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# Reliability and Validity of the Champion's Health Belief Model Scale for Mammography among Iranian Women with Family History of Breast Cancer

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**Abstract**

**Aims:** The presence of a patient with breast cancer in the family can be considered as a guidance for further prevention and increase the susceptibility of people against this disease. Champion's health belief model scale is translated and tested in different countries, but few attempts have been made to measure this scale in women with history of breast cancer.

**Methods:** After the standard Champion's Health Belief Model Scale was translated, 28 items were extracted with the help of panel of experts (n=13) and focus group (n=42) in four subscales. The eligible women were selected randomly (n=200) and took part in this study. The participants filled in the questionnaire through interviews. To test the construct validity of the data, the confirmatory factor analysis (CFA) was applied using AMOS software, moreover, test of internal consistency and test of reliability were applied by retesting (n=30).

**Findings:** The confirmatory factor analysis, which, was repeated after omitting these two items for the subscale of perceived barriers and shows the proper fit of its structural model. Cronbach 'alpha coefficients were 0.72 (susceptibility), 0.75 (seriousness), 0.82 (benefits) and 0.76 (barriers). Internal consistency ranged from 0 .64 to 0 .79 and test-retest reliability correlation were from 0 .67 to 0.92.

**Conclusions:** The Persian version of the Champion's Health Belief Model Scale can be a reliable and valid measure in Iranian women with family history of breast cancer.

**Keywords:** Champion's health belief model scale, Confirmatory factor analysis, Mammography, Breast cancer

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## Introduction

Breast cancer has a great importance due to its increasing prevalence in many countries, especially in Iran. This disease is the third cause of death. It has the highest mortality rate and it is the most common type of cancer among Iranian women [1].

The World Health Organization introduces two main measures to prevent breast cancer including relevant education and mammography as the fastest way of diagnosis before the appearance of disease symptoms [2]. There are many factors affecting women's doing mammography. One of them is the perceived belief of women's in regard to mammography behaviour [3-5] .The second, family history, as the risk of breast cancer increases 15% in women especially those whose first degree family members (mother, sister or daughter) have been affected by this disease [6]. Hence, the positive family history of breast cancer can act as a motivation factor in their performing preventive measures.

The Health Belief Model (HBM) is a psychological model that attempts to explain and predict health behaviours [7].

The measuring tool of the HBM structures was proposed by Champion [8]. The model was modified three times [9-11] and is translated and tested in different countries with different cultures [12-17].

In Iran also the reliability and validity of this questionnaire was assessed by Taymoori in Sanandaj [18]. But because, one of the important factors which, should be considered while assessing the reliability of this instrument is applying it on different group with culture which can have important effects on the reliability and validity of the questionnaire [19-21]. We assessed the reliability and validity of this questionnaire in Sabzevar.

Sabzevar as a deprived city with some special ethnic and culture is located on the northeast of Iran, the province of Khorasan Razavi with 400,000 people.

This project carried out with three aims; 1- translating the champion's health belief model scale to the Persian language. 2- evaluating the factor structure of the scale in a sample of Iranian women with family history of breast cancer using confirmatory factor analysis (CFA); 3- determining the validity and internal consistency of measures based on the obtained factor structure.

## Method

A methodological research design was conducted to determine the reliability and validity of the Persian version Champion's HBM Scale in women with the history of breast cancer in their families.

The data was collected from August 2012 to February 2013. Initially, all women who had been affected by breast cancer in the last five years in the city of Sabzevar and still alive were identified by the help of health centre of Sabzevar. 213 cases were identified and they were called by phone. Since the subjects of this research were confined to women only, they were asked if they have at least one female first degree family member to be included in this study. Finally 323 cases were introduced by these people.

