subscale, the item "I feel people can tell my breasts are not normal" also conveys participants' concerns over notoriety and stigma. In many societies and cultures, affliction by BC invades patients' privacy, affects family relationships, and hence, is considered as a stigma (46, 47). Cancer-related social stigma in turn inevitably affects mood and social relationships (48). Moreover, the sense of shame caused by BC affliction and reduced quality of life can alter body image (46). Body image alterations in turn can affect identity, self-confidence, social acceptance, and sexual relationships, and hence, result in stigmatization (49).

Body-related shame was the third subscale of the Persian BIBCQ. It is defined as a negative feeling about self and a global self-blame and self-heartedness which is usually experienced when people find themselves unable to fulfill body-related social standards (50). The self-objection theory and objectified body consciousness hold that people evaluate and monitor themselves with respect to social ideals and may feel emotional shame and engage in maladaptive health-related behaviors if they find themselves unfitted to these ideals (51). Although the item "I try to hide my body" obtained the greatest factor loading in this subscale, other items of this subscale also denote willingness to cover the body and prevent it to be seen by others. Similarly, previous studies reported that social pressure on patients with illnesses which carry cultural burdens (such as breast or testis cancers or AIDS) may require them to hide their illnesses (52, 53).

The fourth subscale of the Persian BIBCQ was body satisfaction. The concept of body satisfaction is related to the different aspects of sexual function and the quality of romantic sexual relationships. Its high levels are associated with great satisfaction with marital relationships (54). The greatest factor loading in this subscale was related to the items, "I like my body" and "I am satisfied with the shape of my body". Unlike most BC survivors who have negative body-related feelings and imaginations, some of them experience body satisfaction and acceptance which increase with age. Post-BC positive body image, body acceptance, and body satisfaction cause feelings such as compassion, life satisfaction, and hopefulness and encourage positive beliefs (55).

The fifth subscale of the Persian BIBCQ was physical disability stigma. Physical disability stigma is a type of involuntary social deviance particularly when dealing with disability and isolation and is manifested by physical symptoms and negative responses (56). The item "I feel less feminine since cancer" and the two other items of this subscale reflect women's concerns over arm-related problems and disabilities and denote physical disability stigma. Cancer treatments may cause chronic pains, physical disability, lymphedema, and musculoskeletal complications in the upper extremities and hence, bring about negative effects on the physical, psychological, and social aspects of quality of life (57). BC-

induced lymphedema not only causes pain and movement problems, but also affects body image and hence, may contribute to depression (58).

After confirming the model fit of the BIBCQ first-order factor structure, second-order factor analysis was used to achieve a more precise structural equation model. The aim of this method is to achieve a more meaningful arrangement of the data with the presumptions that the intended concept has two levels and the latent variables in the covariance are related to one or more higher-order factors (31). In fact, the first-order subscales (i.e. vulnerability, body stigma, body-related shame, body satisfaction, and physical disability stigma in our study) do not completely act as independent variables and their strong inter-correlations reflect a broader construct at a secondary conceptual level. Structural equation modeling is the most appropriate approach for assessing this structure because it can reveal those first-order constructs which are considered latent variables (59). Some scholars recommended that it is better to primarily create the factor structure of the intended construct through first-order factor analysis and then, to use second-order factor analysis to assess the structural equation model and show the appropriateness of the conceptual construct (60). In the present study, the lack of convergent and discriminant validity and the lack of distinction among BIBCQ subscales in first-order confirmatory factor analysis highlighted the necessity of second-order confirmatory factor analysis (61). Second-order factor analysis confirmed the convergent validity of the Persian BIBCQ and showed that the subscales of the questionnaire measure a broader concept, which was labeled "Body image stigma".

Reliability evaluation revealed the acceptable internal consistency of all subscales of the Persian BIBCQ. Previous studies also reported that the Cronbach's alpha of the questionnaire was 0.8 (21) and 0.9 (62) and the Cronbach's alpha values of its subscales were 0.67–0.82 (62).

Limitations

One of the main limitations of the present study was related to participants' concerns over the authors' judgment about their responses to the BIBCQ items due to the sociocultural and religious context of Iran. We attempted to manage this limitation through allowing them to answer the questionnaire in a private place and ensuring them that their data will be confidentially handled.

