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Methodology

## Adaptation and Validation of the Health Belief Model Scale for Breast Self-Examination in Mexican Women



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### ABSTRACT

**Objectives:** In Mexico, breast cancer is often not detected until it is already at an advanced stage. Many women know about breast self-examination (BSE), but few do it correctly. BSE can assist in the early detection of breast cancer, and a valid and reliable instrument to help determine the factors of the Health Belief Model that affect the practice of BSE in Mexican women would thus be advantageous. This study evaluates the psychometric properties of the Spanish version of the Health Belief Model Scale (HBMS) for BSE and identifies the factors that influence its practice.

**Methods:** A cross-sectional design was used; 738 Mexican women aged 20 years and older who attended a tertiary public hospital were evaluated. The HBMS of Champion was translated into Spanish. Focus groups of women were consulted, and experts' judgments were gathered to determine content validity.

**Results:** In the exploratory factor analysis, a structure of 6 factors was obtained, and Cronbach's alpha scales ranged between 0.65 and 0.84. BSE practice was associated with age (odds ratio [OR] 1.05; confidence interval [CI] 1.03-1.07), self-efficacy (OR 1.16; CI 1.12-1.20), barriers (OR 0.953; CI 0.912-0.996), and health motivation (OR 0.907; CI 0.837-0.983).

**Conclusion:** The Spanish version of the HBMS is an adequate, valid, and reliable instrument for the Mexican population that allows us to evaluate their beliefs about breast cancer and BSE, and it should also be applicable to other Spanish-speaking people. Perceived barriers, self-efficacy, and health motivation in particular should be considered in the development of health promotion programs for Mexican women.

**Keywords:** breast self-examination, health belief model, reliability, validity.

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## Introduction

Breast cancer is the most common cancer in the Americas and accounts for the second-highest number of cancer deaths in women.<sup>1,2</sup> In Mexico, breast cancer is one of the main causes of hospital morbidity due to cancer in women 20 years and older (29.5%) and is the second-largest individual cause of death, accounting for 14 deaths per 100 000 people.<sup>3</sup> Predictions based on population growth indicate that in the year 2030, there will be more than 596 000 new cases and more than 142 100 deaths due to breast cancer.<sup>2</sup>

Although there is currently no empirical evidence that breast self-examination (BSE) can save lives, it does boost general awareness of breast cancer. Mainstream organizations treating cancer currently recommend only mammography, largely because they are focused on developed countries. However, in developing

countries, there are limitations in healthcare services, and different strategies for the detection of breast cancer are commonly used and recommended.<sup>4</sup> Some authors suggest that BSE could help detect breast tumors earlier in countries where breast cancer screening is infrequent and leads to delayed diagnosis of cancer.<sup>5</sup> Mexico has insufficient infrastructure and specialized personnel for adequate detection with mammography,<sup>6</sup> and 70% of breast cancer tumors are not detected until advanced stages.<sup>7</sup> Therefore, the promotion of BSE is one of the more important strategies used to fight against breast cancer in Mexico.

Mexican health standards recommend BSE beginning at 20 years of age to raise awareness among women about breast cancer, help them gain better knowledge of their own body, and identify any changes or abnormalities in order to seek appropriate medical attention.<sup>8</sup>

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Several sociodemographic factors have been found to be associated with the practice of BSE: older age, schooling, socioeconomic level, and residing in urban areas.<sup>9,10</sup> However, it is also important to consider cultural, psychological, and cognitive factors related to the detection of breast cancer.<sup>11,12</sup>