Inclusion criteria included: 1-At least one of the female members of the family is affected by breast cancer. 2- Women above the age of 35(for high-risk women. For example those who had two or more members of the family affected by this disease, the age of above 25 was considered as acceptable in this study, also in the case the diseased member of the family was affected by this disease before menopause age, 10 years less than the age in which she caught the disease was considered as the entrance criterion for this study [22]. 3- Not having a suspicious mass shown in mammography or ultrasound or breast examination. 14 people declined to cooperate in this study and finally 200 cases were selected randomly from among 309 women who were family members of breast cancer patients and the Champion scale questionnaire was filled out through interviews with women.

The last version of the health belief questionnaire was prepared by Champion with some modifications on the structure of perceived susceptibility, benefits and barriers. The result of the study was the extraction of 3 items in regard to the subscale of perceived susceptibility, 5 items of perceived benefits and 11 items of perceived barriers [11]. Moreover, in the previous version, 7 items in regard to the subscale of perceived seriousness were checked for reliability and validity [9]. Each item was anchored with a five-point Likert scale with response options from 1="strongly disagree" to 5="strongly agree"

First, permission was gained from Professor Champion and then it was translated to Persian by two expert translators. To check the extent of compatibility of the translations with the original version, the technique of back-translation was applied. So, two other expert translators who had not seen the original version were asked to translate the Persian versions into English. After confidence was gained about the compatibility of the translations with the original version, some essential structural and wording modifications were applied in the questionnaire with the discretion of relevant professors and scholars in order to fit the instrument culturally.

To ensure cultural compliance of the translated

questionnaire, 13 experts who investigated the items with regard to their being essential or not and also checked the items quality [23]. Also 30 women with breast cancer history in their family who did not participate in the study were asked to investigate each item in order to check the compatibility of the target group's perception with the objectives of the questionnaire and comment on the clarity of the items, and whenever any problem was observed, the item in question was modified. As for the subscale of perceived susceptibility, there were 3 items in the last version [11]. Of the Champion's questionnaire to which one item was added due to the expert panel's suggestion regarding the special features of the participants in this study who had the history of breast cancer in their family, this item was; " I am more likely than the average woman to get breast cancer". It should also be noted that this item was maintained in the previous version of Champion's questionnaire [10]. Finally, four items were considered for the subscale of perceived susceptibility. Also, in regard to the subscale of perceived barriers, since the age of the participants in the study considering their special features was less that the study carried out by Champion, the expert panel decided to omit the item saying "I am too old to need a routine mammogram". Using the method of composing 2 focus groups of 10 from women with breast cancer and 2 group of 12 from women with the family history of breast cancer (who did not later participate in the study) the items of the Champion's HBM were discussed. The participants in these focus groups were selected randomly and altogether 42 people took part in the discussions. The most controversial items were related to the subscale of perceived barriers. The items "I don't know where to go for the test of mammography"," I don't have any problem in my breasts, I don't need doing the test of mammography", " I do self-examination of the breasts, there is no need for doing the test of mammography", and "I don't have enough money to do the test of mammography" were added to the items of the subscale of perceived barriers. Also the item "People doing mammograms are rude to women" was eliminated with the suggestion of women participating in the discussions and also with consultation with the experts' panel because of the lack of cultural compatibility of the research area. Participants believed that the sense of shame prevents doing mammography and not the issue of obscenity. Also the item "I don't know how to go about doing a mammogram "was eliminated because of the city's being quite small. The rest of the items for perceived barriers were maintained and in total 12 questions regarding the perceived

barriers were extracted. About the perceived seriousness subscale, the item " Breast cancer would, threaten a relationship with my boyfriend, husband, or partner" according to Islamic roles that sexual relationship outside the marriage is forbidden, the terms "boyfriend " and "partner" were deleted, and only husband" was retained. Other items in regard to the perceived seriousness and 5 items in regard to perceived benefits of doing mammography were maintained with the same content of the original version and only some trivial grammatical changes were applied. Since in this study higher marks in different subscales show a more desirable condition, the data were re-coded only for the sub-scale of perceived barriers.

**Analysis**

SPSS version 20 software was used for the analysis of the data. Also the AMOS software version 16 was used for the construct validity. Afterwards, to check the internal consistency of the data Cronbach's alpha test was applied and the degree of alpha was calculated for each sub-scale of this model. Cronbach's alpha coefficient $\geq 0.70$ was considered satisfactory [24].

