

Factors Affecting Breast Self-examination Behavior Among Female Healthcare Workers in Iran: The Role of Social Support Theory

Saeed Bashirian¹, Majid Barati¹, Leila Moaddab Shoar², Younes Mohammadi³, Mitra Dogonchi⁴

¹Department of Public Health, School of Health, Social Determinants of Health Research Center, Hamadan University of Medical Sciences, Hamadan, Iran; ²Department of Radiation Oncology, School of Medicine, Hamadan University of Medical Sciences, Hamadan, Iran; ³Department of Epidemiology, School of Health, Modeling of Noncommunicable Diseases Research Center, Hamadan University of Medical Sciences, Hamadan, Iran; ⁴Department of Public Health, School of Health, Hamadan University of Medical Sciences, Hamadan, Iran

Objectives: In women, breast cancer is the most common cancer and the leading cause of cancer death. Screening tests are the basis for early diagnosis. In Iranian women, the mortality rate of breast cancer is high due to insufficient screening examinations and delayed visits for care. Therefore, this study aimed to determine the factors affecting breast self-examinations among Iranian women employed in medical careers.

Methods: This cross-sectional study included 501 women working in the medical professions at Hamadan University of Medical Sciences in western Iran in 2018. The subjects were selected by stratified random sampling. Data were collected using a researcher-developed, self-report questionnaire that contained demographic information and questions based on protection motivation theory and social support theory. Descriptive data analysis was conducted using SPSS version 23 and model fitting with PLS version 2.

Results: The mean age of the participants was 37.1 ± 8.3 years, and most of the women (80.4%) were married. Most women had a bachelor's degree (67.5%). The findings of this study showed that the coping appraisal construct was a predictor of protection motivation ($\beta=0.380, p<0.05$), and protection motivation ($\beta=0.604, p<0.05$) was a predictor of breast self-examination behavior. Additionally, social support theory ($\beta=0.202, p<0.05$) had a significant positive effect on breast self-examination behavior.

Conclusions: The frequency of practicing self-examinations among women employees in the medical sector was low; considering the influence of social support as a factor promoting screening, it is necessary to pay attention to influential people in women's lives when designing educational interventions.

Key words: Breast self-examination, Women, Breast cancer, Motivation, Social support, Iran

Received: December 3, 2018 Accepted: June 3, 2019

Corresponding author: Mitra Dogonchi, MSc
Department of Public Health, School of Health, Hamadan University of
Medical Sciences, Hamadan 6517838695, Iran

E-mail: Dogonchi.mitra@yahoo.com

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Breast cancer is the most common form of cancer among women and the leading cause of cancer death among women in many countries [1]. In Iran, breast cancer is likewise the most common cancer among women [2]. Breast cancer leads to various physical, psychological, social, economic, and familial problems; it reduces self-esteem and increases patients'

sense of vulnerability, pain, and absence from work [3]. Breast cancer is a major health problem for Iranian women, because most women are never screened. Therefore, breast cancer is generally diagnosed very late [4]. Early diagnosis of breast cancer is a potentially beneficial way to control the disease and to reduce mortality. Annual mammography, clinical breast examinations, and monthly breast self-examinations (BSEs) are essential for the early diagnosis of breast cancer [1]. BSEs, which are performed by touching the breast with the finger tips, are done in order to find masses. Through this method, women can check their breasts in sitting, standing, or lying positions. BSEs are routinely carried out in advanced countries, but are often not considered to be appropriate in developing countries [5]. Perceived barriers prevent screening, including the absence of signs and concerns about lack of recognition [6]; fear [7]; lack of doctors' recommendations, forgetting the schedule of BSEs, pain, and embarrassment [8]; lack of environmental support and cultural beliefs about fate [9]; and the absence of support from spouse, friends, and family [10]. Studies have shown that existence of social support increases women's participation in breast cancer screening programs [10-13]. Social support is categorized into 4 categories. Emotional support includes empathy, love, trust, and care. Instrumental support refers to tangible assistance. Informational support manifests as advice, comments, and information that a person can use in the face of a problem. Appraisal support refers to the provision of information that is useful for internal evaluation [14].

In this study, protection motivation theory (PMT) was used as a theoretical framework for identifying factors affecting whether Iranian employed women perform BSEs. This model suggests that protection motivation (i.e., the intention to engage in protective behavior) is derived from the 2 processes of threat appraisal and coping appraisal. The effective variables in this model include susceptibility construct, severity construct, response efficacy, self-efficacy, rewards associated with incompatible responses, and response costs of consistent behavior. PMT is used as a cognitive social model to predict various behaviors, such as cancer screening. However, a limitation of PMT is that it cannot detect environmental and cognitive variables (such as subjective norms) that affect behavior change [15,16]. Therefore, the main purpose of this study was to answer the following question: does the social support theory resolve this weakness of PMT? (Supplemental Material 1).