Conclusions

The Persian BIBCQ has an acceptable factor structure in Iranian population and measures the broad concept of "Body image stigma". This concept consists of five subscales, namely vulnerability, body stigma, body-related shame, body satisfaction, and physical disability stigma. This questionnaire can be used for post-BC body image assessment among Iranian women.

Clinical application

Healthcare providers can use the Persian BIBCQ to measure body image among BC survivors and then, develop strategies to promote their coping with BC and improve their quality of life. Accurate body image assessment among women with BC through valid and reliable culturally-appropriate measurement tools can help healthcare providers diagnose patients' concerns over body-related shame and guilt and thereby, provide them with regular counseling services to promote their social activities.

Abbreviations

BIBCQ: Body Image after Breast Cancer Questionnaire

BC: Breast Cancers

AIC: average inter-item correlation

CVR: Content Validity Ratio

CVI: Content Validity Index

KMO: Kaiser-Meyer-Olkin

CV: Critical Value

AVE: Average Variance Extracted

MSV: Maximum Shared Squared Variance

ASV: Average Shared Squared Variance

Declarations

Ethics approval and consent to participate

This study was approved by the Ethics Committee of Babol Islamic Azad University, Babol, Iran (code: IR.IAU.BABOL.REC.1397.001). Participation in the study was voluntary and anonymous in order to guarantee confidentiality. All participants gave their written informed consent and then they took part in the study.

Consent for publication

Not applicable.

Availability of data and material

The datasets generated during the current study are available from the corresponding author on reasonable request.

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Tables

Table 1. Extracted factors together with their items and factor loading values

%Variance	ℓ	h^2	Loading	Q_n. Item	Factor
14.30	3.278	6.21	736.	Q34: I need to be reassured about the appearance of my bust	Vulnerability
		6.22	730.	Q42: I need reassurance about my health	
		6.31	650.	Q35: I think about breast cancer	
		3.40	552.	.Q15: I feel my body has let me down	
		5.37	551.	Q48: I worry about minor aches and pains	
		3.89	480.	Q33: I worry that the cancer is spreading	
		5.79	461.	Q39: I worry about my body	
14.73	3.836	6.44	767.	Q30: I avoid physical intimacy	Body stigma
		6.80	687.	Q29: I feel that people are looking at my chest	
		6.22	676.	.Q31: I feel that people are looking at me	
		4.70	567.	Q21: I avoid close physical contact such as hugging	
		3.11	465.-	Q50: I feel people can tell my breasts are not normal	
13.19	3.430	5.25	682.	Q1: I try to hide my body	Body-related shame
		6.30	658.	Q32: I hide my body when changing clothes	
		4.99	599.	Q40: I would keep my chest covered during sexual intimacy	
		3.98	593.-	Q12: I would feel comfortable changing in a public change-room.	
		3.89	536.	Q3: I avoid looking at my scars from breast surgery	
13	3.385	5.52	715.	Q10: I like my body	Body satisfaction
		5.19	662.	Q49: I feel normal	
		5.27	621.	.Q8: I am satisfied with the shape of my body	
		4.55	588.	Q43: I can participate in normal activities	
		4.45	564.	Q11: I feel comfortable about the way I look when I exercise	
		3.23	414.	Q37: I feel sexually attractive when I am nude	
11.5	3.004	5.53	693.	Q9: I feel less feminine since cancer	Physical disability stigma
		5.18	595.	Q47: Arm pain is a problem for me	
		4.93	571.	Q38: Swelling of my arm is a problem for me	

Abbreviation: ℓ: Eigenvalue, h^2: communality

Table 2. The correlations of unallocated items with the extracted factors

Factor5	Factor4	Factor3	Factor 2	Factor 1	Factor Item
		r = −.523, P = <.001			Item 24
	r =.272, P =.004				Item 25
	r =.256, P =.008				Item 26
	r =.313, P =.001				Item 27
r = .314, P <.001					Item 28
		r =.291, P =.029			Item 51
			r = .50, P = <.001		Item 52
r = .272, P =.004					Item 53

Table 3. The fit model indices of first- and second-order factor analyses

CFI	IFI	AGFI	PNFI	PCFI	RMSEA	CMIN/DF	P value	df	χ^2	Indices* Model
834.	838.	808.	624.	728.	068.	1.938	001. >	241	466.958	First-order
831.	835.	809.	628.	687.	069.	1.942	001. >	244	473.657	Second-order