The Health Belief Model (HBM) is commonly used to explain change in and maintenance of health-related behaviors; it includes concepts that allow prediction of why people take preventive action to detect or control a disease. The dimensions included are susceptibility, seriousness, benefits, barriers, cues for action, self-efficacy, and health motivation.<sup>13</sup> The HBM has been used to evaluate breast cancer detection behaviors such as BSE and mammography with the development of the Health Belief Model Scale (HBMS) in the American population by Champion.<sup>14,15</sup> The HBMS has also been adapted for African American,<sup>16</sup> some Asian,<sup>17-20</sup> and some European<sup>21-23</sup> populations, and it has shown validity and reliability. However, to our knowledge, the HBMS has been adapted only for mammography in any Spanish-speaking or Latin American context and not for BSE.<sup>24,25</sup> As a first step in the adaptation of the HBMS into Spanish, it has been validated for the Mexican university student population.<sup>26</sup> Nevertheless, it is also important to validate it for the general population. The objective of this study is to adapt the HBMS and determine its factorial structure and its reliability among the general population of Mexican women. A Spanish-language instrument with adequate psychometric properties could help to identify beliefs about cancer and BSE in Mexico or other Latin American or Spanish-speaking countries.

## Method

### Participants

This was a cross-sectional, descriptive study with a non-probabilistic sample. Women who were 20 years or older, agreed to participate in the research, and signed the informed consent form were enrolled. Exclusion criteria included history or current diagnosis of breast cancer, being pregnant, or lactating. The study was carried out from 2017 to 2018 and was authorized by the research and bioethics committee of the authors' institution (HMBSSNL-2016/748).

### Measures

A general data questionnaire and an adaptation of the HBMS were used to collect data.

#### General data questionnaire

The data questionnaire gathered sociodemographic information such as age, marital status, and schooling. It also included information about the history of breast cancer in the family or in close social circles and the respondent's own history of other breast diseases. Information about the knowledge and practice of BSE was also included in this questionnaire.

#### HBMS for BSE

The original version of this instrument, from Champion,<sup>14</sup> has 42 items that evaluate the 6 dimensions of the HBM: susceptibility (5 items), seriousness (7 items), benefits (6 items), barriers (6 items), health motivation (7 items), and self-efficacy (11 items).<sup>15</sup> The response options are presented on a Likert scale of 5 points, ranging from *strongly agree* to *strongly disagree*. This instrument has demonstrated content and construct validity; the Cronbach alpha reported for the scale dimensions ranges from 0.83 to 0.93.

For this study, an adaptation of this scale was performed, the procedure for which is described later.

Items were selected from research that used the HBMS for BSE.<sup>14-16,27,28</sup> A total of 52 items were obtained, and the translation and adaptation of the items was carried out with the translation-retranslation method, in which two professional translators with Spanish as a native language independently translated the instrument from English to Spanish and then back-translated it from Spanish to English.

Six focus groups with a total of 25 women 20 years and older were also conducted to identify whether Mexican women had different barriers or benefits than women studied in other populations. This was done according to the recommendations of Champion and Scott.<sup>16</sup> However, no novel barriers or benefits were identified in the focus groups. The content evaluation was conducted by national experts: 3 psychologist experts in design scales, 3 other psychologists, and a social worker with experience working with patients with breast cancer. They evaluated the items in terms of adequacy, coherence, and relevance. Based on this evaluation, changes were made to the dimensions of the questionnaire: an item was added to the susceptibility scale; an item was removed from the seriousness scale due to ambiguity; an item was added on the benefit scale, and the wording in another was changed to negative from positive; on the barriers scale, an item on ambiguity was removed; on the self-efficacy scale, it was decided to add 5 items covering more specific aspects of the BSE procedure; and finally, on the health motivation scale, an item concerning avoidance of unhealthy behaviors was added.

According to our experience with the application of multiple-option questionnaires using the Likert scale in our population, the standard Likert options (from *strongly disagree* to *strongly agree*) were not appropriate, because the average schooling in Mexico is only 9.2 years, equivalent to some secondary school, and is even fewer years on average for women.<sup>29</sup> For our target population, we decided to change the response options to 1 (no), 2 (it seems that no), 3 (it seems that yes), and 4 (yes). The final version consisted of 58 items. Results from a pilot trial using 30 people indicated that the questionnaire did not require further modifications.

### Data Collection

The instrument was administered to women visiting a clinic in a public tertiary care hospital in Northern Mexico. Most participants were companions of patients who met the inclusion criteria and were found in the waiting rooms of the hospital. After verifying the inclusion criteria, participants signed an informed consent form and also indicated that they could be called or sent mail for a second administration of the questionnaire. To assess the test-retest reliability of the scale, the questionnaire was administered a second time (6 weeks after the initial session) by telephone to the women who provided their number.