METHODS

In this cross-sectional study, the participants were 501 women working in the medical professions at Hamadan University of Medical Sciences in western Iran in 2018. Since the total number of employed women in the Medical Sciences University units was 3030, and previous studies have reported different levels of prevalence of BSEs, in order to determine the sample size, a rate of 73% [17] with an alpha value of 0.01, accuracy of 0.05, and confidence level of 99% were considered. Finally, after taking into account a 10% projected loss to follow-up, 501 employed women were enrolled in the study. After obtaining approval from Hamadan University of Medical Sciences and receiving a list of employees, the names of individuals in the research units were selected through multi-stage sampling (stratified random sampling). Considering that Hamadan University of Medical Sciences has educational, health, medical, and office units, at first, the number and names of employed people, as well as the actual percentage of individuals to be sampled in each unit, were obtained. Then, the women's names in each unit were separately entered into the Research Randomizer (<https://www.randomizer.org/>), and the number of individuals to be sampled in each unit was determined randomly. The researchers went to the relevant location and presented the questionnaire to the selected subjects to complete. If the selected subjects did not choose to participate in the study or were not present when there searchers was there, alternative subjects were re-selected using the software. The inclusion criteria for participation in the study were consent and willingness to participate in the study, age between 20 years to 61 years, and the lack of a history of breast cancer. The exclusion criteria were having breast cancer at the time of the study and incomplete completion of the questionnaire. The tool used to collect information was a researcher-developed questionnaire consisting of 3 sections on demographic information (Table 1), the PMT constructs, and the theoretical construct of social support [18-22].

The part of the questionnaire dealing with the PMT constructs contained questions on a 5-point Likert scale, arranged as follows: 8 questions on the severity construct, 6 questions on the self-efficacy construct, 7 questions on the response efficacy construct, 4 questions on the response costs construct, 5 questions on the reward construct, 4 questions on the fear construct, and 4 questions on the protection motivation construct. The part of the questionnaire dealing with social sup-

Table 1. Relationships between demographic variables and breast self-examination (BSE) performance (n=501)

Variables	Total	BSE performance		p-value
		Yes (n=321)	No (n=180)	
Age (y)				0.453
<40	337 (67.3)	217 (64.4)	120 (35.6)	
≥40	164 (32.7)	104 (63.4)	60 (36.6)	
Marital status				0.004
Married	403 (80.4)	270 (67.0)	133 (33.0)	
Single	98 (19.6)	51 (52.0)	47 (48.0)	
Educational status				0.024
Diploma	35 (7.0)	16 (45.7)	19 (54.3)	
Technician	37 (7.4)	24 (64.9)	13 (35.1)	
Bachelor	338 (67.5)	219 (64.8)	119 (35.2)	
Master	74 (14.8)	48 (64.9)	26 (35.1)	
Doctor	17(3.4)	14 (82.4)	3 (17.6)	
No. of children				0.441
None	80 (19.5)	51 (63.0)	29 (37.0)	
1-2	308 (76.8)	212 (68.8)	96 (31.2)	
≥3	15 (3.7)	9 (60.0)	6 (40.0)	
History of breast disease				0.006
Yes	44 (8.8)	36 (81.8)	8 (18.2)	
No	457 (91.2)	285 (62.4)	172 (37.6)	
Family history of breast cancer				0.277
Yes	63 (12.6)	43 (68.3)	20 (31.7)	
No	438 (87.4)	278 (63.5)	160 (36.5)	
Menopause				0.260
Yes	46 (9.2)	27 (58.7)	19 (41.3)	
No	455 (90.8)	294 (64.6)	161 (35.4)	
Workplace				0.013
Health unit	85 (17.0)	62 (72.9)	23 (27.1)	
Therapeutic unit	308 (61.5)	200 (64.9)	108 (35.1)	
Educational unit	58 (11.6)	31 (53.4)	27 (46.6)	
Head office	50 (10.0)	28 (56.0)	22 (44.0)	
Hormone therapy				0.068
Yes	6 (1.2)	6 (100)	0 (0.0)	
No	495 (98.8)	315 (63.6)	180 (36.4)	
Having seen a patient with breast cancer				0.001
Yes	202 (40.3)	146 (72.3)	56 (27.7)	
No	299 (59.7)	175 (58.5)	124 (41.5)	

Values are presented as number (%).

port likewise consisted of questions on a 5-point Likert scale, distributed as follows: 5 questions on the emotional support construct, 3 questions on the informational support construct, 3 questions on the instrumental support construct, and 3 questions on the appraisal support construct. In more detail, the

Table 2. Mean, standard deviation (SD), and range of scores for the constructs of protection motivation theory (n=501)

Variables	Mean ± SD	Range
Knowledge	5.59 ± 1.94	1-10
Susceptibility	16.36 ± 3.72	5-25
Severity	29.81 ± 5.98	8-40
Self-efficacy	24.58 ± 3.80	6-30
Response efficacy	27.78 ± 4.86	7-35
Response costs	14.81 ± 2.81	4-20
Reward	20.30 ± 3.34	5-25
Fear	16.20 ± 3.69	4-20
Protection motivation	14.12 ± 3.18	4-20

