

Effect of Educational Intervention Based on Theory of Planned Behavior (TPB) on Doing Breast Self-examination in a Sample of Iranian Women

Ali Khani Jeihooni¹, Zahra Sadat Moayedi², Victoria Momenabadi³, Farzaneh Ghalegolab⁴ and Pooyan Afzali Harsini⁵

¹Nutrition Research Center, Department of Public Health, School of Health, Shiraz University of Medical Sciences, Shiraz, Iran. ²Department of Public Health, Fasa University of Medical Sciences, Fasa, Iran. ³Department of Public Health, School of Health, Bam University of Medical Sciences, Bam, Iran. ⁴Department of Public Health, School of Health, Yasuj University of Medical Sciences, Yasuj, Iran. ⁵Department of Public Health, School of Health, Kermanshah University of Medical Sciences, Kermanshah, Iran.

Breast Cancer: Basic and Clinical Research
Volume 17: 1–11
© The Author(s) 2023
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/11782234221145417



ABSTRACT

BACKGROUND: Breast self-examination (BSE) is an important part of health care for all women in every stage of life. This study aimed to investigate the effect of theory of planned behavior (TPB) on doing BSE in a sample of Iranian women.

METHODS: A cross-sectional study was carried out to examine the factors affecting the BSE in 400 women. Then, a quasi-experimental study was conducted on 200 subjects (100 in experimental group and 100 in control group). The educational intervention for the experimental group consisted of 8 training sessions. A questionnaire including demographic characteristics, knowledge, and constructs of TPB was used to measure BSE performance before and 6 months after the intervention. Constructs of attitude, subjective norms, and perceived behavioral control predicted the intention to do the BSE.

RESULTS: The mean age of the subjects was 31.65 ± 7.59 years. The studied variables predicted 38.7% of behavioral intention ($P < .001$, odds ratio = 0.387). Six months after the intervention, the experimental group showed a significant increase in the knowledge, attitude, perceived behavioral control, subjective norms, intention, and BSE performance compared with the control group ($P < .001$).

CONCLUSIONS: This study showed that educational intervention based on the TPB was effective in promoting breast cancer screening behavior such as BSE. Therefore, it is suggested that health educators and health care planners use educational texts based on these constructs of TPB to increase their influence on individuals via screening behavior for breast cancer.

KEYWORDS: Breast cancer, breast self-examination (BSE), theory of planned behavior (TPB), education, Iran

RECEIVED: August 25, 2022. **ACCEPTED:** September 2, 2022.

TYPE: Original Research Article

FUNDING: The author(s) received no financial support for the research, authorship, and/or publication of this article.

COMPETING INTERESTS: The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

CORRESPONDING AUTHOR: Ali Khani Jeihooni, Nutrition Research Center, Department of Public Health, School of Health, Shiraz University of Medical Sciences, P.O.Box: 71645-111, Shiraz, Iran. Email: khani_1512@yahoo.com

Background

Cancer is a disease of cells, characterized by uncontrolled proliferation of cells.¹ Breast cancer is also considered as one of the causes of death among women. Out of 9 women, 1 is affected by cancer in developing countries.² Annually, 1.2 million new cases of breast cancer are diagnosed in the world, and more than 500 000 deaths occur as a result of the disease. In European countries, the disease is one of the major causes of women's death. In addition, the incidence of breast cancer in Iranian women is 22 per 100 000 and its prevalence is 120 per 100 000.³

The American Cancer Society (ACS) has recommended breast self-examination (BSE) guidelines, breast clinical examinations, and mammography for early diagnosis of breast cancer in asymptomatic cases.⁴

Due to lifestyle changes, the incidence of cancer in most developing countries has increased by 5% annually over the past decade.⁵ Different factors including age, early puberty, late menopause, first pregnancy after 30 years of age, obesity after

menopause, history of breast cancer in first-degree relatives, smoking and alcohol consumption, breast radiography, postmenopausal hormone therapy, using contraceptive pills, inadequate physical activity, lack of breastfeeding, dense breast tissue, and history of other cancers, especially endometrial and ovarian cancer, are involved in breast cancer.⁵⁻⁷

Screening is very important because it helps detect cancer early. Breast self-examination, clinical breast examination, and mammography are considered as breast cancer screening methods and breast health awareness. By performing a BSE as a screening method, malignant mass as small as 1 cm can be detected by the patient.⁸ The goal of screening is to diagnose the malignancy at a stage of less than 1 cm, which provides the highest likelihood of recovery from surgery.⁹ Early diagnosis in the early phases increases the survival of patients by up to 92%.¹⁰

The ACS has recommended increased knowledge of the disease symptoms and monthly BSE after 20 years of age.⁶



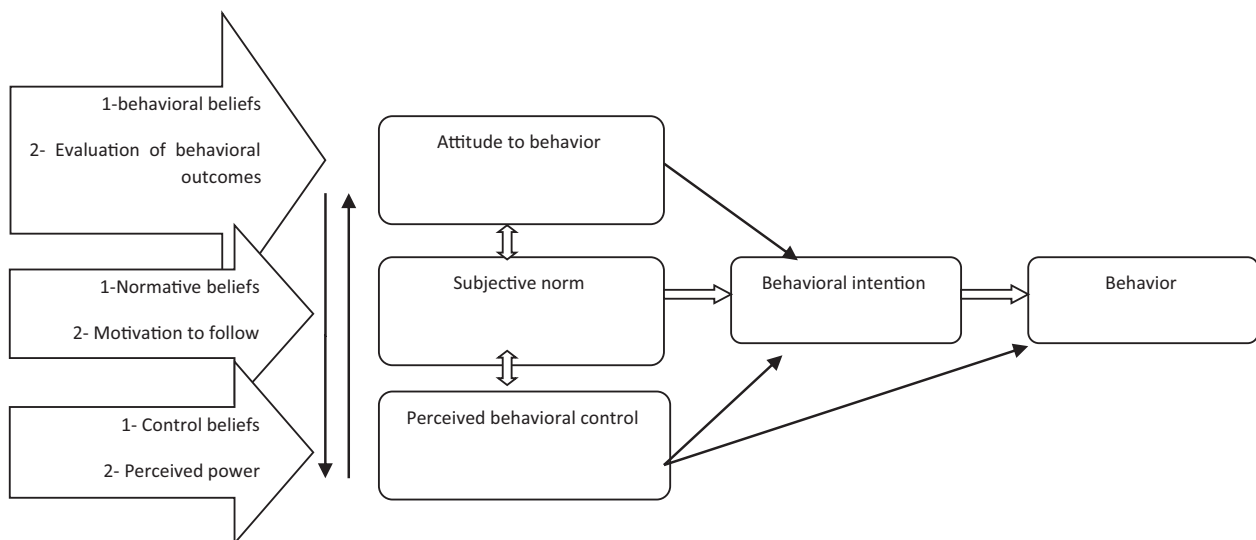


Figure 1. A view of the theory of planned behavior.