### Statistical Analysis

SPSS version 21 was used to analyze the data. Descriptive analyses of the sociodemographic data and data on the history of cancer and BSE were obtained. For content validity, exploratory factor analysis was used, with the principal axes method and varimax rotation. The Kaiser-Meyer-Olkin test was used to measure adequacy, and the Bartlett test of sphericity was used to examine the correlation matrix. The criterion for retaining an item in a scale was an associated minimum factor loading coefficient of 0.30. For reliability analysis, Cronbach alpha was obtained for each dimension of the HBMS; with an item-total correlation criterion of the scale  $\geq 0.30$ , the alpha levels sought were 0.70 or higher. To

evaluate the test–retest reliability of each subscale, the interclass correlation index was used to evaluate the association between the pretest and retest measurements. To evaluate criterion validity, a logistic regression analysis was performed with the forward method using the practice of BSE as a dependent variable and sociodemographic, clinical history, and dimensions of the HBMS as predictors to assess whether significant differences occurred between the women who had practiced BSE and those who had not.

## Results

### Descriptive Data

Of an initial sample of 890 women, 115 did not agree to participate and 37 were excluded (15 younger than 20 years, 13 pregnant, 7 lactating, and 2 with a history of breast cancer). Thus, 738 women ultimately participated, for a response rate of 82.9%. The characteristics of the sample are shown in Table 1. The mean (SD) age of the sample was 42.7 (12.7) years (range, 20–81 years), average duration of schooling was 8.9 years (range, 0–20 years),

**Table 1.** Characteristics of the participants.

Variable (N = 738)	M (SD)
Age, y	42.7 (12.7)
Scholarship, y	8.9 (3.4)
Monthly income, \$	331.54 (724.17)
	F (%)
Employment status	
Working	233(32)
Not working	495 (68)
Marital status	
Single	145 (19.7)
Married/consensual union	383 (52.0)
Divorcee/ widow	79 (10.8)
History of breast cancer	
Family (yes)	144 (19.5)
Grandmother	13 (9.0)
Mother	33 (22.9)
Sister	26 (18.1)
Aunt	56 (38.9)
Others	16 (11.1)
Other social circle (yes)	246 (33.5)
Friends	115 (46.4)
Neighbors	41 (16.5)
Others	92 (37.4)
Benign breast disease (yes)	123 (16.7)
Cysts	37 (5.0)
Fibrosis	46 (6.3)
Fibroadenoma	7 (1.0)
Mastitis	4 (0.5)
Other	29 (87.2)
Know about BSE (yes)	636 (86.2)
From whom did you learn how to perform BSE?	
Healthcare provider	436 (60.1)
Class/workshop	52 (7.2)
Pamphlet	81 (8.7)
Other	57 (7.9)
BSE practice (yes)	550 (74.7)

BSE indicates breast self-examination; M, mean; SD, standard deviation.

and most respondents were married or in consensual unions (69.5%). Most did not have work outside the home (67.1%), and their average monthly income was \$331.54 (\$724.17). Further, 16.7% had presented with some nonmalignant breast disease, 19.5% had a history of breast cancer in their family, 33.5% had acquaintances with breast cancer, 86% mentioned knowing how BSE is performed, and 74.1% had practiced it at least 1 or a few times, whereas 45.3% mentioned practicing it routinely.

### Exploratory Factor Analysis

A structure of 6 factors was obtained, and the measure of sampling adequacy reached a Kaiser–Meyer–Olkin value of 0.842, which indicates that the elements are related. Bartlett's test was significant ( $\chi^2(1653) = 12123.126, P < .0001$ ), rejecting the hypothesis of independent elements. Items loaded on 6 factors for the HBM, explaining 37.8% of the total variance (Table 2). Table 2 also shows the items that were retained from the original HBMS and those added to the Spanish version.

