Evaluation of an Intervention Program for Promoting Breast Self-Examination Behavior in Employed Women in Iran

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ABSTRACT

INTRODUCTION: Breast cancer is the most common malignancy in the world. Screening is the basis for early detection. However, the mortality rate is still high in Iranian women related to not screening and timely check-ups. We offered a theory-based intervention program to improve breast cancer screening behavior in women.

METHODS: This interventional study was conducted in 135 employed women in 2019. Their screening behavior was investigated using a questionnaire based on the Protection Motivation and Social Support Theories. We compared the efficacy of 2 educational interventions (a workshop and an E-learning program) between 2 intervention groups and a control group. The results were collected 3 months after the interventions had taken place. Data were analyzed in SPSS 23 using descriptive statistics, chi-square, analysis of variance (ANOVA), and the paired sample *t*-test.

RESULTS: We found a significant difference between the mean score of knowledge and the theoretical constructs (P value $< .001$) before and after the interventions. Our results also showed that both the intervention methods had a similar effect and that there was a significant difference in the performance of breast self-examinations between the intervention and control groups after the intervention (P value $< .001$).

CONCLUSION: Given the cost-effectiveness and feasibility of implementing an E-learning program, we would recommend that health care planners assist in designing and implementing this effective form of intervention to encourage many more women to perform self-examinations to aid breast cancer screening.

KEYWORDS: Breast self-examination, employed women, protection motivation theory, social support theory

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Introduction

Breast cancer is the most common malignancy in the world so that in 2018 it was predicted that 266 120 people would develop breast cancer and 63 960 would die from the cancer in the United States. It is also the most common cancer among women in Iran according to the GLOBOCAN report in 2018[1]; it accounts for 27% of all malignancies in women.[2] Breast cancer can be cured if it is detected early byscreening.[3] One of the screening methods is breast self-examination. Although the effectiveness of self-examination as a screening method for breast cancer is controversial, the American Cancer Society encourages women to be aware of the natural texture of their breasts and to report to their physician if they see or feel any changes.[4]

Regular monthly breast self-examinations can be an important way to detect a tumor at an early stage. And if the tumor is discovered early, treatment will generally be more successful. In addition, self-examinations are a simple, no-cost method that can be used at any age by every woman. Many Iranian women are unaware of the common warning signs of breast cancer, so that 70% of new patients[5] present with an advanced or metastatic stage of breast cancer, which leads to poor survival rates.[6] In general, breast self-examinations, clinical breast examinations, and mammography are not yet well accepted in Iran.[7] Despite these benefits and well-known efficacy of breast self-examinations previous study conducted in Iran showed that only 6% of studied women had performed breast self-examinations regularly.[5] Given the increase of breast cancer in Iran and the prevalence of advanced-stage breast cancer diagnoses, we need to consider how to tackle problem with educational interventions, based on promoting appropriate patterns of behavior and leading to early detection.[8] There are different ways to intervene: one method is to give workshops at which the teacher can offer active learning opportunities.[9] Another method is to