Acceptable values are as follows: > 0.5 for PNFI, PCFI, AGFI; > 0.9 for CFI and IFI; > 0.08 for RMSEA; and > 0.5 for CMIN/DF

Table 4. Convergent and discriminant validity, Cronbach's alpha, and composite reliability indices of the Persian BIBCQ

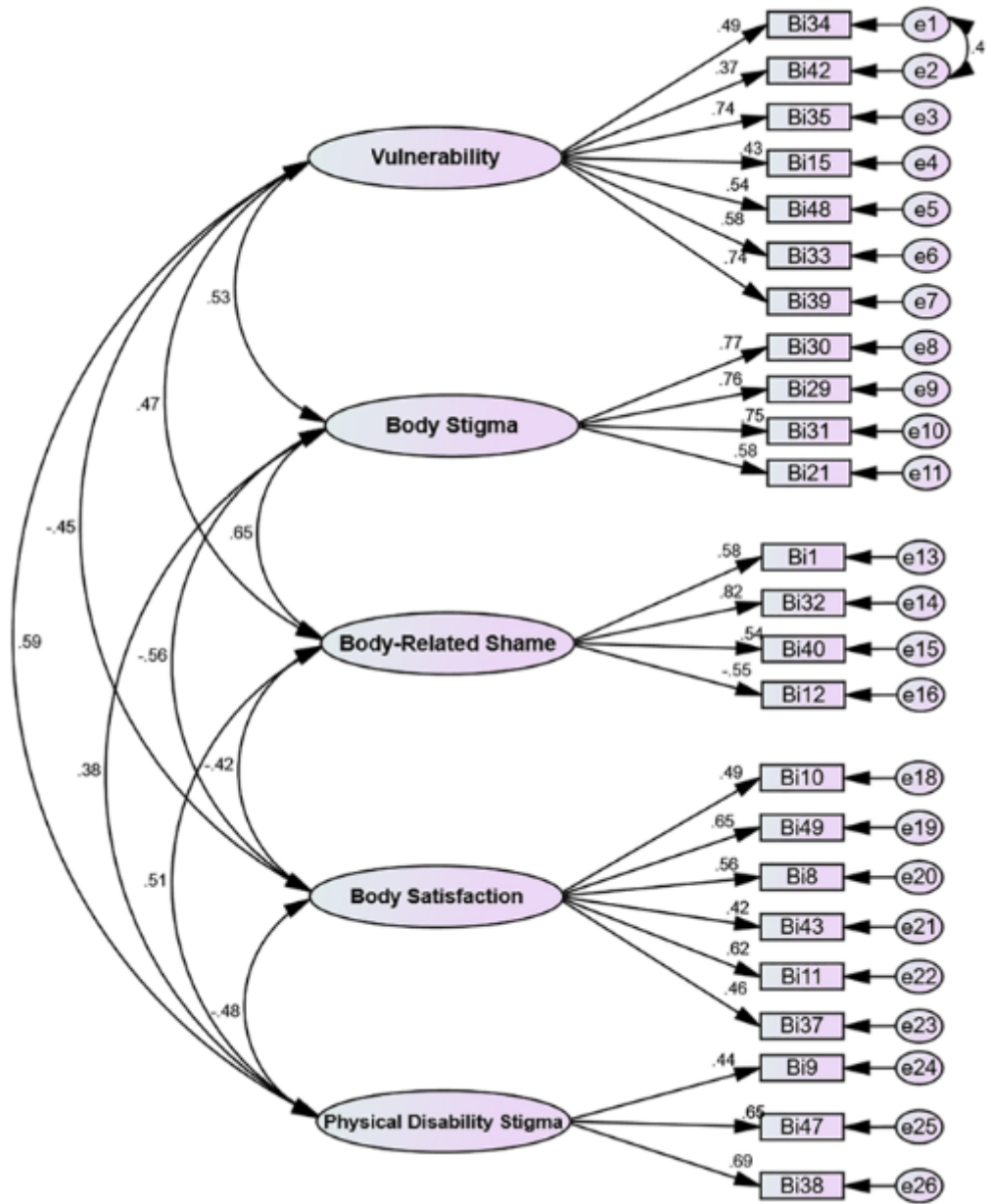| Indices Factors	AVE	MSV	ASV	CR	(α (95% CI	AIC	Ω
Vulnerability	293.	318.	230.	709.	(to .814 716.) 768.	331.	779.
Body Stigma	324.	348.	262.	760.	(to .778 659.) 723.	302.	774.
Body-Related Shame	516.	417.	291.	808.	(to .734 584.) 664.	329.	701.
Body Satisfaction	403.	417.	270.	448.	(to .768 643.) 710.	291.	714.
Physical disability stigma	365.	348.	247.	625.	(to .714 556.) 641.	343.	700.