The construct validity of the Champion's questionnaire was evaluated with the confirmatory factor analysis (CFA) using maximum likelihood (ML) estimation in AMOS. In the confirmatory factor analysis the researcher selects the variables with an idea already formed to explain the underlying processes creating the factor or factors and is designed to confirm previous finding by allowing researchers to explore data with the aid of theory, modification index and/or the pattern and significance of factor loading [25]. A model fit is suggested to be acceptable if the $\frac{\chi^2}{df}$ ratio is lower than 2, if the CFI, NFI, IFI and TLI are higher than 0.90 and if the RMSEA is lower than 0.08 [26, 27].

Reliability was evaluated using Cronbach's Alpha and test-retest correlation. Each dimension was expected to have an alpha of at least 0.7. For test-retest correlation we randomly selected 30 participants to complete the scale 21 to 28 days after the participant had completed the scale for the first time. We compared the test-retest scores for each dimension using Pearson correlation test. We also, considered that test-retest correlation coefficient should be at least 0.6.

**Results**

Demographic characteristics of the participants are summarized in Table 1.The mean age of study sample was 46.15 years (range 28-69, SD 7.26). Most of the participants were married, house wife and primary educated.

**Table 1** Demographic characteristic of Iranian with family breast cancer(n=200)

| Variable | Family breast cancer (n) | (%) |
|---|---|---|
| **Age** | | |
| 28-38 | 39 | |
| 39-49 | 98 | 49 |
| 50-60 | 54 | 27 |
| >61 | 9 | 4.5 |
| **Educational level** | | |
| Illiterate | 17 | 8.5 |
| Primary | 83 | 41.5 |
| High school | 45 | 22.5 |
| University/college | 55 | 27.5 |
| **Marital status** | | |
| Single | 18 | 9 |
| Married | 169 | 84.5 |
| Widowed | 9 | 4.5 |
| Divorced | 4 | 2 |
| **Occupational status** | | |
| House wife | 158 | 79 |
| Employed | 24 | 12 |
| Worker | 2 | 1 |
| Self-employed | 7 | 3.5 |
| Unemployed | 9 | 4.5 |
| **Relationship with patients** | | |
| Daughter | 112 | 56 |
| Sister | 84 | 42 |
| Mother | 4 | 2 |

In the confirmatory factor analysis the questionnaire included 28 items in 4 subscales, each subscale is marked by an oval as a latent variable and the items of each subscale are linked to its sub-scale by a flash. The results of the confirmatory factor analysis of the general model with 28 items in four subscales indicated that the ratio of chi- square to degrees of freedom was equal to 1.695, $\frac{x^2}{df} = \frac{452.864}{267} = 1.695$ , $P_{value} < 0.001$. Also the value of RMSEA equal to 0.059 with a confidence interval of 0.050 & 0.068. Also the value of CFI equal to 0.957, the value of IFI equal to 0.958, the value of TLI equal to 0.939 and the value of NFI was equal to 0.904. The factor loading related to the item of "mammography being painful" and "the costs of doing mammography" was smaller than 0.1, hence the confirmatory factor analysis was repeated after omitting these two items. The result of the confirmatory factor analysis after omitting the mentioned items was as below; Chi- square ratio to degrees of freedom was equal to 1.563

$\frac{x^2}{df} = \frac{343.90}{220} = 1.563$ , $P_{value} < 0.001$. Also the value of RMSEA was equal to 0.053 with a confidence interval of 0.042 & 0.064. The value of CFI equal to 0.969, the value of IFI

equal to 0.970, the value of TLI equal to 0.955 and the value of NFI was equal to 0.921. So, the confirmatory factor analysis shows the adequacy of the model and the proper fit of its structural model (Figure1).

Descriptive data and internal consistency of champion's scale, Means and standard deviations of the overall scale and the score of the subscales are presented in Table 2. Table 3 shows item-total correlation and Cronbach α for subscales.