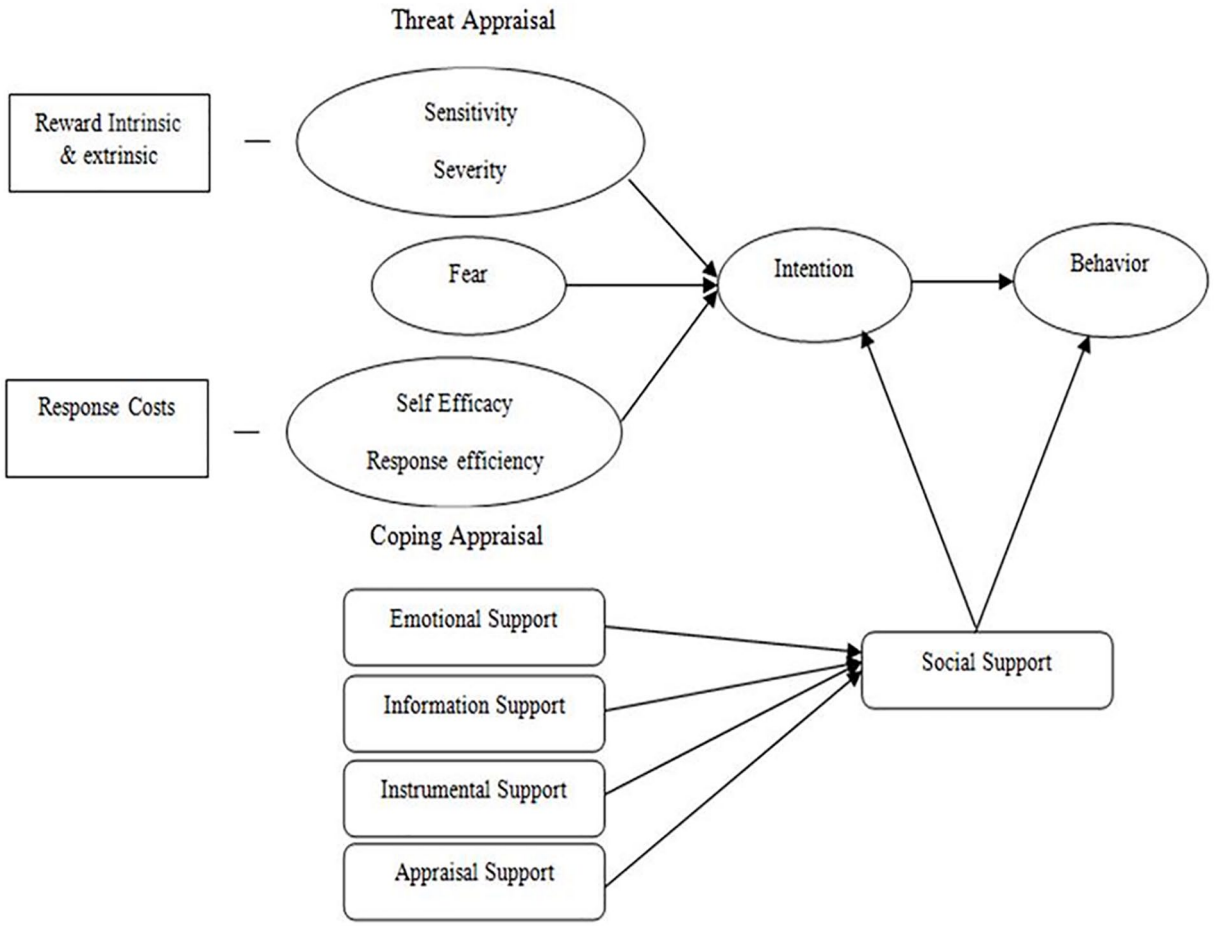

Figure 1. Combined model of protection motivation and social support theories.

offer E-learning, which overcomes some of the barriers to workshops and provides easy access to information and skills. This approach also offers access to women in remote areas, and reduces travel and time costs (Figures 1 and 2).[1]

The effectiveness of health education programs depends on the correct use of the theories and models used. Such a model plays an important role in identifying and addressing educational needs, starting the program in the right direction, and reducing any vague and ambiguous parts in the main content of an educational intervention.[10] We therefore performed a systematic review and meta-analysis to select the appropriate model[11] using the constructs and determinants of Protection Motivation Theory (PMT) as the main theoretical framework for our study. This theory assumes that the adoption of recommended health behavior is directly linked to people's motivation to protect themselves.[12] This model suggests that protection motivation (ie, 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.[13] But this has its limitations. The environmental and cognitive variables (subjective norms) that affect the behavior change cannot be detected,[14,15] since not every intention leads to behavior change but rather to environmental factors that influence the intention and behavior.[16] Therefore, the availability of environmental factors such as social support will close the gap between intention and behavior, and eventually accelerate behavior change. Studies show that social support plays a key role in health screening and behaviors.[17-21] Social support theory can be classified into 4 different groups of supportive actions or behaviors: (1) emotional support, which includes empathy, love, trust, and care (from spouse, relatives, and friends); (2) instrumental support, that is, tangible help; (3) information support, that is, giving advice, comment, and information, and (4) evaluation support, which includes providing information useful for internal evaluation.[19] Therefore, we used a hybrid model of PMT and social support theory in designing our interventions. Given the high prevalence of breast cancer and the importance of its early detection, we aimed to design, implement, and evaluate an intervention program to promote self-examination as breast cancer screening behavior in Iranian women.