5-point Likert scale was constructed with scores of 1-5 assigned to responses of "I completely disagree," "I disagree," "I have no idea," "I agree," and "I completely agree." The scoring of answers to questions about the response costs construct and the reward construct was reversed. The domains of the scores and questions are presented in Table 2. To determine the content validity of the questionnaire, 10 questionnaires were distributed to specialists in health education, gynecology, and oncology. To evaluate content validity, the content validity ratio (CVR) and content validity index (CVI) were used. A CVI score of 0.7 or higher and a CVR score of 0.6 or above were considered acceptable (Table 3) [16,23]. To determine the formal validity of the questions, 10 women were asked to give their opinion about the simplicity, clarity, and readability of questions. Vague questions were revised.

Exploratory factor analysis was used for construct validity, which was calculated for all samples (501 individuals). In order to conduct factor analysis, first, the adequacy of the sample size was confirmed using the Kaiser–Meyer–Olkin (KMO) measure, and for correlations between measured variables, the Bartlett test of sphericity was used. Acceptable KMO values range from 0.7 to 0.8 [24]. In our study, the KMO statistic was 0.75, indicating that the sample was suitable for performing factor analysis. The null assumption of the Bartlett test of sphericity is that variables correlate only with themselves. Therefore, rejection of this assumption shows the suitability of the correlation matrix for factor analysis [25]. In other words, the items are correlated with each other. In this analysis, the varimax rotation method was selected to achieve the best factor loading (>0.4) [25,26].

To assess the reliability of the tool, internal consistency and re-testing were used. To measure internal consistency, a pilot study was conducted among 30 women employed at Hama-

Table 3. Validity of the questionnaire and measurement model indices

Construct and indicators	Scoring	CVR	CVI	Factor loading	Cronbach alpha	Composite reliability	AVE	t-value
Susceptibility	3-15	0.93	≥ 0.79		0.83	0.74	0.56	
I'm worried about developing breast cancer				0.747				8.43
Because of environmental exposure to sun ray I am at risk of developing breast cancer				0.829				27.11
Because I eat foods that contain low levels of vitamin (D and E), I am at risk for breast cancer				0.802				18.72
Severity	8-40	0.79	≥ 0.79		0.89	0.74	0.55	
Breast cancer can have negative emotional effects on the affected person and her family				0.621				6.35
The physical and mental harms of breast cancer are serious and disrupt the affected person's life				0.703				9.76
Breast cancer will lead to mastectomy (removal of the entire breast)				0.607				7.77
Breast cancer leads to hospitalization and a long course of treatment				0.794				18.15
Developing breast cancer will lead to hospitalization, with high costs				0.738				13.95
Developing breast cancer causes absence from work and loss of the individual's job				0.725				11.49
Breast cancer impacts the marital relationship of the affected individual				0.757				14.24
Developing breast cancer results in the loss of a feminine appearance and beauty				0.714				12.21
Self-efficacy	6-30	0.78	≥ 0.79		0.92	0.90	0.68	
I can perform a self-test, even if it's time consuming				0.671				7.24
I can learn the BSE technique and do it right				0.831				15.64
I can perform BSEs even if they cause me to worry				0.874				21.16
I can perform BSEs even if my breasts are large				0.879				22.62
I can perform BSEs even if detecting a mass is difficult for me				0.838				17.65
I can perform BSEs even if others disagree				0.868				22.99
Response efficacy	7-35	0.80	≥ 0.79		0.91	0.88	0.61	
By conducting a monthly self-examination, I can prevent breast cancer				0.685				8.04
If I perform self-examinations regularly, I will live longer				0.800				18.51
If I performs self-examinations monthly, I will not be concerned about breast cancer				0.751				14.29
BSEs prevent the problems that breast cancer would cause me to experience				0.792				13.62
If through a self-examination, I find an unnatural mass in the early stages, breast cancer treatment will have good results				0.791				14.20
Doing self-examinations saves the costs that would be incurred by cancer treatment				0.843				22.16
By conducting monthly BSEs, I can identify unnatural masses of the breast before the doctor's diagnosis				0.758				10.51
Cost	4-20	0.85	≥ 0.79		0.82	0.72	0.54	
Performing self-examinations is time-consuming				0.729				8.52
I do not perform self-examinations because I fear being diagnosed with cancer				0.809				10.25
Remembering the timing of self-examinations is difficult for me				0.666				5.95
If I examine my breasts, my family will mock me				0.738				7.27

(Continued to the next page)