Breast self-examination is an easy, confidential, and safe method, which does not require special equipment. If performed properly and accurately, it would allow an early diagnosis.¹¹ The best time for a breast examination is 5 to 7 days of menstruation. In postmenopausal women, it is better to be done on a specific day.⁹

Studies indicated that more than 65% of all breast masses are diagnosed by the patients themselves.¹² In a review study of 96 papers, BSE in Iran was reported to be 3% to 17%.¹³

Studies have indicated that most Iranian women do not have adequate knowledge of warning symptoms of breast cancer, and screening behaviors have been reported poor.¹⁴⁻¹⁷ If women have adequate skills in performing BSE, they will do it regularly and correctly.¹⁴ In another review study, the knowledge of women on screening methods and breast cancer was poor and their performance in using diagnostic methods was reported poor, too.¹⁸

Given the increasing rate of breast cancer in Iran and admission of many patients with breast cancer at advanced stages of the cancer,¹⁹ it is necessary to determine the factors affecting BSE and to perform breast cancer educational interventions based on appropriate health education and health promotion. Studies indicated that education is associated with the enhanced knowledge and screening behaviors of breast cancer.²⁰⁻²²

Choosing a health education model is the first step in planning an educational program, and effective health education depends on skill of using the best model and appropriate strategies for each event.^{23,24} The model selected in this study to examine the factors affecting BSE behaviors and educational intervention was based on the theory of planned behavior (TPB). Theory of planned behavior (Figure 1) was developed by Ajzen and Fishbein in 1980, which is one of the behavior change models (cognitive-social model of value expectation). It states that intention is the main determinant of behavior, affected by 3 independent constructs,²⁵ as follows:

1. One's attitude toward the behavior (related to behavioral beliefs, as well as one's evaluation of the probable outcome of the behavior).
2. Subjective norms (related to normative beliefs: one's belief that the people who are important to him or her agree or disagree with that behavior as well as motivation to follow).
3. Perceived behavioral control (related to control beliefs): How one feels that he or she acts according to a specific behavior as well as perceived power: how simple or difficult would be doing a behavior from one's perspective.²⁵

The TPB has been used to determine the factors affecting breast cancer screening and educational interventions in several studies.^{3,26,27} The research of Rezabeigi-Davarani et al²⁶ using the TPB showed that awareness is the strongest predictor of BSE behavior in women.

The research of Sarghazi et al²⁷ also showed an increase in BSE behavior after performing educational interventions based on the structures of planned behavior theory. Research has further used the TPB indicating the effectiveness of such models in the behavioral change. For instance, Hatefnia et al³ reported that education based on such model could promote screening behavior.

Due to the increasing number of breast cancers and the fact that breast cancer is the most common type of cancer among Iranian women and delays in the diagnosis and treatment reduce the chances of survival, this study aimed to investigate the effect of TPB on doing BSE in a sample of Iranian women.

Methods

Study design and participants

This study was conducted in 2 stages in Fasa from June 2017 to January 2016.

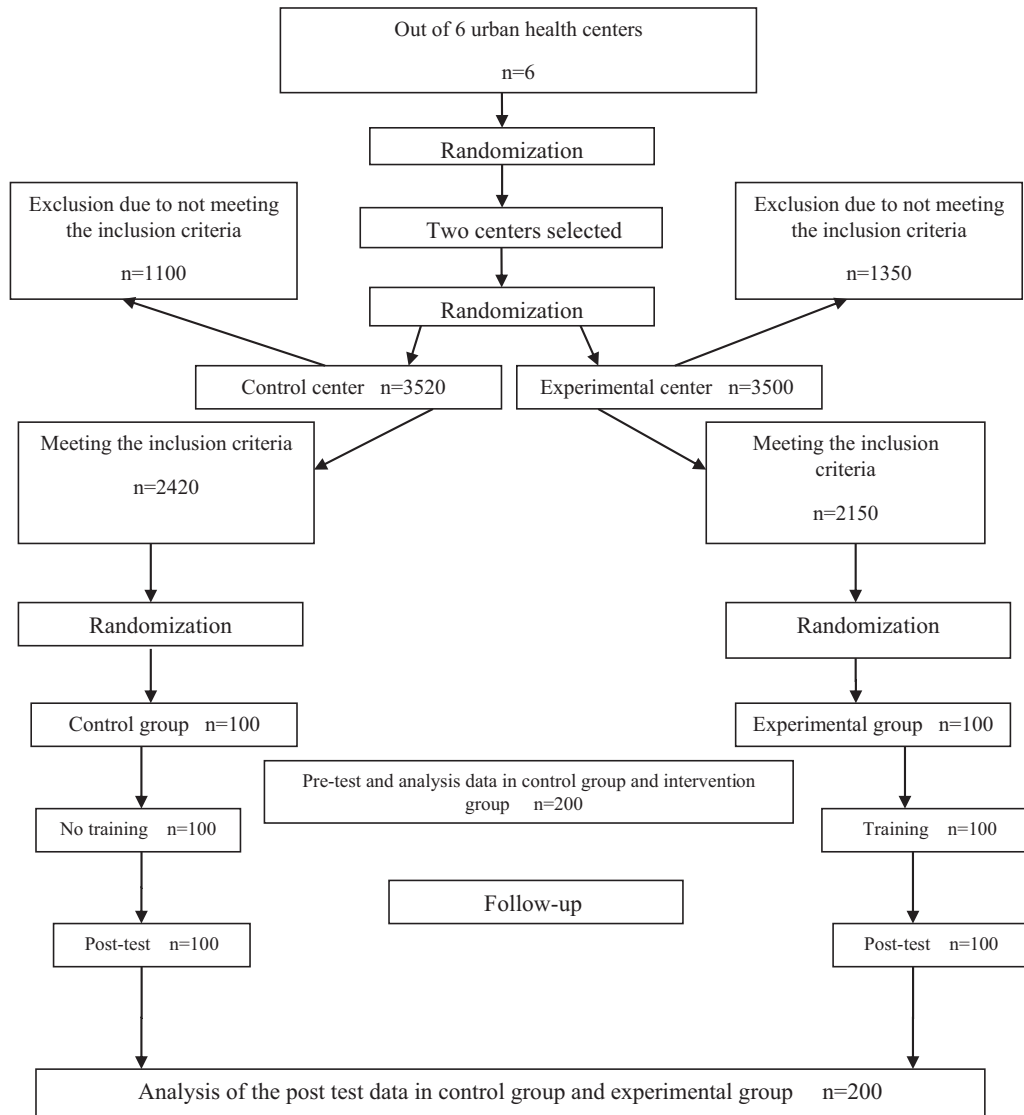


Figure 2. Flowchart of study participant.