Methods

Study design and sample

This experimental study was carried out on 135 women employed by Hamadan University of Medical Sciences (Iran) in 2019. To determine the sample size, the minimum difference

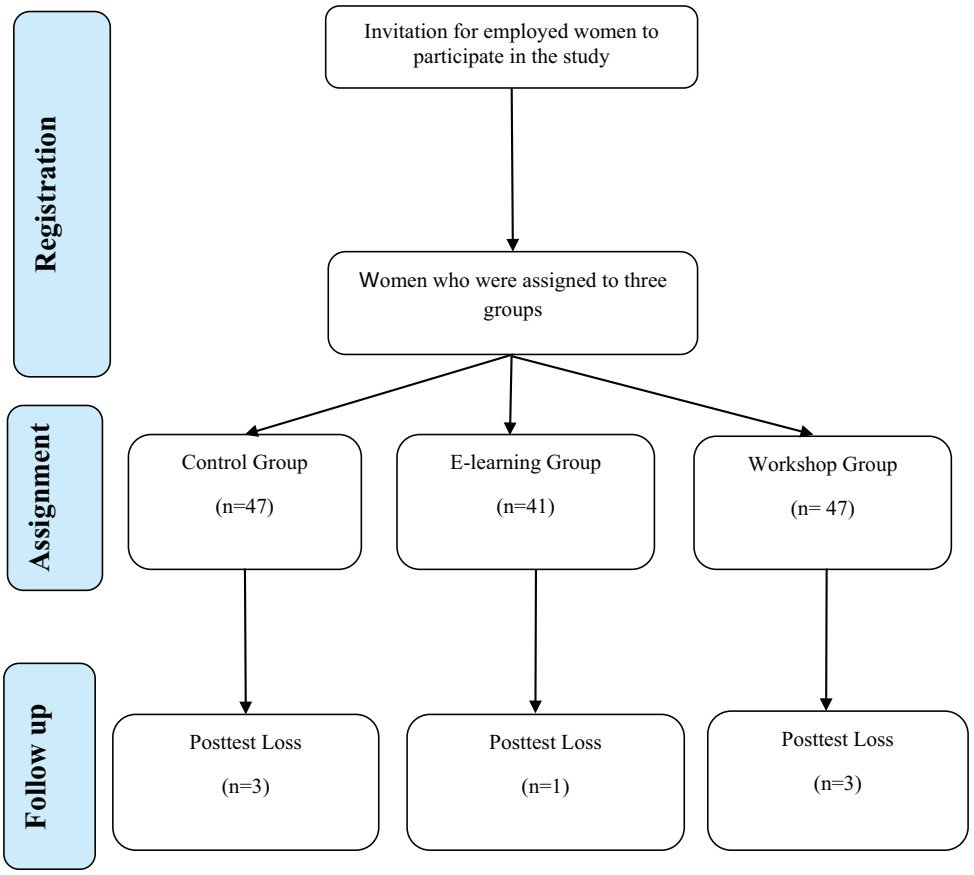

Figure 2. Study flowchart.

in breast self-examination screening behavior was 35%,[22] which was 40 with $\alpha = 0.05\%$ and 90% power, and 47 people were selected for each group, taking into account the 15% loss. It was based on the results of an earlier study[23] that investigated the factors related to breast self-examination behavior of women employed by the present research team. We had 3 groups of staff: in the education unit, at the university's headquarters (staff of the E-learning management system), and in the health centers. We set up 2 types of intervention (workshop and E-learning). We observed the highest percentage of nonregular breast self-examination behavior among staff in the education and headquarters units.[23] We randomly allotted our workshop intervention to the education unit, the e-learning intervention to the headquarters group, and the health centers became the control group.