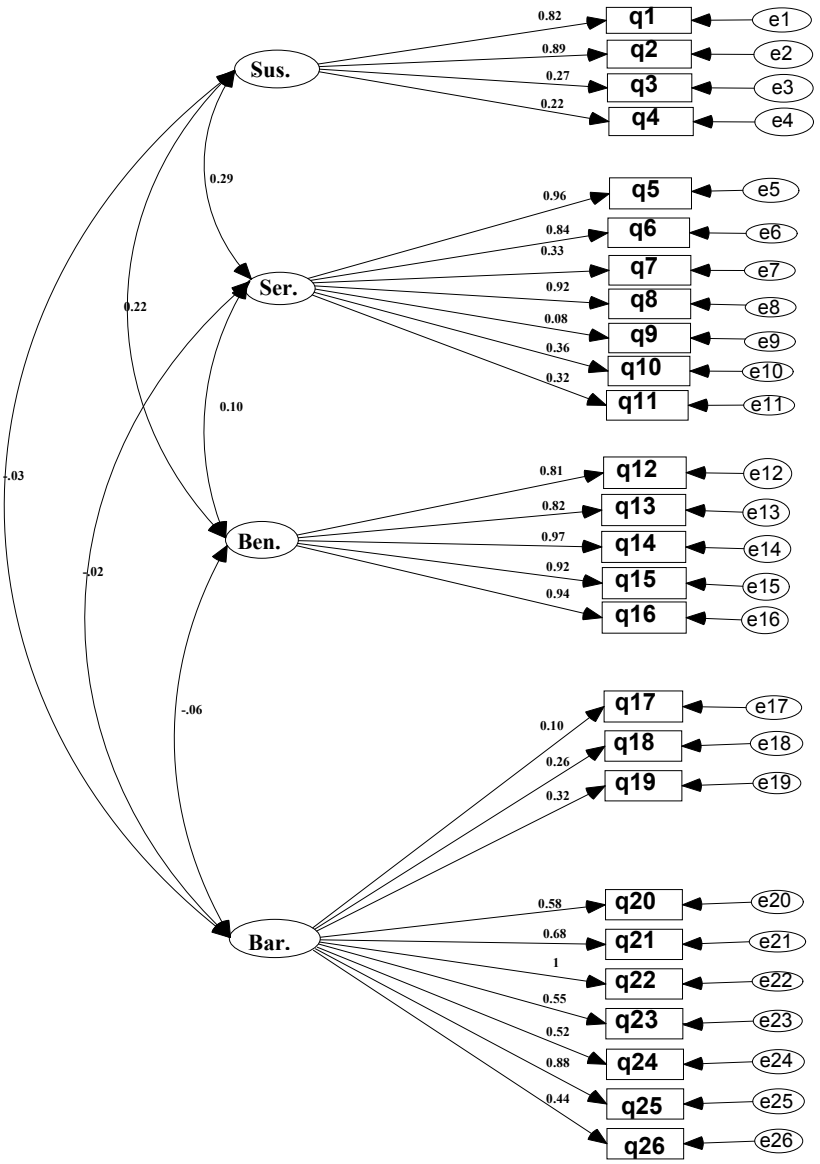


**Figure 1** Confirmatory factor analysis of the champion scale-Farsi version with four sub-scales (perceived susceptibility, perceived seriousness, perceived barriers and perceived benefits

**Table 2** Description of the champion subscales in women with family breast cancer(n=200)

| Subscales | Possible Score range | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| *Susceptibility | 4-20 | 6 | 20 | 13.12 | 3.70 |
| *Seriousness | 7-35 | 11 | 35 | 24.90 | 5.67 |
| *Benefits | 5-25 | 8 | 25 | 18.77 | 3.68 |
| **Barriers | 10-50 | 15 | 49 | 32.87 | 5.96 |
| Total | 26-130 | 56 | 129 | 89.66 | 11.12 |