First, a descriptive-analytical cross-sectional study based on the structures of the TPB was conducted to investigate the factors affecting BSE.

In the first stage (cross-sectional phase of the study), 2 centers were randomly selected from 6 urban health centers in Fasa. Using random sampling method, 400 women referring to health centers, who met the inclusion criteria, participated in the study.

In the second stage (intervention phase of the research), a quasi-experimental study was conducted before and then controls. Thus, of 6 urban health centers in Fasa, 2 centers were randomly selected (one as an intervention group and the other as a control group) and then from these 2 centers, 200 patients above 20 years of age were randomly selected (100 people in the control center and 100 people from the intervention center).

Before the training sessions, pretests were performed in the control and intervention groups. The intervention group underwent training interventions, whereas the control group

did not receive any training. After 6 months of educational intervention, posttest was performed again for both groups (Figure 2).

After determining the sample size and characteristics of the subjects, a written consent was obtained from the subjects and they were explained that they do not need to write their names to complete the questionnaires and it was ensured that their information will remain completely confidential.

Inclusion and exclusion criteria

In the first stage, the inclusion criteria were Iranian women aged ≥ 20 years (most patients with small, benign breast cancers are below 30 years old; therefore, early detection of breast cancer by BSE leads to more successful treatment),⁶ lack of history of benign or malignant breast diseases in first-degree relatives, and willingness to participate in the study. Exclusion criteria were subjects' unwillingness to participate in the study and failure to answer the questions.

In the second stage, the inclusion criteria were having a family record in health centers, women aged ≥ 20 years, no history of breast cancer in the first-degree relatives, and willingness to participate in the study. The exclusion criteria also consisted of unwillingness to participate in the study, debilitating physical and mental illnesses, and absence from more than 2 training sessions.

Sample size

In the first stage, using the results of similar studies, considering $r = .2$, $\alpha = .05$, $\beta^2 = 0.2$,²⁶ based on the sample size formula in the related studies, and considering the probability of dropout rate, the sample size was considered to be 400. In the second stage, according to a study by Khazir et al²⁸ and considering the significance level of 5%, test power of 80%, mean difference of 2, and standard deviation of 4.2, the sample size was estimated to 200.

Data collection tools

Data were collected using a standard questionnaire used in other studies.^{26,27} The questionnaire consisted of 3 parts. The first part included demographic information (age, number of deliveries, occupation, education, marital status, breast feeding, family income).²⁶

The second part consisted of the knowledge questionnaire on signs and symptoms, risk factors, and methods of early detection of the cancer. The questionnaire included 20 questions with true, false, and I do not know options. The knowledge score ranged from 0 to 20.²⁹

The third part of the questionnaire was based on the constructs of TPB. To measure the variables of attitude, subjective norms, and perceived behavioral control, a 5-point Likert scale with a range of 1 (*strongly disagree*) to 5 (*strongly agree*) was used.²⁶ Attitude was measured by 8 questions (minimum score of 8 and maximum score of 40); for example, in case of timely diagnosis of breast cancer and appropriate treatment, the patient can continue her normal life.

Subjective norms were measured by 6 questions (minimum score of 6 and maximum score of 30); for example, health care staff considers BSE obligatory for women. Perceived behavioral control was measured by 6 questions (minimum score of 6 and maximum score of 30); for example, I do not have the opportunity to do breast examinations due to my job.

Behavioral intention also included 1 question of intention to do the BSE, measured on a 5-point Likert scale, ranging from very low to very high (minimum score of 1 and maximum score of 5) and the performance was also measured with 3 questions on BSE.²⁶

In determining the content, the questionnaire was reviewed by 12 experts (9 PhD in health education, 1 PhD in midwifery,

1 PhD in obstetrics, and 1 PhD in biomedical sciences). The reliability of the data collection tool was assessed using a test-retest and Cronbach alpha, and its value was obtained as .87, .89, .92, .90, .89, and .78 for knowledge, attitude, subjective norms, perceived behavioral control, behavioral intention, and performance, respectively.

Materials

At the beginning of the study, the pretest questionnaire was administered to the 2 groups. The illiterate subjects also answered the questionnaire through self-report; however, an expert assistant interviewed them and recorded their answers in the questionnaire. In the intervention group, the training program was presented by the authors and 5 public health experts. Educational intervention included 8 sessions of 50 to 55 minutes through lecture, group discussion, practical demonstration, and educational film, images, and PowerPoint, which were held at the Health Center Hall.

One session was also held with the presence of physicians, health center staff, and their wives as subjective norms. At the end of the session, they were provided with an educational booklet.

A telegram group was also formed for the exchange of information and one message was sent to the subjects per week. There was held a session per week for the experimental group for 2 months. Monthly, a follow-up session was held for subjects.

Breast self-examination education and completion of questionnaires were performed by midwifery experts, who were skilled in communication and interest in education. Intervention was performed based on the necessity of behavior in forms of face-to-face training, group discussion (on mental beliefs, positive and negative outcomes of behavior, on factors facilitating the behavior and motivation to follow the influential people and subjective norms), providing educational pamphlet on BSE, visual education methods, and role-playing. Also, during the educational interventions, to better understand the educational content by illiterate or illiterate people participating in the study, many educational images and videos were used in educational sessions.

The effect of intervention on the intention to do clinical and preclinical examinations on performance was evaluated 6 months after the intervention. The details are presented in Table 1.

Accordingly, the questionnaires were provided gain for the same subjects. No attrition occurred in the study groups. The control group did not receive any training and was only invited to the special sessions to fill out the questionnaires; however, due to ethical considerations, a training session on BSE was held for the group after the study. Also, the control group was provided with an educational pamphlet after the posttest.

Table 1. Educational program implemented in the experimental group.