Figures

Figure 1

The corrected model of first-order confirmatory factor analysis for the Persian BIBCQ
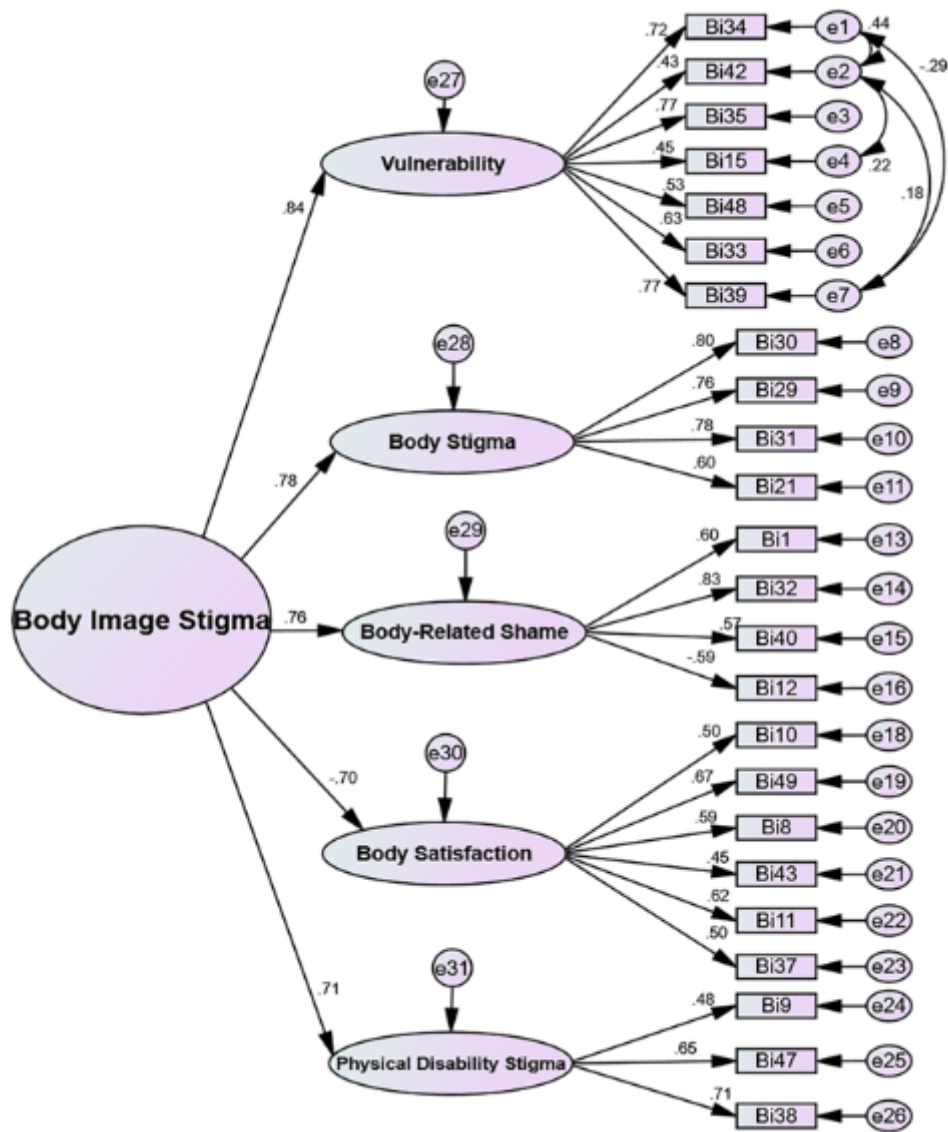
Figure 2

The corrected model of second-order confirmatory factor analysis for the Persian BIBCQ