Data collection

First, we sent out an invitation through the staff portal asking women to text the researcher if they would like to participate in the study. The control group was based on the 4 health centers where staff had reported the least screening behavior[23] and we enrolled women who did not perform breast self-examinations monthly and who were willing to participate. In total, we had 47 women from the education unit, 41 from the headquarters and 47 from the health centers. Our inclusion criteria for participants were: age $\geqslant 20$, no regular breast self-examinations, and a signed informed consent form for this study. The exclusion criteria were: breast cancer screening already being performed by participant or medical doctor, missing more than one training session, and failure to respond to electronic questionnaires. The tool used to collect information was a researcher-developed questionnaire consisting of 3 sections on demographic information and knowledge, the PMT constructs, and the theoretical construct of social support. The questions were designed based on the PMT including perceived susceptibility construct (5 Item), perceived severity construct (8 Item), perceived self-efficacy construct (6 Item), construct of perceived response efficacy (7 Item), construct of response cost (4 Item), construct of perceived reward (5 Item), construct of fear (4 Item), intention construct (4 Item). All of the scales were positively related to the screening behavior, except for the cost response and perceived reward, which were negatively associated. The PMT questions were measured on a 5-point Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The dependent variable, practices related to BSE, was assessed on the frequency of BSE. The BSE score was coded in *nonpractice* = 1 and *regular practice* (monthly) = 2.

The part of the questionnaire dealing with social support likewise consisted of questions on a 5-point Likert-type 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 5-point Likert-type scale was constructed with scores of 1 to 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. To determine the content validity of the questionnaire, 10 questionnaires were distributed to specialists in health education, gynecology, and oncology. To determine the reliability, the Cronbach's Alpha coefficient and the Test-Retest were used. The Cronbach's Alpha coefficient was 0.83 and the correlation coefficient was 0.99. 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.

Before the interventions started, we sent out electronic self-report questionnaires to measure variables according to PMT and Social Support theories and on participants' awareness to all the groups. Data were analyzed in SPSS 23 using descriptive statistics, chi-square, analysis of variance (ANOVA), and the paired sample *t*-test.

Workshop intervention

The workshop intervention comprised 4 sessions over a 2-week period; these were held in a meeting room at the university. The average duration of each session was 60 minutes, and the number of participants was 47 for each workshop. The workshop included lectures, slideshows, hands-on tutorials, educational films, and group discussions. Two videos were shown on how to perform a breast self-examination for 3 and 4 minutes. The first was entitled "Symptoms and Treatment of Breast Cancer" and the second "Identification of Symptoms and Breast Cancer Techniques Training." After the videos had been shown, the technique of breast self-examination was demonstrated by the researcher and participants were asked to practice simultaneously.

In addition, 3 pamphlets were designed, printed, and distributed. The first was entitled "Breast Cancer," covering signs and symptoms of breast cancer and those who had a higher risk of breast cancer. The second pamphlet, "Breast Self-Examination" covered the technique of breast self-examination, while the third, "Mammography," described a screening program, including the age and time for having a mammogram and how it is performed. We also designed and printed a booklet entitled "Start Fighting Breast Cancer," which included a definition of breast cancer, symptoms and at-risk groups, ways to fight breast cancer, and descriptions of breast cancer screening methods.

Using social support theory in both intervention groups. To enhance emotional support, participants were asked to add influential decision-makers to an already established group in Iran called the Breast Cancer Prevention Group and the researcher sent a telegram to these people emphasizing the importance of remembering breast self-examination. Participants were provided with copies of the pamphlets and booklet so links to the educational videos to enhance their informational support. For practical support, those women who were interested in having a mammography or ultrasound were encouraged to collect a personal health insurance card, in which a gynecologist wrote an order fora mammography or ultrasound; they were then referred to a magnetic resonance imaging (MRI) center for the scan. The researcher enhanced the perceived appraisal support by providing feedback on the women's response to professional screening and to their regular breast self-examinations.