SESSIONS	OBJECTIVES	A SUMMARY OF TOPICS AND ACTIVITIES
First	Promoting knowledge	Providing information about breast cancer risk symptoms, the importance, and necessity of early detection of breast cancer
Second	Promoting knowledge	Increasing the participants' awareness of early cancer diagnosis based on instructional approaches providing new information, motivating communications, and expressing feelings accompanied by images using the PowerPoint. complications, and consequences of breast cancer
Third	Changing and improving attitude	Topics, including whether breast self-examination pleasant and useful or unpleasant and harmful, and its positive effects on women's health were discussed.
Fourth	Improving attitude	Topics, including the positive effects of breast self-examination on women's health and longevity were discussed.
Fifth	Subjective norms (positive effect of family and doctor on breast self-examination)	In this session, the subjects' girls or sisters and relatives were educated about the benefits of breast self-examination for women's health by a reproductive health specialist, and also some explanations were provided about encouraging and supporting their mothers or sisters or relatives regarding breast self-examination
Sixth	Subjective norms (positive effect of family and doctor on breast self-examination)	In this session, the subjects' girls or sisters and relatives were educated about the benefits of breast self-examination for women's health by a reproductive health specialist, and also some explanations were provided about encouraging and supporting their mothers or sisters or relatives regarding breast self-examination
Seventh	Familiarity of women with perceived barriers to breast self-examination	Promoting perceived benefits of BSE, breast self-examination barriers, and the ways to overcome them were presented
Eighth	Promoting women's ability and self-efficacy to do breast self-examination	Enhancing decision-making power based on attitude change and skill development approaches and the steps of breast self-examination were presented visually.

Abbreviation: BSE, breast self-examination.

Data analysis

The data were analyzed by SPSS 22 software, using descriptive statistics (frequency and mean ± SD) and logistic regression McNemar test. Independent *t* test was used to compare the mean scores of the control and experimental groups. Paired *t* test was also used to compare the scores of constructs before and after the educational intervention. A χ^2 test was also used to evaluate the effectiveness of the educational intervention on the experimental group in terms of BSE rate. The significance level in all tests was considered to be .05.

Results

In this cross-sectional study, 400 women participated. According to Table 2, the mean ± SD age of the subjects was 31.65 ± 7.59 years, 88% of subjects were married, 78.25% of them were housekeeper, and 85.75% of the study population did not breastfeed their infant (Table 2).

Logistic regression analysis results in predicting the intention to do BSE based on TPB are presented in Table 3. Based on the results, all 3 constructs of attitude, subjective norms, and perceived behavioral control predicted the intention to do BSE. Overall, the studied variables predicted 38.7% of behavioral intention.

Table 2. Demographic characteristics of samples.

VARIABLES		NO. (%)*
Education	Illiterate	12 (3)
	Elementary	65 (16.25)
	Secondary	110 (27.50)
	High school	149 (37.25)
	Academic	64 (16)
Marital status	Single	48 (12)
	Married	352 (88)
Occupation	Housekeeper	313 (78.25)
	Employed	87 (21.75)
Breast feeding	No	343(85.75)
	Yes	57(14.25)
Family income (monthly)	Less than 20 million Rials	102 (25.50)
	2-4 million Rials	228 (57)
	More than 4 million Rials	70 (17.50)

*Frequency (%).

Table 3. Regression analysis of factors related to the intention to do breast self-examination.

VARIABLES	BETA	SE B	P	ADJUSTED B*	SE B	P	DEPENDENT VARIABLE
Attitude	0.157	0.323	.001	0.212	0.231	.001	Intention to do breast self-examination in women **R ² = .387 ***R ² adj = .028
Perceived behavioral control	0.176	0.242	.002	0.134	0.192	.001	
Subjective norms	0.128	0.194	.006	0.111	0.126	.003	

**R² = Coefficient of determination, measuring how much variability in the outcome is explained by predictor.

***R² adjusted.

*P < .001: measure of statistical significance of the association of predictor and outcome.

Table 4. Comparison of demographic variables of patients participating in the study.

VARIABLES		INTERVENTION GROUP	CONTROL GROUP	SIGNIFICANCE LEVEL**
		NO. (%)*	NO. (%)*	
Education	Illiterate	2 (2)	3 (3)	P = .186
	Elementary	10 (10)	15 (15)	
	Secondary	25 (25)	20 (20)	
	High school	43 (43)	45 (45)	
	Academic	20 (20)	17 (17)	
Marital status	Single	13 (13)	16 (16)	P = .124
	Married	87 (87)	84 (84)	
Occupation	Housekeeper	76 (76)	80 (80)	P = .155
	Employed	24 (24)	20 (20)	
Breast feeding	No	84 (84)	80 (80)	P = .162
	Yes	16 (16)	20 (20)	
Family income (monthly)	Less than 20 million Rials	26 (26)	30 (30)	P = .137
	2-4 million Rials	58 (58)	55 (55)	
	More than 4 million Rials	16 (16)	15 (15)	

*Frequency.

**Chi-square test.

In the quasi-experimental study, the study population age ranged from 20 to 70 years and the mean age of subjects in the experimental and control groups was 31.20 ± 7.75 and 30.95 ± 7.87 years, respectively ($P = .124$). Before the educational intervention, there was no statistically significant difference between the 2 groups in terms of demographic variables ($P > .05$). The number of deliveries/subject in the intervention and control groups was 2.87 ± 1.44 and 2.95 ± 1.27 , respectively ($P = .264$). Most of the study population were married, had a diploma, and were housewives.

Based on the results of the interventional study, χ^2 test showed no significant difference between the 2 experimental and control groups in terms of occupation ($P = .155$), education ($P = .186$), marital status (.124), breast feeding ($P = .162$), and family income ($P = .137$) ($P > .05$; Table 4).

Results revealed no significant difference between the 2 groups in terms of attitude, subjective norms, perceived

behavioral control, intention, and BSE performance; however, the mentioned constructs showed a significant increase in the experimental group compared with control group 6 months after the intervention ($P < .001$; Table 5).

Before the intervention, 18 and 21 subjects had BSE in the experimental and control groups, respectively, whereas 6 months after the intervention, 76 subjects in the experimental group and 24 subjects in the control group had BSE. The McNemar test showed a significant difference between the 2 groups in this regard ($P < .05$; Table 5).

Discussion

Breast self-examination is one of the early strategies to prevent breast cancer and reduce death caused by the disease. This study is an educational intervention based on the constructs of TPB designed to improve BSE behavior in women referred to health centers in Fasa.

Table 5. Comparison of the mean score of knowledge, attitude, subjective norms, perceived behavioral control, intention and breast self-examination performance before and 6 months after the intervention.