On the self-efficacy subscale, items A11 “I can organize my daily activities to perform breast self-examination,” A12 “I can do a breast self-examination despite being afraid to find something wrong,” A13 “I can squeeze my nipples to check if some liquid comes out,” and A14 “I can perform self-examination of the breast from where the neck begins (clavicle) to where the breast ends (abdomen begins), including the armpits,” were eliminated all owing to low factor loadings of less than 0.30. On the health motivation subscale, HM2 “It is very important for me to maintain good health” was eliminated because of a factor loading less than .30, and HM7 “I go regularly to health checkups even when I'm not sick” and HM8 “When I go to the doctor's office I follow the instructions [subsequently]” were grouped under self-efficacy, so it was decided to eliminate them because although they do reflect self-efficacy behavior, it is not specific to BSE.

Seriousness subscale item SR10 “Breast cancer is a disease without hope” was removed because of factor loading barriers. On the barriers subscale, item BR1 “Doing breast self-examination will make me worry about breast cancer” was removed because of a lower load of 0.30, and BR5 “It is hard for me to remember to do BSE” was removed because of a negative factor loading in the health motivation dimension. Finally, on the susceptibility subscale, item SP5 “I think I have a high probability of developing breast cancer because I have unhealthy habits” was removed to obtain a negative charge on the health motivation subscale.

### Reliability

The mean, standard deviation and alpha coefficient were obtained for each factor. The items were evaluated in relation to the total scale, and those that presented a correlation less than .30 were eliminated. For the susceptibility subscale, with 5 items, an alpha of .76 was obtained; for seriousness, SR1 “Women suffering from breast cancer die of this disease” and SR2 “The consequences of breast cancer and its treatments last a long time” were eliminated, giving 7 items with an alpha of 0.75. For benefits, with 8 items, an alpha of 0.84 was obtained. For barriers, with 9 items, the alpha was 0.79. For self-efficacy, A14 “I can get the BSE from where the neck starts to where the breast ends, including armpits” was eliminated owing to a correlation less than 0.30, and an alpha of 0.84 was obtained for 9 items. For health motivation, items HM1 “I am interested in detecting any health problem in time” and HM9 “I avoid consuming alcohol, tobacco and drugs” were eliminated because of correlations less than 0.30, and an alpha of 0.65 was obtained for the remaining 4 items. Subscale stability was evaluated with test–retest reliability using 145 participants; the interclass correlation index is shown in Table 3.