E-learning intervention

Our E-learning intervention was offered to women employed in our headquarters. To prepare the training program, the researcher interviewed physicians in various hospital departments about breast cancer issues (a blood and oncology specialist, a radiologist/oncologist, a general surgeon, and a community medical specialist). The interviews were video-recorded at the School of Public Health. The recorded interviews were then edited into 29 short training videos, each lasting 1 to 7 minutes. Next, a secure personal page (with a username and password) was created for each participant. Participants were taught how to access their own personal page, using photos of each step and sending it to them via telegram. The short videos were then uploaded to the system and 5 4-choice questions were designed and uploaded for each session. The aim of the questions was to allow participants to move on to the next video after answering the questions correctly. If the answers were incorrect, the participant was encouraged to watch the video again. After watching all the short videos and answering the questions correctly, there was a final test of 23 questions. An acceptable score of knowledge was 60/100 for this test.

One month after the training sessions had been completed, a telegram group called the "Breast Cancer Prevention" was established for both intervention groups, and they were asked to add influential people the group. Messages were sent out reminding the group it was again time to perform self-examination. Messages were stopped 1 month before the post-test time point. It should be noted that all participants in the workshop and the E-learning group were in-service certified by the University's Vice Chancellor for Research. The control group was sent all 3 type of pamphlet and the training booklet.

Results

The mean age of participants was 41 ± 7.50 years, 81% of them were married, 45% had a university education, and 90% had no family history of breast cancer (Table 1). The mean scores of PMT and social support theory constructs are

Table 1. Comparison of demographic characteristics of study participants in intervention and control groups before intervention.

VARIABLE	WORKSHOP	E-LEARNING	CONTROL GROUP
	N (%)	N (%)	N (%)
Age (y)			
20-30	1 (2.3)	2 (50)	8 (18.2)
31-40	12 (27.3)	21 (52.5)	12 (27.3)
41-50	31 (70.5)	17 (42.5)	24 (54.5)
Mean ± SD	33.31 ± 8.01	32.15 ± 9.87	32.15 ± 9.87
$\chi^2 = 15.27$ $P_{value} = .004$			
Marital status			
Married	5 (11.4)	9 (22.5)	10 (22.7)
Single	39 (88.6)	31 (77.5)	34 (77.3)
$\chi^2 = 2.40$ $P_{value} = .30$			
Educational status			
Technician	12 (27.3)	6 (15)	8 (18.2)
Bachelor	18 (40.9)	15 (37.5)	25 (56.8)
MSc	14 (31.8)	19 (47.5)	11 (25)
$\chi^2 = 6.92$ $P_{value} = .40$			
History of breast disease			
YES	5 (11.4)	2 (5)	4 (9.1)
NO	39 (88.6)	38 (95)	40 (90.9)
$\chi^2 = 1.10$ $P_{value} = .57$			

Abbreviation: SD, standard deviation.

presented in Table 2. After the intervention had taken place, there was positive significant difference seen between the intervention and control groups (P value $< .001$), except for the fear construct, where no significant difference was found (P value $> .05$; Table 2).

The highest level of construct in the workshop group was 43.8% with the constructs of awareness, and perceived instrumental support at 36.6%, and the highest level of construct in the E-learning group was 43.3% with the constructs of awareness, 45.8% for perceived instrumental support, while the lowest level of balance in both groups was related to fear of breast cancer screening behavior (Table 3).

The study participants were evaluated at 3 months after intervention. Table 4 shows that the chi-square test revealed a statistically significant difference in breast self-examination behavior between the intervention and control groups after the intervention (P value $< .001$). There were 37 (84.1%) participants in the workshop group, 24 (60%) in the E-learning group, and 9 (20.5%) in the control group performing regular, monthly breast self-examinations during the first 3 months after the intervention.

Discussion

The efficacy of our educational interventions (workshops, E-learning) was evaluated against a control group using a randomized controlled trial. Overall, this study showed that the interventions had a significant and positive effect on the variables studied in both the workshop and E-learning groups compared to the control group. Findings demonstrated the interventions had a significant impact on the awareness of breast cancer and its screening methods. This was in line with similar studies.[4,24-26] In general, the more people are aware of the cancer risk factors and symptoms of breast cancer, the less they will worry about breast cancer, and thus the higher their screening behavior.