VARIABLES	GROUP	BEFORE INTERVENTION M ± SD	SIX MONTHS AFTER INTERVENTION M ± SD	**P VALUE
Knowledge	Intervention group	4.35 ± 3.82	4.13 ± 14.30	<i>P</i> < .001
	Control group	5.12 ± 3.66	5.94 ± 3.79	<i>P</i> = .137
	Mean difference	-0.77	-1.81	
	* <i>P</i> value	0.139	<i>P</i> < .001	
Attitude	Intervention group	14.57 ± 6.25	28.37 ± 6.56	<i>P</i> < .001
	Control group	15.10 ± 6.87	15.90 ± 6.99	<i>P</i> = .180
	Mean difference	-0.53	12.47	
	* <i>P</i> value	0.195	<i>P</i> < .001	
Subjective norms	Intervention group	10.28 ± 3.24	23.17 ± 4.38	<i>P</i> < .001
	Control group	10.81 ± 3.21	11.10 ± 3.31	<i>P</i> = .112
	Mean difference	-0.53	12.07	
	* <i>P</i> value	0.250	<i>P</i> < .001	
Perceived behavioral control	Intervention group	10.22 ± 30.55	24.42 ± 3.76	<i>P</i> < .001
	Control group	10.17 ± 3.097	10.65 ± 4.08	<i>P</i> = .286
	Mean difference	0.05	13.77	
	* <i>P</i> value	0.162	<i>P</i> < .001	
Intention	Intervention group	1.04 ± 1.75	3.47 ± 1.23	<i>P</i> < .001
	Control group	1.10 ± 1.82	1.15 ± 1.80	<i>P</i> = .259
	Mean difference	-0.06	2.32	
	* <i>P</i> value	0.246	<i>P</i> < .001	
Breast self-examination performance	Intervention group	0.83 ± 0.54	2.28 ± 0.60	<i>P</i> < .001
	Control group	0.78 ± 0.68	0.80 ± 0.72	<i>P</i> = .288
	Mean difference	0.05	1.48	
	* <i>P</i> value	0.183	<i>P</i> < .001	

*Independent *t* test.**Paired *t* test.

In this study, first, the factors affecting the behavior of BSE were investigated based on TPB and educational intervention. Following the educational intervention, the mean score of knowledge and the studied constructs (attitude, subjective norms, perceived behavioral control, behavioral intention, and BSE performance) in the experimental group increased significantly compared with the pre-intervention stage.

The study results indicated that the constructs of attitude, subjective norms, and perceived behavioral control predicted the intention to do BSE and the studied variables predicted 38.7% of intention to do BSE. In a study by Peiman et al,³⁰ the

constructs of attitude, subjective norms, and perceived behavioral control had a significant relationship with BSE behavior, and these constructs predicted 40% of the BSE behavior. In a study by Godin et al,³¹ subjective norms predicted mammography in women. In a study by Alami et al,³² the constructs of perceived behavioral control and knowledge had significant associations with intention to take nutritional supplements; however, in studies by Peiman et al³⁰ and Drossaert et al,³³ perceived behavioral control was the weakest predictor of breast cancer screening.

A qualitative study by Tolma et al³⁴ revealed that the subjects had a positive attitude toward mammography. A study by

Rezabeigi-Davarani et al²⁶ showed that the mean score of knowledge, attitude, perceived behavioral control, and intention of women with a history of BSE had a significant difference with the women without a history of BSE. In a study by Bae and Suh,³⁵ the constructs of TPB predicted BSE in women. In a study by Noroozi et al,³⁶ 7.6% of subjects did BSE regularly, and constructs of the health belief model explained 62% of variance in BSE.

This study revealed that educational intervention based on TPB improved BSE behaviors in women admitted to health centers in Fasa. Women's knowledge on breast cancer was at a low level before receiving the educational intervention, while the results of the study suggested an increase in the mean score of women's knowledge on breast cancer and BSE 6 months after the intervention in the experimental group. Educational sessions for the experimental group, providing educational materials through video clip, group discussion, and booklet, increased their knowledge of breast cancer and self-examination. In studies by Firooze,³⁷ Alami et al,³⁸ Alsaraireh and Darawad,³⁹ Abera et al,⁴⁰ and Ouyang and Hu,⁴¹ educational intervention improved the knowledge of women with breast cancer.

Attitude toward a behavior means to what extent the behavior is desired, pleasant, effective, or useful for person, which depends on one's judgment on outcomes of the behavior.⁴² In this study, attitude toward behavior also showed a significant increase in the experimental group 6 months after the intervention, which is consistent with a study by Crombie et al.⁴³ In studies by SalimiPormehr et al⁴⁴ and Steadman and Rutter,⁴⁵ positive attitude toward behavior was found to be one of the factors affecting women's participation in breast cancer screening programs.

Attitude is an individual factor influencing behavior. It is person's belief in the outcomes of health-related behaviors that is weighted based on the value of the results. In fact, the more people believe that doing preventive behaviors can be useful and protects them from getting sick, the more they will have a positive desire and attitude to follow such behavior. In this regard, various media are suggested to provide more frequent and interesting explanations of the effects of preventive health measures in breast cancer to improve people's attitudes.⁴⁶

The results showed an increase in the mean score of subjective norms 6 months after the intervention in the experimental group, whereas no significant difference was seen in the control group. Also, a significant increase was observed in the score of subjective norms of the experimental group. The TPB focuses on social factors and the motivation to follow influential people, and the role of these factors in doing breast cancer screening has been stressed in another study.⁴⁵ In similar study, it was revealed that recommendation of friends and family members increases the intention to do mammography in Latin American women.⁴⁷ In a study by Sarghazi, educational intervention based on TPB in women admitted to health centers in Zahedan

increased the level of knowledge, attitude, perceived behavioral control, intention, and doing screening behaviors in the experimental group.⁴⁸ In studies by Vahedin Shahrodi et al⁴⁹ and Nourizadeh et al,⁵⁰ physicians and health care staff were the most informative sources of participants regarding breast cancer and its screening methods.

Subjective norms are considered interpersonal factors affecting behavior. They refer to the social pressures perceived by the individual and the expectations of the people who are important in the individual's life. In fact, the more the people who are important to a person expect him or her to engage in preventative behaviors, the more likely the person will be to follow behavior. Given that learning from friends, relatives, mass media, social media, and health officials and experts about BSE positively predicts preventative behaviors, the policies and programs of the Ministry of Health to encourage and mobilize the public to take preventive behaviors can include education through the mass media, social networks, posters, and advertisements. On the contrary, if such programs are continuously implemented at regular intervals, people will be constantly exposed to the announcements or reminders of screening behaviors, and consequently, their emotions will be aroused and they will increasingly engage in the behavior.