**Table 2.** Exploratory factor analysis of the Health Belief Model Scale for BSE.

	F1	F2	F3	F4	F5	F6
A10. I know the body positions to perform the BSE*	0.768					
A5. I am sure of the steps I need to follow to perform a BSE <sup>16</sup>	0.753					
A8. I can use the correct part of my fingers when I examine my breasts <sup>16</sup>	0.731					
A1. I know how to perform the BSE <sup>16</sup>	0.673					
A9. I know the dates on which I have to perform the BSE*	0.608					
A7. I know how often I should have BSE*	0.584					
A3. I trust that I can correctly perform the BSE*	0.567					
A6. When I look at the mirror, I can recognize abnormal changes in my breasts such as: wrinkles, color changes, and/or position of the nipple <sup>16</sup>	0.545					
A4. I can find a lump in my breast if I perform the breast examination by myself <sup>16</sup>	0.542					
A2. I know from what age I can perform the breast self-exploration*	0.453					
HM4. I am looking for activities that improve my health <sup>15</sup>		0.722				
HM5. I eat well-balanced meals <sup>14</sup>		0.671				
HM7. I exercise regularly, at least 3 times a week <sup>14</sup>		0.606				
HM3. I look for new information to improve my health <sup>16</sup>		0.496				
SR8. If I had breast cancer, I would put my economy at risk <sup>14</sup>			0.665			
SR9. If I had breast cancer, my whole life would fall apart <sup>14</sup>			0.645			
SR6. If I had breast cancer, I would put my job or professional career at risk <sup>14</sup>			0.633			
SR7. If I had breast cancer, I would change the image I have of myself <sup>14</sup>			0.613			
SR3. Breast cancer treatments are very aggressive*			0.571			
SR4. The consequences of breast cancer and its treatments (nausea, vomiting, etc) affect daily life*			0.558			
SR5. If I had breast cancer, I would put my relationship with my partner at risk <sup>14</sup>			0.533			
BR10. I avoid doing the BSE because the medical staff performs the exploration <sup>16</sup>				0.677		
BR9. Performing the BSE interferes with my daily activities <sup>14</sup>				0.654		
BR11. I avoid performing BSE because I get a mammogram every year <sup>16</sup>				0.640		
BR2. Performing the BSE will make me feel uncomfortable*				0.628		
BR7. The BSE is performed only if you feel pain in the breast*				0.596		
BR3. BSE takes me too much time <sup>16</sup>				0.580		
BR6. I don't have enough privacy to do BSE <sup>16</sup>				0.551		
BR8. I have other more important problems than the BSE <sup>16</sup>				0.523		
BR4. I'm afraid to do the BSE because I can find something wrong <sup>14</sup>				0.445		
BP4. Performing BSEs each month will allow me to find lumps early <sup>16</sup>					0.823	
BP7. Performing the BSE allows me to detect a lump before it is detected by the doctor <sup>14</sup>					0.756	
BP2. Performing the BSE will be good for my health <sup>14</sup>					0.685	
BP3. Performing BSE will make me feel more calm with breast cancer <sup>14</sup>					0.663	
BP5. If I perform BSEs monthly, I am less likely to die from breast cancer <sup>16</sup>					0.614	
BP8. If I find a lump early, I will have a better treatment for breast cancer <sup>16</sup>					0.602	
BP1. Performing the BSE will make me feel good about myself <sup>27</sup>					0.598	
BP6. Performing BSE monthly will decrease my chances of requiring radical or disfiguring surgery if breast cancer occurs <sup>16</sup>					0.594	
SP1. There is a good chance that I develop breast cancer within the next 10 years <sup>28</sup>						0.733
SP3. I think I will have breast cancer sometime during my life <sup>16</sup>						0.708
SP2. In comparison with women my age, I think I have more probability to suffer from breast cancer <sup>28</sup>						0.708
SP4. I think I have a high probability of suffering from breast cancer due to physical health <sup>14</sup>						0.683
SP6. I think I have a high probability of developing breast cancer because there are several cases in my family*						0.601

A indicates self-efficacy; BSE, breast self-examination; BP, perceived benefits; BR, perceived barriers; HM, health motivation, SP, perceived susceptibility; SR, perceived seriousness.

\*Spanish version.

**Table 3.** Reliability of the dimensions of the HBMS for breast self-examination.

Factor	Number of items	M (SD)	$\alpha$	Test-retest ICC [95% CI ]
Perceived susceptibility	5	9.0 (3.6)	0.75	0.75 [0.559-0.847]
Perceived seriousness	7	19.8 (5.1)	0.75	0.79 [0.707-0.860]
Perceived benefits	8	30.7 (2.8)	0.84	0.66 [0.532-0.757]
Perceived barriers	9	12.0 (4.7)	0.79	0.74 [0.637-0.824]
Self-efficacy	10	32.9 (6.8)	0.84	0.76 [0.679-0.833]
Health motivation	4	13.1 (8.7)	0.65	0.81 [0.742-0.866]

CI indicates confidence interval; HBMS, Health Belief Model Scale; ICC, interclass correlation coefficient; M, mean; SD, standard deviation.

### Regression Analysis

The variables that positively predict the probability of performing a BSE are age (OR 1.05; CI 1.03-1.07), self-efficacy (OR 1.16; CI 1.12-1.20), having fewer barriers (OR 0.953; CI 0.912-0.996), and being motivated to maintain health (OR 0.907; CI 0.837-0.983; Table 4).

### Discussion

The objective of this study was to adapt the HBMS for BSE in Mexican women. The rates of correct practice of BSE in Mexico are very low,<sup>30</sup> and the National Plan for women's health intends that primary and secondary care programs reflect the characteristics of the real situation.<sup>31</sup> Thus, an instrument accurately assessing beliefs about cancer and BSE in the Mexican context is important to help guide strategies for health promotion.