Table 3. Continued from the previous page

Construct and indicators	Scoring	CVR	CVI	Factor loading	Cronbach alpha	Composite reliability	AVE	t-value
Reward	5-25	0.79	≥ 0.79		0.89	0.85	0.62	
Information about breast health does not matter to me				0.802				2.77
I do not feel that performing a self-examination is useful work				0.739				2.54
Early diagnosis of a breast mass is not important for treating breast cancer				0.834				2.89
By performing self-examinations, I don't save much in terms of costs				0.859				3.07
If I perform self-examinations on a monthly basis, it will cause me to lose my peace of mind				0.703				2.17
Fear	4-20	0.93	≥ 0.79		0.91	0.89	0.74	
When I think about breast removal, I'm scared				0.935				3.79
When I think about chemotherapy, I'm scared				0.878				3.76
When I think about chemotherapy, I'm worried				0.842				3.41
When I think about breast cancer, I'm afraid of losing the interest of my spouse and children				0.842				3.37
Protection motivation	4-20	0.80	≥ 0.79		0.83	0.73	0.56	
I never think about monthly BSEs				0.871				12.53
I think about performing a BSE monthly				0.697				2.67
I will probably perform a self-examination every month				0.838				12.46
I will certainly perform a BSE every month				0.855				16.02
Emotional support	5-25	0.80	≥ 0.79		0.93	0.91	0.75	
There is a person who encourages you to perform self-examinations				0.859				20.63
There is a person who reminds you of the timing of self-examinations				0.876				27.25
There is someone who will admire you for performing a self-examination				0.899				35.56
There is a person who you can talk about the fear of performing a self-examination				0.849				22.92
There is a person who, if necessary, will help you to perform a self-examination				0.849				22.23
Informational support	3-15	0.93	≥ 0.79		0.96	0.93	0.89	
There is a person to guide you to overcome obstacles when you encounter barriers to self-examinations				0.933				47.53
There is a person with whom you can consult, when you have anxiety about self-examinations				0.961				86.73
There is a person who provides information about the appropriate way to perform self-examinations				0.937				45.88
Instrumental support	3-15	0.72	≥ 0.79		0.95	0.93	0.88	
There is a person who gives you a book or pamphlet on how to perform self-examinations and breast cancer				0.940				58.20
There is a person who, if needed, will teach you the self-examination technique				0.944				61.09
There is a person who gives you a CD or educational film on how to perform self-examinations and breast cancer				0.934				46.75
Appraisal support	3-15	0.93	≥ 0.79		0.97	0.95	0.91	
There is a person who can help you to evaluate your own health by doing a self-examination				0.946				46.68
There is a person who can give feedback on your success for follow-up and performing timely self-examinations				0.977				131.17
There is a person who can help you to evaluate your fear of performing a self-examination				0.948				42.88

CVR, content validity ratio; CVI, content validity index; AVE, average variance extracted; BSE, breast self-examination.

dan University of Medical Sciences. Cronbach alpha coefficients above 0.70 were considered acceptable, and the Cronbach alpha was calculated to be 0.83. To calculate the reliability by the re-test method, the questionnaire was filled out by 30 participants and then the subjects completed the questionnaires for a second time within 2 weeks. An intraclass correlation coefficient (ICC) value of 0.80 or higher shows high reliability, an ICC value between 0.60 and 0.79 shows moderate reliability, and an ICC value less than 0.60 shows poor reliability [27]. In the present study, the ICC was 0.99.

Data Analysis

The results of this study were analyzed using SPSS version 23 (IBM Corp., Armonk, NY, USA) and structural equation modeling (SEM) with PLS version 2 (SmartPLS GmbH, Bönningstedt, Germany). SEM is an approach that consists of 2 stages: a measuring model and a structural model [28].

Measurement Model

To investigate the fit of the measuring models, the 3 criteria of reliability, convergent validity, and divergent validity were used.

In this step, to examine the questions' homogeneity, their factor loadings and *t*-values were evaluated. The measurement of factor loadings utilized a threshold of ≥ 0.4 , and significant *t*-values were considered to be > 96.1 . In the present study, due to low factor loadings, the first and second questions of the susceptibility construct were removed. In the next step, to examine the reliability of the instrument, composite reliability was assessed using the Cronbach alpha with acceptable threshold of > 0.7 , and the average extracted mean variance (AVE criterion) was used to assess convergent validity, using a threshold of > 0.5 [29,30].

After confirming the homogeneity and reliability of the instrument, divergent validity was investigated. This refers to the concept that the questions measuring some variables should be different from those measuring other variables. Divergent validity was evaluated using the Fornell-Larcker method [30].

Once suitable measurement indicators were confirmed, the analysis proceeded to the structural model step.

Ethics Statement

This study was approved by the Ethics Committee of Hamedan University of Medical Sciences (IR.UMSHA.REC.1396.609). The researcher also pledged to keep all information confiden-

tial. Participation in this study was voluntary, and the participants could discontinue participation at any time and for any reason.

RESULTS

In this study, the participation rate was 100%.