In relation to the perceived susceptibility construct, results showed that, 3 months after the intervention, the mean perceived susceptibility scores had increased in both groups, meaning that participants better appreciated their risk of developing breast cancer after the intervention. This finding is consistent with similar studies.[27,28] However, a study[29] in Turkey that used printed educational materials did not change the perceived susceptibility of the subjects; this inconsistency may be due to the different intervention method and training materials.

Table 2. Comparison of the mean scores of the PMT and social support theory constructs between the intervention and control groups before and after the intervention.

CONSTRUCTS	GROUPS	BEFORE INTERVENTION N = 135	AFTER INTERVENTION N = 128	PAIRED TEST	*P* VALUE
		MEAN ± SD	MEAN ± SD		
Knowledge	Workshop	4.61 ± 2.11	7.95 ± 1.69	−9.049	<.001
	E-learning	4.68 ± 2.41	7.97 ± 1.94	−8.926	<.001
	Control group	6.70 ± 2.00	5.66 ± 2.30	3.781	<.001
	ANOVA *F*	12.958	19.142		
	P value	<.001	<.001		
Sensitivity	Workshop	10.23 ± 2.61	10.98 ± 1.75	22.237	<.001
	E-learning	10.30 ± 2.25	11.49 ± 1.79	−3.570	<.001
	Control group	10.59 ± 2.71	10.05 ± 2.13	1.985	.054
	ANOVA *F*	0.25	6.169		
	P value	.779	.003		
Severity	Workshop	30.02 ± 6.10	32.30 ± 4.64	−3.189	<.001
	E-learning	28.98 ± 4.93	29.74 ± 4.90	−1.107	.275
	Control group	30.39 ± 5.59	28.66 ± 4.29	2.588	<.001
	ANOVA *F*	0.713	7.194		
	P value	.492	<.001		
Self-efficacy	Workshop	23.34 ± 3.02	26.66 ± 3.28	−5.351	<.001
	E-learning	23.78 ± 3.25	26.10 ± 3.83	−3.577	<.001
	Control group	24.59 ± 3.32	22.95 ± 2.61	4.122	<.001
	ANOVA *F*	1.723	16.369		
	P value	.183	<.001		
Response efficacy	Workshop	28.55 ± 4.10	31.18 ± 3.63	−3.752	<.001
	E-learning	26.90 ± 3.60	29.92 ± 4.69	−3.682	<.001
	Control group	27.16 ± 3.30	25.50 ± 2.54	4.099	<.001
	ANOVA *F*	2.474	28.634		
	P value	.088	<.001		
Cost	Workshop	2.43 ± 0.75	2.06 ± 0.75	−5.091	<.001
	E-learning	2.55 ± 1.10	2.39 ± 0.97	−2.531	<.001
	Control group	2.52 ± 0.92	2.70 ± 0.92	2.993	<.001
	ANOVA *F*	0.187	5.648		
	P value	.830	<.001		
Reward	Workshop	1.79 ± 0.70	1.54 ± 0.54	−2.959	<.001
	E-learning	1.85 ± 0.83	1.52 ± 0.64	−3.389	<.001
	Control group	2.06 ± 0.69	2.04 ± 0.37	−1.758	.086
	ANOVA *F*	1.648	13.312		
	P value	.197	<.001		

(Continued)

Table 2. (Continued)