Based on the results of study, the mean score of the perceived behavioral control showed a significant increase in the experimental group 6 months after the intervention, whereas no change was seen in the control group. Perceived behavioral control reflects one's beliefs on availability or nonavailability of resources and opportunities to do the behavior. When people are encouraged to do health behaviors, they feel that they have control over it.⁵¹ The control factors include internal and external ones. Internal factors are personal including skills, abilities, information, and emotions. However, external factors are related to environmental and occupational factors.⁵² As stated by Ajzen, perceived behavioral control is an important and effective factor in performing any behavior. When individuals are unsure of their ability to perform certain behaviors, assessing perceived behavioral control could help predict such behaviors.⁵³ Studies have revealed that the BSE behavior would increase significantly by providing education and increasing women's knowledge.^{48,54} Providing education through films and images, training self-examination by skilled midwifery experts, establishing relationship, creating interest in women to facilitate the behavior, and forming up a telegram group increased the score of perceived behavioral control in the experimental group. In a study by Hatefnia et al,⁵⁵ perceived behavioral control was one of the significant factors in the mammography behavior of women.

Given the concept of perceived behavioral control, indicating the barriers and facilities available to do a behavior⁵⁶ and the culture of the Fasa people, the importance of perceived behavioral control was high. Sarghazi et al⁴⁸ reported illiteracy, people's lack of knowledge on screening tests, and their

discontent to admit to health centers. An increase in the score of the perceived behavioral control suggested the effect of education on removing the barriers of doing and promoting screening behaviors.

In this study, the mean score of behavioral intention before the intervention was not significantly different between the experimental and control group; however, 6 months after the intervention, there was a significant change in the control group. Researchers argue when the intention of a person to do a behavior is high, the probability of doing that behavior would be also high.^{30,57} In a study by Dezhnam et al,⁵⁸ behavioral intention was the most important predictor of mammography behavior. Based on the results of a study by Juon et al,⁵⁹ educational intervention increased the intention of mammography. In a qualitative study by Keshavarz et al,⁶⁰ most of the subjects did not have the intention to do breast and uterine cancer screening; therefore, interventions were recommended to reduce these barriers. This emphasizes the intention as a necessary factor in performing a behavior. However, the intention is always introduced as a variable whose existence is necessary to perform a behavior but not enough; in other words, it can be said that there is no 100% relationship between intention and behavior.⁶¹

The mean score of BSE behavior in the experimental group significantly increased after the intervention, whereas no change was seen in the control group. In this study, increasing knowledge, attitude, perceived behavioral control, and subjective norms toward BSE were the important factors that resulted in increased intention and doing BSE behaviors. In studies by Kwok and Lim,⁶² Seven et al,⁶³ Masso-Calderón et al,⁶⁴ Kashfi et al,¹¹ and Khiyali et al,⁶⁵ educational intervention increased BSE behavior. Given that the educational intervention based on the TPB effectively improved the intention and behavior of self-examination, it is suggested that similar educational interventions be implemented and evaluated based on the same model in women of other age groups.

Limitations of the Study

This study had some limitations. First, it was conducted on a small group of participants and the questionnaire was completed self-reportedly; therefore, it is suggested to use interviews as a complement to the questionnaire. Second, the results cannot be generalized to other women because the information was exclusively collected from the women in Fasa. Also possible to evaluate health status in the study environment and subjects' residence, it is recommended that future studies take this issue into consideration to account for marginalized people. The model is recommended to be compared with other health education and health promotion models in future studies. Furthermore, considering the time limit in this intervention, it is suggested that the long-term effects (6 months and more) of the intervention be examined in future studies.

Conclusions

The results indicated the effect of the educational intervention based on the TPB on doing BSE 6 months after the intervention. Breast cancer is the second most common cancer in Iranian women, but there is no systematic plan for prevention of the disease and awareness and screening behaviors among Iranian women are low. Accordingly, extensive training courses are recommended to detect problems timely and prevent disease development.

Due to the cost-effectiveness and feasibility of training, we recommend that health care planners and health educators use educational texts based on these constructs of TPB to increase their influence on individuals via screening behavior for breast cancer and adopt effective educational interventions to encourage women to perform self-examinations for breast cancer so that theory-based educational programs be provided through mass media such as television.

Declarations

Ethical Approval and Consent to Participate

The study was approved by the ethics committee of Fasa University of Medical Sciences with the code of ethics number IR.FUMS.REC.1396.317. Informed consent was taken from all the participants. For illiterate people involved, informed consent from a parent and/or legal guardian was obtained in the study. The ethics committee of Fasa University of Medical Sciences approved the procedure for verbal consent since the study is observational and respected the code of ethics as stated in the Declaration of Helsinki. There was an emphasis on maintaining privacy in keeping and delivering the information accurately without mentioning the names of the participants. The participants were given the right to leave the interview at any time, and they were promised to have access to the study results.

Consent for Publication

None.

Author Contributions

Ali Khani Jeihooni: Conceptualization; Investigation; Methodology; Project administration; Supervision; Validation; Visualization; Writing—review & editing.

Zahra Sadat Moayedi: Conceptualization; Data curation; Formal analysis; Methodology; Resources; Software; Validation; Writing—original draft.

Victoria Momenabadi: Formal analysis; Methodology; Project administration; Resources; Software; Supervision; Validation; Visualization.

Farzaneh Ghalegolab: Conceptualization; Formal analysis; Methodology; Project administration; Supervision; Writing—original draft; Writing—review & editing.

Pooyan Afzali Harsini: Data curation; Formal analysis; Investigation; Resources; Supervision; Validation; Visualization; Writing—original draft; Writing—review & editing.

Acknowledgements

We express our appreciation to the participants in this study and the staff of the health centers for their impeccable contribution.

Availability of Data and Materials

The datasets used and/or analyzed during the current study can be made available by the corresponding author on reasonable request.