*Higher scores indicate higher susceptibility , seriousness and benefits perceived
**Higher scores indicate lower barriers perceived

**Table 3** Item-Total Correlation and Cronbach α for Subscales

| Subscales | No. Items | Item-Total Subscales Correlation | Coronbachα | Test-retest correlation coefficient |
|---|---|---|---|---|
| Susceptibility | 4 | 0.64 -0.68 | 0.72 | 0.83; p< 0.001 |
| Seriousness | 7 | 0.66 -0.85 | 0.75 | 0.67; p< 0.001 |
| Benefits | 5 | 0.76 -0.94 | 0.82 | 0.78; p< 0.001 |
| Barriers | 10 | 0.71 -079 | 0.76 | 0.92; p< 0.001 |

## Discussion

The results show an acceptable validity and reliability for the Champion scale to mammography exam for Iranian women with the family history of breast cancer. The results also show a proper fit of the model. In this study, the face and content validity of the items were checked with the help of experts using group discussions of the target society women and caused modifications in some of the items. As for the subscale of perceived susceptibility, since the research sample were at risk of breast cancer, the item " I am more likely than the average woman to get breast cancer" was added and this item was confirmed through the confirmatory factor analysis. Hence, the subscale of perceived susceptibility was confirmed by four items and a great consistency was observed between the items of this subscale. Champion also reported a high internal consistency of items for this subscale with 3 items and observed a proper fit (0.82) using confirmatory factor analysis [11]. Also WU TY confirmed the four subscales of the Champion scale (perceived susceptibility, seriousness, benefits and barriers) through the confirmatory factor analysis. He also reported the range of Cronbach's alpha for the Champion's subscales between 0.77 to 0.90 [28]. Huaman also reported a proper fit (Goodness of Fit Index for those data was 0.89) of the Champion HBM with three subscales of perceived susceptibility, benefits and barriers using confirmatory factor analysis, but she reported that the subscale of perceived susceptibility has a poor concurrent validity [17]. One of the important facts that may can considered as a limitation about the present study is that all participants had a family history for breast cancer. The presence of a patient with breast cancer in the family can be considered as a guidance for further prevention

and increase the susceptibility of people against this disease, although, the increase of susceptibility in women cannot definitely lead to people doing the screening and mammography because there are some obstacles as fear and worry about finding a mass in the breast which prevent these women from doing the test [29-33]. On the other hand, the studies show that the belief that this disease is mortal and the fear of finding a mass in the breast can decrease the perceived susceptibility and causes not doing the test of mammography. Hence, despite having family history which seems to be a motive for doing the screening, the intensity of barriers as fear and worry from this disease can decrease the motive.

Also, the subscales of perceived seriousness and benefits and barriers showed a good internal consistency which is similar to some studies [10, 13].

One of the most controversial subscales of the health belief is the subscale of perceived barriers because the perceived barriers can be different due to individual and environmental features in different communities [34-39]. After the confirmatory factor analysis one of the added items to the subscale of the perceived barriers in the Persian version which was "I don't have enough money to do the mammography" was eliminated due to small rate of coefficient. Although, in the group discussion the women believed that costs of mammography can be considered as a barrier due to their financial status and this item was added with experts' view, this item was finally omitted after statistical analysis. The item "doing mammography is painful" which was one of the items of the subscale of perceived barriers in the original version of the questionnaire, was also omitted because of low coefficient in confirmatory factor analysis. Anyway, considering the fact that people from the city of Sabzevar are strong and resistant people, especially women are capable of bearing troubles and hardships, the mammography processes being painful cannot be considered as a barrier for their not doing it. The rest of the items present in the original version were maintained and confirmed with their main contents.

**Conclusion**

Considering the assessment of the Champion scale in the research population, this scale can be used as a proper instrument for educational interventions and compilation of proper educational content based on the health belief model for improve mammography beliefs and practice.

**Ethical considerations**

This research is part of a PHD dissertation in

Tarbiat Modares University, Faculty of Medical Sciences, Tehran and is confirmed in the Ethics Committee of this university.

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