Descriptive Statistics

The majority of the studied population (67.3%) were under 40 years old, and most participants (80.4%) were married. Most participants had a bachelor's degree (67.5%), 91.2% had no personal history of breast disease, and 87.4% had no family history of breast cancer. Only 9% of the subjects performed monthly BSEs on a regular basis. The relationships between demographic variables and BSE behavior are presented in Table 1. In the present study, respondents had low scores for their level of knowledge and for the various constructs of PMT. The mean, standard deviation, and range of scores for the PMT constructs are presented in Table 2.

Measurement Model

The results showed that the factor loading of each item for its variable was greater than its factor loading for the remaining variables. Therefore, divergent validity was confirmed (Table 3).

Structural Model

Based on the results of the path analysis, the protection motivation construct ($\beta=0.890$, $p<0.05$) and social support ($\beta=0.202$, $p<0.05$) had significant relationships with BSE behavior. However, social support ($\beta=0.020$, $p>0.05$) did not have a significant relationship with intentions. A significant relationship was found between response costs and coping appraisal ($\beta=0.342$, $p<0.05$). Coping appraisal showed significant relationships with self-efficacy ($\beta=0.900$, $p<0.05$), response efficacy ($\beta=0.892$, $p<0.05$), and the protection motivation construct ($\beta=0.380$, $p<0.05$). Threat appraisal showed significant relationships with severity ($\beta=0.948$, $p<0.05$) and susceptibility ($\beta=0.638$, $p<0.05$). Furthermore, social support showed significant relationships with emotional support ($\beta=0.791$, $p<0.05$), information support ($\beta=0.889$, $p<0.05$), instrumental support ($\beta=0.804$, $p<0.05$), and appraisal support ($\beta=0.890$, $p<0.05$). Non-significant relationships were found between the threat appraisal construct and the protec-

Table 4. Results of indicators and structural model criteria

Construct	Coefficient	t-value	Supported
Protection motivation (behavior)	0.604	10.070	Yes
Social support (behavior)	0.202	2.819	Yes
Cost (coping appraisal)	0.342	3.139	Yes
Reward (threat appraisal)	0.067	0.341	No
Coping appraisal (self-efficacy)	0.900	33.804	Yes
Fear (protection motivation)	-0.154	1.021	No
Coping appraisal			
Response efficacy	0.892	26.341	Yes
Protection motivation	0.380	4.194	Yes
Protection motivation	0.091	0.749	No
Threat appraisal			
Susceptibility	0.638	6.496	Yes
Severity	0.948	71.455	Yes
Social support			
Protection motivation	0.075	0.755	No
Emotional	0.791	13.476	Yes
Appraisal	0.890	37.504	Yes
Informational	0.889	40.660	Yes
Instrumental	0.804	18.301	Yes

tion motivation construct ($\beta=0.091$), the threat appraisal construct and the reward construct ($\beta=0.067$), and the fear construct and protection motivation ($\beta=-0.154$) (Table 4).

Social support had a positive and significant effect on BSE behavior and had no effect on protection motivation. No evidence of fit was found for these results (Figure 1). Finally, the goodness-of-fit (GOF) of the final model was evaluated. Wetzels et al. [31] suggested that GOF values above 0.36 indicate that the model is suitable for behavioral science. In the present study, the GOF model was estimated to be 0.60.

DISCUSSION

The purpose of this study was to develop PMT through the use of social support theory. Suitable fitting of the model was observed. In the present study, the proportion of respondents employed in the medical professions who regularly conducted BSEs was found to be low, which is consistent with previous studies [32-34]. In this research, our main hypothesis was that factors identified in social support theory would influence the protection motivation construct of BSE. The hypothesis test