CONSTRUCTS	GROUPS	BEFORE INTERVENTION N = 135	AFTER INTERVENTION N = 128	PAIRED TEST	*P* VALUE
		MEAN ± SD	MEAN ± SD		
Fear	Workshop	15.25 ± 4.28	15.68 ± 3.58	−0.557	.58
	E-learning	16.85 ± 2.98	16.85 ± 3.45	0.000	1.000
	Control group	15.64 ± 3.14	15.98 ± 3.14	−1.188	.241
	ANOVA *F*	2.310	1.293		
	P value	.103	.278		
Intention	Workshop	13.09 ± 2.36	16.43 ± 2.48	−8.364	<.001
	E-learning	11.63 ± 2.61	15.54 ± 2.83	−6.627	<.001
	Control group	12.95 ± 2.47	12.11 ± 2.91	2.823	<.001
	ANOVA *F*	4.680	30.011		
	P value	.011	<.001		
Emotional support	Workshop	10.11 ± 3.52	13.73 ± 4.91	−6.310	<.001
	E-learning	9.70 ± 3.66	13.03 ± 3.17	−4.965	<.001
	Control group	10.45 ± 3.58	9.41 ± 3.39	2.708	<.001
	ANOVA F	0.463	15.145		
	P value	.630	<.001		
Informational support	Workshop	5.82 ± 2.58	7.36 ± 2.94	4.944	<.001
	E-learning	6.13 ± 2.54	7.08 ± 2.89	2.336	<.001
	Control group	7.80 ± 2.45	8.14 ± 2.16	−1.923	.061
	ANOVA *F*	0.724	17.553		
	P value	.487	<.001		
Instrumental support	Workshop	5.82 ± 2.58	9.43 ± 2.74	−7.294	<.001
	E-learning	6.13 ± 2.54	10.84 ± 2.07	−8.078	<.001
	Control group	8.64 ± 2.16	7.86 ± 2.71	1.772	.083
	ANOVA *F*	17.553	15.133		
	P value	<.001	<.001		
Appraisal support	Workshop	6.07 ± 2.96	8.93 ± 3.09	−5.140	<.001
	E-learning	6.63 ± 2.49	9.90 ± 2.34	−5.689	<.001
	Control group	7.86 ± 2.28	7.34 ± 2.69	1.418	0.163
	ANOVA *F*	5.467	9.257		
	P value	.05	<.001		

Abbreviations: ANOVA, analysis of variance; SD, standard deviation; PMT, protection motivation theory.

Based on results, the perceived severity score in the intervention groups significantly increased after the training program. This finding may be due to the intervention leading to increased attention for the consequences of not performing self-examination. This finding was consistent with other studies.[28,30]

The efficacy scores for self-examination increased significantly after the intervention, in line with findings by studies in Turkey[31] and Malaysia.[32] Self-efficacy is the most important predictor of behavioral change, it reflects a person's confidence in his or her ability to correctly perform breast self-examination and identify suspicious masses. Since breast self-examination is a

Table 3. Comparison of the difference (over 100) of the constructs of the PMT and social support theory before and after the educational intervention.

CONSTRUCTS	WORKSHOP N=47			EFFECT SIZE WORKSHOP	E-LEARNING N=41			CONTROL GROUP N=47			EFFECT SIZE E-LEARNING
	BEFORE	AFTER	DIFF		BEFORE	AFTER	DIFF	BEFORE	AFTER	DIFF	
Knowledge	46.10	79.50	33.4	43.8	46.80	79.70	32.90	67.00	56.60	−10.40	43.3
Sensitivity	60.83	70.75	9.92	14.42	85.83	95.75	9.92	63.25	58.75	−4.50	14.42
Severity	65.56	67.93	2.37	7.77	65.56	67.93	2.37	69.96	64.56	−5.40	7.77
Self-efficacy	74.08	83.75	9.67	16.5	74.08	83.75	9.67	77.45	70.62	−6.83	16.5
Response efficacy	76.96	86.63	9.67	15.6	71.07	81.85	10.78	72.00	66.07	−5.93	16.71
Cost	9.81	12.06	2.25	3.38	9.06	10.06	1	9.25	8.12	−1.13	2.13
Reward	21	22.25	1.25	1.35	15.75	17.35	1.60	14.65	14.75	10	1.5
Fear	71.87	73	1.13	−90.99	80.31	80.31	0.00	72.75	74.87	2.12	−2.12
Intention	56.81	77.68	30.87	26.12	47.62	72.12	24.50	55.93	50.68	−5.25	29.75
Emotional support	25.55	43.65	18.1	23.3	23.50	41.65	18.15	27.25	22.05	−5.20	23.35
Informational support	36.33	23.50	12.83	5.83	34.00	26.08	7.92	40	47	7	0.92
Instrumental support	23.50	53.58	30.08	36.58	26.08	65.33	39.25	47	40.50	−6.50	45.75
Appraisal support	25.28	49.41	24.13	28.47	30.25	57.50	27.25	40.50	36.16	−4.34	31.95

Abbreviations: Diff, difference; PMT, protection motivation theory.
Circled values signify p = 0.02.