In this study, the Mexican adaptation of the HBMS obtained 42 items in 6 factors with medium and high factor loadings, like the original scale.<sup>14,15</sup> In other countries, in contrast, the scale was left with 36 items and a greater number of factors, such as in Korea, in which the factor of perceived seriousness was divided into two, for 7 factors in all. Nevertheless, the authors decided to leave it as a single factor because of the strong correlation between the two factors.<sup>18</sup> Likewise, in the Turkish version, 42 items were found to divide into 7 factors: the barrier dimension presented as 2 factors, but the authors decided to unite it because of high correlation between both factors, leaving the final version with 6 factors again.<sup>22</sup>

In the exploratory factor analysis of the scale, although no new factors were formed, some items were eliminated, mainly because of low factor loadings. The elimination of self-efficacy items, A13 and A14, may be due to the fact that they imply very specific knowledge of BSE procedure. In the case of item A11, it is difficult to infer why women do not recognize the need for or view

themselves as able to organize activities to perform BSE; they may associate the question with having a job outside the home, whereas in this sample, most of the participants did not work.

Another possibility is that women do not ascribe enough importance to performing BSE and so they do not work it into their daily routine. Finally, regarding removal of item A14, one study that convened focus groups in Mexico on reasons for doing BSE noted that fear is rarely mentioned as a barrier (Juárez-García and García-Solís, 2018, Unpublished data), so it is possible that Mexican women do not consider fear of what they will find as a barrier to BSE. Also, the elimination of this item shows self-efficacy behavior, in that, as Bandura<sup>32</sup> mentions, people with high confidence in their abilities tackle difficult tasks as challenges to be mastered instead of threats to be avoided. This is consistent with the high scores obtained by the participants in self-efficacy.

On the scale of health motivation, several items were eliminated (HM1, HM2, HM7, HM9, and HM8), and this scale also obtained the lowest alpha, at 0.65. More studies are needed to identify which indicators motivate Mexican women to take care of their health or avoid illness.

On the scale of perceived seriousness, 4 items were eliminated (SR1-SR3, and SR10). It is possible that SR1 and SR10 reflect a very fatalistic attitude against breast cancer among some of the sample that is not representative of all Mexican women (as reflected in insufficient factor loadings); on the other hand, SR2 may reflect ignorance of the duration of anticancer treatments among Mexican women.

From the barriers scale, item BR1 was eliminated. On one hand, this may reflect that women do not identify with this item because they consider that BSE has great benefits; on the other hand, another possibility is that the wording is not very clear, because this item was also eliminated in the Mexican version of HBMS for university students.<sup>26</sup>

**Table 4.** Logistic regression analysis for performing BSE.

Variable (N = 583)	B	SE	Wald	P value	OR	95% CI
Barriers	-0.048	0.022	4.602	.032*	0.953	0.912-0.996
Self-efficacy	0.151	0.018	70.364	.000 <sup>†</sup>	1.163	1.123-1.205
Health motivation	-0.098	0.041	5.691	.017*	0.907	0.837-0.983
Age	0.051	0.010	25.213	.000 <sup>†</sup>	1.052	1.031-1.073
Constant	-3.928	0.750	27.449	.000	0.020	
						R <sup>2</sup> Nagelkerke = 0.36

B indicates B coefficient; CI, confidence interval; OR, odds ratio; SE, standard error.

\*P < .05.

<sup>†</sup>P < .001.



On the susceptibility scale, SP5 was eliminated because of negative load in HM. The scale was left with 5 items added to this subscale as SP4 “I think I have a high probability of suffering from breast cancer due to my physical health” and SP6 “I think I have a high probability of developing breast cancer because there are several cases in my family,” which were grouped together and to obtain an adequate factor loading.

Most of the factors obtained a Cronbach alpha greater than 0.70, and the benefits and perceived self-efficacy scales obtained alphas of 0.80. In the test–retest analysis, most of the factors obtained an interclass correlation coefficient greater than 0.70, except the benefit scale, which obtained a value of .66. This may be due to the influence of the first test, which could improve participants’ way of seeing BSE: many women expressed gratitude at being invited to answer the scale, as it reinforced the importance of BSE, taught them more about it, and promoted their interest in it, as also mentioned by Champion and Scott.<sup>16</sup>

The main factors of the HBMS that were associated with BSE were perceived barriers, self-efficacy, health motivation, and age. Similar to other countries, such as Turkey and Saudi Arabia, the variables that most influence the frequency of BSE are self-efficacy and perceived barriers.<sup>23,33</sup> In both studies, health motivation was not a predictor but was related to BSE.