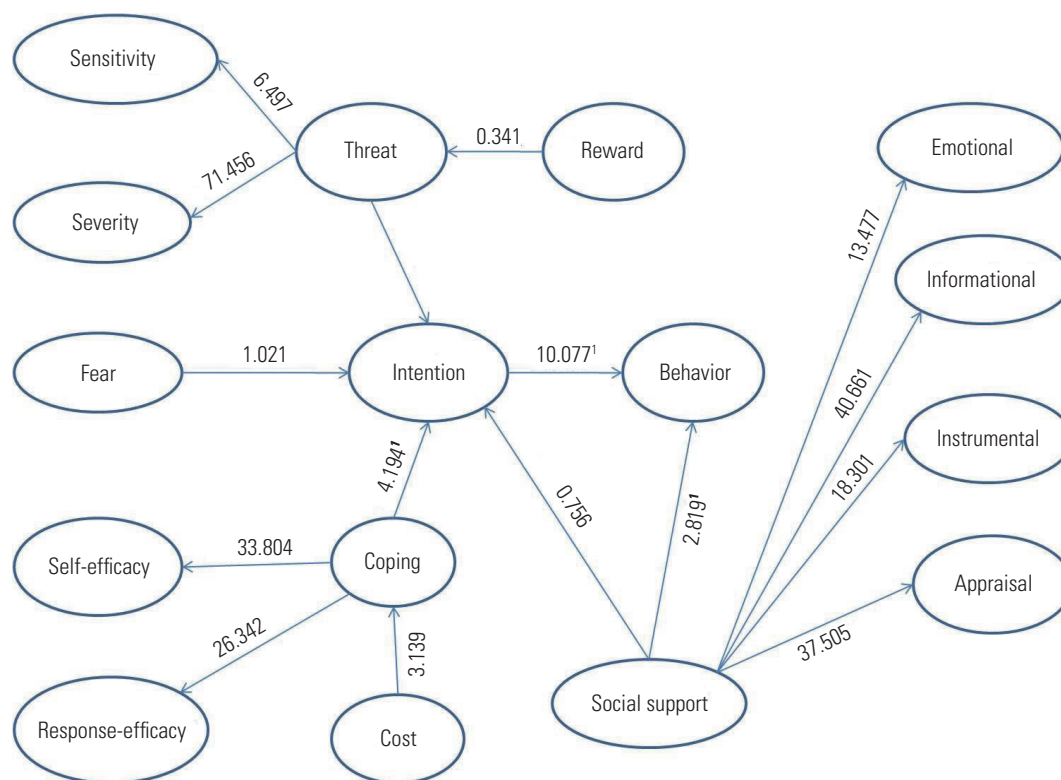


Figure 1. Motivation theory with social support theory based on t-value. To test the hypotheses, structural equation modeling was used from t-value. If the magnitude of the absolute value is greater than 96/1, it indicates that the relationship between the structures is correct and, therefore, confirms the research hypotheses at 95% confidence level. ¹t-value.

showed that social support had a positive and significant effect on BSE behavior, but no effect on protection motivation. No evidence of fit was found for these results. However, this finding does imply that social support from colleagues, friends, and family members has an impact on information access, individual encouragement, and the adoption of preventive behaviors. By increasing self-efficacy, social support helps individuals overcome perceived barriers (emotional, logical, and financial) to breast cancer screening [11]. Therefore, when designing educational programs, is essential to pay attention to the role of influential people in individuals' daily lives.

In some studies, such as those conducted by Farhadifar et al. [11] and Messina et al. [35], social support positively influenced protection motivation for screening, which is not consistent with the present study.

Another result of this study is that coping appraisal was found to be the strongest predictor of protection motivation for screening behavior, similar to results reported in other studies [15,16]. Therefore, considering self-efficacy and the response efficacy construct, which are components of coping appraisal, can improve the degree to which individuals engage in screening behavior.

The findings of this study showed that there was a correlation between the response cost and coping appraisal. This means that higher costs of consistent behaviors can be a barrier to engaging in those behaviors, resulting in reduced self-efficacy. In this study, it was also found that there was no significant relationship between the fear construct and the protection motivation construct, in contrast to the study conducted by Helmes [36]. Fear is a barrier to screening behavior. The study conducted by Ackerson and Preston [37] obtained a similar result to that of the present study. Therefore, identifying and removing behavioral barriers may help to increase consistent behaviors.

Another noteworthy finding of this study was the presence of significant relationships between coping appraisal and the susceptibility and severity constructs. According to PMT, coping appraisal consists of a combination of the 2 constructs of susceptibility and severity [38].

Greater perceived susceptibility regarding the possibility of developing breast cancer results in increased screening behaviors. The severity construct refers to the concept that the frequency of preventive behaviors will increase in correspondence with an individual's mental beliefs about the disease and the disadvantages posed by its complications [15]. There-

fore, the greater the perceived threat, the more common screening behavior will be. This result is consistent with the findings of Barati et al. [39]. For this reason, when designing educational programs, attention should be paid to the characteristics of the community and, by promoting threat appraisal, people should be encouraged to reach the risk control stage.

In the present study, no significant relationship was observed between the threat appraisal construct and the protection motivation construct. This finding is not consistent with the results of the studies of Barati et al. [39] and Yan et al. [40]. When a threat is not taken seriously (low severity), individuals have a low motivation to evaluate the effectiveness of the recommended solutions. Those who believe that the threat is serious and are endangered by its negative consequences have a greater motivation to protect themselves.

The present study had limitations. First, BSEs are no longer recommended by the American Cancer Society. However, one of the most important reasons for regular BSEs is that they enable women to know what is normal for their breasts so that they can identify any changes, which is critical to managing their breast health. If women see or feel something different or unusual while performing a BSE, they should see their doctor without delay. Second, the results cannot be generalized to all employed women in all environments, because the information was collected exclusively from medical professionals at Hamadan University of Medical Sciences. Third, the information was self-reported.

In conclusion, the frequency of regular BSEs in Iranian employed women was low. Considering the influence of social support as a factor promoting regular screening, it is necessary to pay attention to influential people in women's daily life when designing educational interventions.