REFERENCES

- Hajian S, Vakilian K, Najabadi KM, Hosseini J, Mirzaei HR. The effects of education based on the health belief model on screening behavior in high risk women for breast cancer, Tehran, Iran. *Asian Pac J Cancer Prev*. 2011;12:49-54.
- Pisani P, Bray F, Parkin DM. Estimates of the world-wide prevalence of cancer for 25 sites in the adult population. *Int J Cancer*. 2002;97:72-81.
- Hatefnia E, Niknami S, Mahmudi M, Lamyian M. The effects of "theory of planned behavior" based education on the promotion of mammography performance in employed women. *J Birjand Univ Med Sci*. 2010;17:50-58.
- Hacihanoglu R, Gözüm S. The effect of training on the knowledge levels and beliefs regarding breast self-examination on women attending a public education centre. *Eur J Oncol Nurs*. 2008;12:58-64.
- Entezar Mahdi R, Shamshiri A, Ramezani R, Etemad K. *National Breast Cancer Control Program in I.R.Iran. Operational Planning and Guideline for Breast Cancer Screening With CBE and Mammography*. Tehran, Iran: Ministry of Health and Medical Education; 2012.
- Dundar PE, Ozmen D, Ozturk B, et al. The knowledge and attitudes of breast self-examination and mammography in a group of women in a rural area in western Turkey. *BMC Cancer*. 2006;6:43. doi:10.1186/1471-2407-6-43.
- Tavakol Z, Bani-Hosseini S, Mansoori A. Knowledge, attitude and practice about breast cancer screening among students of Tehran University of Medical Sciences, in 2010. *Navid No J*. 2012;16:1-12.
- Smith RA, Cokkinides V, Brawley OW. Cancer screening in the United States, 2009: a review of current American Cancer Society guidelines and issues in cancer screening. *CA Cancer J Clin*. 2009;59:27-41. doi:10.3322/caac.20008.
- Soltanahmadi Z, Abbaszadeh A, Tirgari B. A survey on the rate and causes of women's participation or nonparticipation in breast and cervical cancers screening programs. *Iranian J Obstet Gynecol Infert*. 2010;13:37-46.
- Parsa P, Kandiah M, Mohd Zulkefli NA, Rahman HA. Knowledge and behavior regarding breast cancer screening among female teachers in Selangor, Malaysia. *Asian Pac J Cancer Prev*. 2008;9:221-227.
- Kashfi S, Khani Jeihooni A, Yazdankhah M. The effect of education about breast self-examination on knowledge, attitude and practice of women in Nourabad Mamasani health clinics, 2009. *J Jabrom Univ Med Sci*. 2012;10:40-45.
- Khalili S, Shojaeizadeh 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 Behdasth Clinic, Lavizan area, Tehran, using health belief model. *J Health*. 2014;5:45-58.
- Babu GR, Samari G, Cohen SP, et al. Breast cancer screening among females in Iran and recommendations for improved practice: a review. *Asian Pac J Cancer Prev*. 2011;12:1647-1655.
- Rastad H, Shokohi L, Dehghani SL, Motamed Jahromi M. Assessment of the awareness and practice of women vis-à-vis breast self-examination in Fasa in 2011. *J Fasa Univ Med Sci*. 2013;3:75-80.
- Charkazi A, Ghouchaei A, Razaq Nejad A. Knowledge, practice and perceived threat toward breast cancer in the women living in Gorgan, Iran. *J Res Dev Nurs Midwifery*. 2013;10:25-32.
- Haghighi F, Portaghali P, Rafaty Javanbakht L, Ghanbarzadeh N, Hosseini S. Knowledge, attitude, and practice of female teachers regarding breast cancer screening in Birjand. *Mod Care J*. 2012;9:146-155.
- Qorban-Sabbagh M, Khanjani N, Fadakar M, Iranpour A. Empowerment of women visiting the health centers of Kerman by teaching self breast examination in the presence of Behvarz. *Iranian Q J Breast Dis*. 2014;7:41-51.
- Naghbi S, Shojaeizadeh D, Yazdani-Cherati J, Montazeri A. Breast cancer preventive behaviors among Iranian women: a systematic review. *Payesh J*. 2015;14:181-191.
- Bakhtari Aghdam F, Nouri Zadeh R, Sahebi L. Effect of education based on health belief model and develop behaviors that promote breast cancer screening in women referring to Tabriz health centers. *Tabriz Univ Med Sci J*. 2013;33:25-31.
- Rosmawati NH. Knowledge, attitudes and practice of breast self-examination among women in a suburban area in Terengganu, Malaysia. *Asian Pac J Cancer Prev*. 2010;11:1503-1508.
- Early J, Armstrong SN, Burke S, Thompson DL. US female college students' breast health knowledge, attitudes, and determinants of screening practices: new implications for health education. *J Am Coll Health*. 2011;59:640-647.
- Bhatt VR, Wetz RV, Shrestha R, et al. Breast cancer knowledge, attitudes and practices among Nepalese women. *Eur J Cancer Care*. 2011;20:810-817.
- Kim EK, Choo J. The health belief model and assertive behavior of asking smokers not to smoke among college students. *Korean J Health Promot*. 2011;11:160-168.
- Hall KS. The health belief model can guide modern contraceptive behavior research and practice. *J Midwifery Womens Health*. 2012;57:74-81.
- Safari M, Shojaeizadeh D, Ghofranipour F, Heydarnia AR, Pakpur A. *Theories, Models and Methods of Health Education and Health Promotion*. Tehran, Iran: Asaresobhan Publications; 2012.
- Rezabeigi-Davaran E, Khanjani N, Falahi M, Daneshi S, Iranpour A. Breast self-examination and its effective factors based on the theory of planned behavior among women in Kerman, Iran. *J Educ Community Health*. 2016;3:1-8. doi:10.21859/jech-0303139.
- Sarghazi M, Mohseni M, Safar Nevadeh M, Iranpour A, Mirzaie M, Jahani Y. The effect of education based on the theory of planned behavior on behaviors leading to early detection Breast cancer in women referred to health centers in Zahedan. *Iranian Q J Breast*. 2014;7:45-55.
- Khazir Z, Morowati Sharifabad MA, Enjebaz B, Vaezi AA, Fallahzadeh H. Effect of educational intervention based on the theory of planned behavior on mammography performance in Iranian women: a randomized controlled trial study. *J Educ Community Health*. 2021;8:51-57.
- Jahangiri L, Shojazadeh D, Khajeh Kazemi R, Dehi M, Karimi F. Using of Health Belief Model in educational based program and its effect on knowledge and attitudes of women on breast cancer screening. *J Health Res Syst*. 2011;7:1052-1060.
- Peiman N, Amani M, Esmaili H. The relationship between health literacy and the constructs of the theory of planned behavior and performing tests Screening of breast cancer in women referred to health centers. *Breast Canc Breed Ser*. 2016;9:60-69.
- Godin G, Gagné C, Maziade J, Moreault L, Beaulieu D, Morel S. Breast cancer: the intention to have a mammography and a clinical breast examination-application of the theory of planned behavior. *Psychol Health*. 2001;16:423-441.
- Alami A, Tavakoly Sany S, Lael-Monfared E, et al. Factors that influence dietary behavior toward iron and vitamin D consumption based on the theory of planned behavior in Iranian adolescent girls. *Nutr*. 2019;18:8.
- Drossaert C, Boer H, Seydel E. Prospective study on the determinants of repeat attendance and attendance patterns in breast cancer screening using the theory of planned behavior. *Psychol Health*. 2003;18:551-565.
- Tolma EL, Reininger BM, Evans A, Ureda J. Examining the theory of planned behavior and the construct of self-efficacy to predict mammography intention. *Health Educ Behav*. 2006;33:233-251.
- Bae PW, Suh SR. Predictive Factors on breast self-examination intention and behavior in middle aged women: based on the theory of planned behavior. *J Korea Acad Ind Cooperat Soc*. 2013;14:2349-2359.
- 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;26:365-374. doi:10.1007/s13187-010-0158-y.
- Firooze F. Influence teaching on the knowledge and attitude to breast self-examination among daughter students. *Qom Univ Med Sci J*. 2010;4:21-26.
- Alami A, Tavakoly Sany SB, Tehrani H, Lael-Monfared E, Hosseini Z, Jafari A. The effect of educational intervention on iron and vitamin D consumption based on the theory of planned behaviour in Iranian adolescent girls: a quasi-experimental study. *Int J Health Promot Educ*. 2019;57:316-331.
- Alsaraireh A, Darawad MW. Impact of a breast cancer educational program on female university students' knowledge, attitudes, and practices. *J Cancer Educ*. 2019;34:315-322. doi:10.1007/s13187-017-1304-6.
- Abera H, Mengistu D, Bedaso A. Effectiveness of planned teaching intervention on knowledge and practice of breast self-examination among first year midwifery students. *PLoS ONE*. 2017;12:e0184636. doi:10.1371/journal.pone.0184636.
- Ouyang YQ, Hu X. The effect of breast cancer health education on the knowledge, attitudes, and practice: a community health center catchment area. *J Cancer Educ*. 2014;29:375-381. doi:10.1007/s13187-014-0622-1.
- Ajzen I. The theory of planned behavior. *Organ Behav Hum Decis Process*. 1991;50:179-211.