In other studies, all HBM factors were related to frequency of BSE, except for perceived seriousness. It was explained that the perceived seriousness of the disease sometimes can also inhibit health behavior for fear of learning that one has the disease or that it may not be influential because most people know that cancer is a serious disease.<sup>14,16</sup>

The results are also congruent with previous studies of Mexican women. In Mexican university students, it was found that the HBM variables that predict BSE were self-efficacy and perceived barriers,<sup>34</sup> whereas in women older than 30 years, HBM factors related to BSE practice were self-efficacy and perceived susceptibility.<sup>35</sup> Another study in Mexico found an association between BSE knowledge and practice and mentioned that this technique requires knowledge and training on the part of women.<sup>36</sup> This could explain why in these studies self-efficacy was associated with practice of BSE.

The motivation for general healthcare was shown to be a predictor for BSE. This indicates that a person who is committed to taking care of their health can perform self-care behaviors related to health. Thus, it is also important that, in addition to the promotion of BSE, encouraging a healthy lifestyle can decrease the modifiable risk factors for breast cancer.

Age was also associated with BSE practice in our sample. This differs from other studies that did not observe an association between the frequency of BSE and age but did find such an association with educational level, work, or family breast cancer history.<sup>23,33</sup> Older women are more likely to use BSE, and this may be because young women tend to feel less vulnerable to breast cancer. Also, only a low percentage of participants in this sample had a history of breast cancer in their family, and few had had other diseases of the breast.

These results demonstrate that interventions must be made to reduce women’s cognitive barriers to performing BSE, which at the same time has repercussions on self-efficacy. Considering self-efficacy as part of an intervention to increase BSE practice is important because self-efficacy involves more aspects than just knowledge of the procedure: it implies that women know that “they can do it” and can overcome the obstacles they face and perform BSE each month as recommended. As mentioned by Bandura,<sup>32</sup> resilient efficacy requires experience overcoming obstacles through persistent effort. Other elements that influence the development of self-efficacy include indirect experience of

social models. In this sense, the participation of health professionals is very important, and the education provided by doctors and nurses can affect the practice of BSE. But above all, once taught BSE, women can be invited to teach other women in turn, thereby also increasing their mastery of the procedure and the impact of BSE as a model with which other women can identify and aspire to achieve.

Psychoeducational interventions in combination with the use of cognitive-behavioral techniques have been shown to be effective in increasing the frequency of breast cancer detection behaviors while decreasing perceived barriers and increasing perceived benefits, self-efficacy, and health motivation.<sup>37,38</sup> Therefore, we recommend that this type of strategy based on behavioral models be considered by public policy makers to provide a greater impact in the fight against breast cancer.

This study has some limitations. First, participants were taken from only one public hospital (and no private hospitals). Although the participants were companions of the patients, a study in the general population would be convenient to confirm the results obtained. Likewise, the criterion validity was studied through a past criterion, that is, whether BSE had been previously performed or not. Another limitation of this self-report type of research is that data can be affected by social desirability. To address these limitations, it is recommended that future studies collect data from multiple centers, with a criterion of predictive validity, and add a brief scale of social desirability. The fact that the average schooling in this sample was lower than the national average could indicate the usability of the scale at the national level, because it appears to be comprehensible at all levels of schooling.

## Conclusion

To our knowledge, this is the first study to attempt to validate a scale of health beliefs for BSE in Mexico and in Spanish. Most subscales had adequate psychometric properties and demonstrated the reliability and validity of the research instrument. Therefore, it can be used in Mexico and other Spanish-speaking countries. Also, this study provides us variables related to the model of health beliefs that influences BSE practice in Mexican women and in particular the central roles of perceived barriers, self-efficacy, and health motivation, which should be of interest and utility in the promotion of health and the fight against breast cancer.

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