The components of social support theory play an important role in empowering women. These factors, including emotional support (patient communication with a physician or support from family/friends) and information support (educational materials) should be applied to improve breast cancer screening, which will reduce fear and promote self-efficacy.

SUPPLEMENTAL MATERIALS

Supplemental material is available at <https://doi.org/10.3961/jpmph.18.277>.

CONFLICT OF INTEREST

The authors have no conflicts of interest associated with the material presented in this paper.

ACKNOWLEDGEMENTS

This article is part of a Ph.D. dissertation in Health Education and Health Promotion at Hamadan University of Medical Sciences. We thank the individuals who participated in this project.

This work was financially supported by Hamadan University of Medical Sciences (grant No. 9603091553).

AUTHOR CONTRIBUTIONS

Conceptualization: SB. Data curation: MD. Formal analysis: YM, MD. Funding acquisition: SB. Methodology: SB, MB, LMS. Project administration: SB. Visualization: SB, MB. Writing - original draft: MD. Writing - review & editing: MD, SB, MB, LMS, YM.

ORCID

Saeed Bashirian <https://orcid.org/0000-0003-2133-087X>

Majid Barati <https://orcid.org/0000-0002-5152-1928>

Leila Moaddab Shoar <https://orcid.org/0000-0002-1936-896X>

Younes Mohammadi <https://orcid.org/0000-0001-7521-4909>

Mitra Dogonchi <https://orcid.org/0000-0002-0223-1115>

REFERENCES

1. Al-Azmy SF, Alkhabbaz A, Almutawa HA, Ismaiel AE, Makboul G, El-Shazly MK. Practicing breast self-examination among women attending primary health care in Kuwait. *Alexandria J Med* 2013;49(3):281-286.
2. Khalili S, Shojaiezadeh D, Azam K, Kheirkhah Rahimabad K, Kharghani Moghadam M, Khazir Z. The effectiveness of education on the health beliefs and practices related to breast cancer screening among women referred to Shahid Behdash Clinic, Lavizan area, Tehran, using health belief model. *J Health* 2014;5(1):45-58 (Persian).
3. Mirzaei-Alavijeh M, Heydari ST, Ahmadi-Jouybari T, Jalilian F, Gharibnavaz H, Mahboubi M. Socio-demographic and cognitive determinants of breast cancer screening. *Int J Adv Biotechnol Res* 2016;7(4):1684-1690.
4. Tahmasebi R, Noroozi A. Is health locus of control a modifying factor in the health belief model for prediction of breast self-examination? *Asian Pac J Cancer Prev* 2016;17(4):2229-2233.
5. Ogunbode AM, Fatiregun AA, Ogunbode OO. Breast self-examination practices in Nigerian women attending a tertiary outpatient clinic. *Indian J Cancer* 2015;52(4):520-524.
6. Akhtari-Zavare M, Juni MH, Ismail IZ, Said SM, Latiff LA. Barriers to breast self examination practice among Malaysian female students: a cross sectional study. *Springerplus* 2015;4:692.
7. Baron-Epel O. Attitudes and beliefs associated with mammography in a multiethnic population in Israel. *Health Educ Behav* 2010;37(2):227-242.
8. Naghibi A, Jamshidi P, Yazdani J, Rostami F. Identification of factors associated with breast cancer screening based on the PEN-3 model among female school teachers in Kermanshah. *Iran J Health Educ Health Promot* 2016;4(1):58-64 (Persian).
9. Abu-Helal MA, Alshraideh HA, Al-Serhan AA, Kawaleet M, Nesheiwat AI. Knowledge, barriers and attitudes towards breast cancer mammography screening in Jordan. *Asian Pac J Cancer Prev* 2015;16(9):3981-3990.
10. Kissal A, Vural B, Ersin F, Solmaz T. The effect of women's breast cancer fear and social support perceptions on the process of participating in screening. *Glob Health Promot* 2018;25(3):52-59.
11. Farhadifar F, Taymoori P, Bahrami M, Zarea S. The relationship of social support concept and repeat mammography among Iranian women. *BMC Womens Health* 2015;15:92.
12. e Silva IT, Griep RH, Rotenberg L. Social support and cervical and breast cancer screening practices among nurses. *Rev Lat Am Enfermagem* 2009;17(4):514-521.
13. Katapodi MC, Facione NC, Miaskowski C, Dodd MJ, Waters C. The influence of social support on breast cancer screening in a multicultural community sample. *Oncol Nurs Forum* 2002;29(5):845-852.
14. Glanz K, Rimer BK, Viswanath K. Health behavior and health education: theory, research, and practice. 4th ed. San Francisco: John Wiley & Sons; 2008, p. 24-40.
15. Karmakar M, Pinto SL, Jordan TR, Mohamed I, Holiday-Goodman M. Predicting adherence to aromatase inhibitor therapy among breast cancer survivors: an application of the protection motivation theory. *Breast Cancer (Auckl)* 2017;11:11782-23417694520.
16. Dehdari T, Hassani L, Shojaiezadeh D, Hajizadeh E, Nedjat S, Abedini M. Predictors of Iranian women's intention to first papnicolaou test practice: an application of protection motiva-