43. Crombie K, Hancock K, Chang E, et al. Breast screening education at Australian and Thai worksites: a comparison of program effectiveness. *Contemp Nurse*. 2005;19:181-196.
44. SalimiPormehr S, Kariman N, Sheykhan Z, AlaviMajd H. Investigation of breast cancer screening tests performance and affecting factors in women referred to Ardebil's health and medical centers, 2009. *J Ardabil Univ Med Sci*. 2010;10:310-318.
45. Steadman L, Rutter DR. Belief importance and the theory of planned behaviour: comparing modal and ranked modal beliefs in predicting attendance at breast screening. *Br J Health Psychol*. 2004;9:447-463. doi:10.1348/1359107042304579.
46. Dumitrescu AL, Wagle M, Dogaru BC, Manolescu B. Modeling the theory of planned behavior for intention to improve oral health behaviors: the impact of attitudes, knowledge, and current behavior. *J Oral Sci*. 2011;53:369-377.
47. Molina Y, Ornelas IJ, Doty SL, Bishop S, Beresford SA, Coronado GD. Family/friend recommendations and mammography intentions: the roles of perceived mammography norms and support. *Health Educ Res*. 2015;30:797-809. doi:10.1093/her/cyv040.
48. Sargezi M, Mohseni M, Safarnavade M, et al. The effect of educational intervention based on the theory of planned behavior on behaviors leading to early detection. Breast cancer in women referring to health centers in Zahedan city. *Iran Q J Breast Dis*. 2014;7:45-55.
49. Vahedin Shahrodi M, Porhaji F, Esmaili H, Porhaji F. The study of motivating constructs, self-efficacy and comprehension response costs. Based on the protective motivation for breast self-examination behavior. *Iran J Obstet Gynecol Inferred*. 2013;15(40):1-9.
50. Nourizadeh R, Bakhtariadgam F, Sahebi L. Knowledge, health beliefs and breast cancer screening behaviors of women referring to health centers of Tabriz. *Iran J Breast Dis*. 2010;3:43-51.
51. Saber F, Shanazi H, Sharifrad G. The survey of theory of planned behavior constructs regarding girl student's physical activity in Naein Payame Noor University in 2012. *J Health Res Syst*. 2013;9:1014-1021.
52. Iwaya GH, Cardoso JG, De Sousa Junior JH, Steil AV. Predictors of the intention to maintain social distancing. *Rev Adm Publica*. 2021;54:714-734.
53. Ajzen I. Perceived behavioral control, self efficacy, locus of control and the theory of planned behavior. *J Appl Soc Psychol*. 2002;32:665-683.
54. Jadgal K, Zareban I, Faryabi R, Rafie M, Alizadeh Siuk H. The investigation of the impact of health belief model based training on breast self-exam in women referred to health centers. *J Health Liter*. 2016;1:172-181.
55. Hatefnia E, Niknami S. Survey of factors affecting to predict mammography in employed women aged 35 years and older based on the theory of planned behavior. *J Health Res Syst*. 2013;9:1062-1070.
56. Ajzen I. The theory of planned behavior: a bibliography; 2007. <http://people.umass.edu/ajzen/tpbrefs.html>. Accessed June 23, 2007.
57. Ajzen I. *The Theory of Planned Behavior*. 1st ed. New Delhi, India: SAGE; 2012:438-459.
58. Dezhm S, Roozbahani N, Khorsandi M. Application of theory of planned behavior in predicting screening mammography in housewives over 40 years. *Med Daneshvar*. 2015;22:33-41.
59. Juon HS, Choi S, Klassen A, Roter D. Impact of breast cancer screening intervention on Korean-American women in Maryland. *Cancer Detect Prev*. 2006;30:297-305.
60. Keshavarz Z, Simbar M, Ramezankhani A. Factors for performing breast and cervix cancer screening by Iranian female workers: a qualitative-model study. *Asian Pac J Cancer Prev*. 2011;12:1517-1522.
61. Pakpour Hajiagha A, Saffari M. Application of planned behavior theory in predicting dental brush behavior among Iranian adolescents in Qazvin. *J Islam Dent Assoc Iran*. 2012;24:201-207.
62. Kwok C, Lim D. Evaluation of a culturally tailored education to promote breast and cervical cancer screening among Chinese-Australian women. *J Cancer Educ*. 2016;31:595-601. doi:10.1007/s13187-015-0859-3.
63. Seven M, Akyüz A, Robertson LB. Interventional education methods for increasing women's participation in breast cancer screening program. *J Cancer Educ*. 2015;30:244-252. doi:10.1007/s13187-014-0709-8.
64. Masso-Calderón AM, Meneses-Echávez JF, Correa-Bautista JE, Tovar-Cifuentes A, Alba-Ramírez PA, Charry-Ángel CE. Effects of an educational intervention on breast self-examination, breast cancer prevention-related knowledge, and healthy lifestyles in scholars from a low-income area in Bogota, Colombia. *J Cancer Educ*. 2018;33:673-679. doi:10.1007/s13187-016-1133-z.
65. Khiyali Z, Aliyan F, Kashfi SH, Mansourian M, Khani Jeihooni A. Educational intervention on breast self-examination behavior in women referred to health centers: application of health belief model. *Asian Pac J Cancer Prev*. 2017;18:2833-2838.