- tion theory. *Indian J Cancer* 2016;53(1):50-53.
17. Mokhtari L, Khorami Markani A, Habibpoor Z. Correlation between health beliefs and breast cancer early detection behaviors among females referring to health centers in Khoys city, Iran. *Health Promot Manag* 2014;3(4):56-64 (Persian).
 18. Malmir S, Barati M, Khani Jeihooni A, Bashirian S, Hazavehei SM. Effect of an educational intervention based on protection motivation theory on preventing cervical cancer among marginalized women in west Iran. *Asian Pac J Cancer Prev* 2018; 19(3):755-761.
 19. Lwin MO. Examining Asian women's motivations to undergo breast cancer screening. *J Womens Health Care* 2014;3(3):158.
 20. Chavoshian SA, Moeini B, Bashirian S, Feradmal J. The role of spiritual health and social support in predicting nurses' quality of life. *J Educ Community Health* 2015;2(1):19-28 (Persian).
 21. Rahaei Z, Ghofranipour F, Morowatisharifabad MA. Psychometric properties of a protection motivation theory questionnaire used for cancer early detection. *SJSPH* 2015;12(3):69-79 (Persian).
 22. Noroozi A, Jomand T, Tahmasebi R. Determinants of breast self-examination performance among Iranian women: an application of the health belief model. *J Cancer Educ* 2011;26(2): 365-374.
 23. Lawshe CH. A quantitative approach to content validity 1. *Pers Psychol* 1975;28(4):563-575.
 24. Kaiser HF. A second generation little jiffy. *Psychometrika* 1970; 35(4):401-415.
 25. Field AD. *Discovering statistics using IBM SPSS statistics*. 5th ed. London: Thousand SAGE Publications; 2018, p. 124-127.
 26. Abdi H, Williams LJ. *Principal component analysis*. Wiley Interdiscip Rev Comput Stat 2010;2(4):433-459.
 27. Halsaa KE, Brovold T, Graver V, Sandvik L, Bergland A. Assessments of interrater reliability and internal consistency of the Norwegian version of the Berg Balance Scale. *Arch Phys Med Rehabil* 2007;88(1):94-98.
 28. Anderson JC, Gerbing DW. Structural equation modeling in practice: a review and recommended two-step approach. *Psychol Bull* 1988;103(3):411-423.
 29. Hulland J. Use of partial least squares (PLS) in strategic management research: a review of four recent studies. *Strat Mgmt J* 1999;20(2):195-204.
 30. Davari A, Rezazadeh A. *Structural equation modeling with PLS*. Tehran: Jahad University; 2013 (Persian).
 31. Wetzels M, Odekerken-Schröder G, Van Oppen C. Using PLS path modeling for assessing hierarchical construct models: guidelines and empirical illustration. *MIS Q* 2009;33(1):177-195.
 32. Birhane N, Mamo A, Girma E, Asfaw S. Predictors of breast self-examination among female teachers in Ethiopia using health belief model. *Arch Public Health* 2015;73(1):39.
 33. Gonzales A, Alzaatreh M, Mari M, A Saleh A, Alloubani A. Beliefs and behavior of Saudi women in the University of Tabuk toward breast self examination practice. *Asian Pac J Cancer Prev* 2018;19(1):121-126.
 34. Negeri EL, Heyi WD, Melka AS. Assessment of breast self-examination practice and associated factors among female health professionals in Western Ethiopia: a cross sectional study. *Int J Med Med Sci* 2017;9(12):148-157.
 35. Messina CR, Lane DS, Glanz K, West DS, Taylor V, Frishman W, et al. Relationship of social support and social burden to repeated breast cancer screening in the women's health initiative. *Health Psychol* 2004;23(6):582-594.
 36. Helmes AW. Application of the protection motivation theory to genetic testing for breast cancer risk. *Prev Med* 2002;35(5): 453-462.
 37. Ackerson K, Preston SD. A decision theory perspective on why women do or do not decide to have cancer screening: systematic review. *J Adv Nurs* 2009;65(6):1130-1140.
 38. Taymoori P, Habibi S. Application of a health belief model for explaining mammography behavior by using structural equation model in women in Sanandaj. *SJKU* 2014;19(3):103-115 (Persian).
 39. Barati M, Amirzargar MA, Bashirian S, Kafami V, Mousali AA, Moeini B. Psychological predictors of prostate cancer screening behaviors among men over 50 years of age in Hamadan: perceived threat and efficacy. *Iran J Cancer Prev* 2016;9(4): e4144.
 40. Yan Y, Jacques-Tiura AJ, Chen X, Xie N, Chen J, Yang N, et al. Application of the protection motivation theory in predicting cigarette smoking among adolescents in China. *Addict Behav* 2014;39(1):181-188.