Table 4. Frequency distribution of regular and monthly breast self-examination behavior in 3 study groups after educational intervention.

GROUPS	BSE		TOTAL	*P* VALUE
	AFTER INTERVENTION			
	DO	DO NOT		
	N (%)	N (%)	N (%)	
Workshop	37 (84.1)	7 (15.9)	44 (100)	$p < 0.001$
E-learning	24 (60)	16 (40)	40 (100)	
Control group	9 (20.5)	35 (79.5)	44 (100)	

BSE: breast self examination.

skillful behavior that can play a role in promoting self-efficacy, the intervention provides information and motivates individuals to perform breast self-examinations.

Results of this study showed that the scores for perceived response to breast cancer in the groups was significantly higher after intervention compared to the control group. Studies with similar interventions on Pap smears[33] and one on preventing skin cancer[34] achieved these results. In fact, women had considered breast self-examination as a screening method for early detection of breast cancer.

The perceived response cost is actually an estimate of the person's costs (money, time, and effort) associated with performing protective behavior.[35] Interventions to reduce the perceived response cost of breast self-examination behavior had a significant effect, in agreement with other reports.[34,36] The costs involved in breast self-examination are time and forgetting to do it. Therefore, by eliminating the perceived costs, behavior can be improved.

If the perceived reward is greater than maladaptive behavior, consistent and correct behavior will be reduced. In this study, the perceived reward score for early detection of breast cancer in the workshop and electronics groups was significantly lower than in the control group, which is consistent with other studies.[34,37] The mean score of fear construct did not increase significantly after the intervention in these 2 groups compared to the control group. Two studies[33,36] on Pap smear screening found these results, but it was different from the study results,[38] where the difference could be due to the target groups or the different intervention methods. The mean score of fear construct before intervention was high in participants who did not affect the intervention on fear construct.

In the case of behavioral intention constructs, results showed a significant improvement in the postintervention score, but the findings of the studies[30,31,37] were different from this study. Since there was also a significant difference in behavioral intention between the groups before intervention, it may be that the women were insufficiently aware of the benefits of self-examination.

In this study, the rate of breast self-examination was higher in both intervention groups. Results show that PMT and social support theory are effective in promoting breast self-examination. Similar studies[26,28,31,32,39,40] have achieved these results. Positive effects on behavior were also reported for web-based interventions by Chaudhry et al[41] (intervention to increase mammography uptake in the United States), Grim et al[42] (to increase physical activity in United States), and Heidarnia et al[43] (to reduce smoking). Since breast self-examination is the simplest and cheapest way to detect early-stage breast cancer, it is important to educate women on the benefits of this behavior.

Various studies have shown that social support plays a key role in promoting and maintaining health screening and behavior.[17-19,39,44] Social support, through increased self-efficacy, overcomes perceived barriers (emotional, rational, and financial) for breast cancer screening.[19] We show that our interventions led to significantly higher mean scores for perceived factors (emotional support, instrumental support, informational support, and appraisal support) in our 2 intervention groups than in the control group. Other forms of support (emotional, informative, and instrumental) also help overcome perceived barriers to screening.

The strengths of this study are its use of modern workshop and E-learning methods for the training intervention, that educational packages were adapted to the target group, a low dropout rate in the intervention groups, and interventions to enhance social support.

Given the effectiveness of both training methods in promoting regular breast self-examination, emphasis should, in future, be placed on using E-learning methods because this method is more cost-effective than the workshops. E-learning has some advantages over face-to-face teaching methods; these include increasing the quality of learning, easy access to a lot of information, and lowcosts. E-learning can also be done individually or in groups at a self-chosen time and place; it avoids the extra expense of bringing women to a location by coach or sending employees out to attend training programs.

However, E-learning also has a few limitations, including lack of human interaction, delayed feedback, and lack of motivation to read materials. To get over these limitations, it is possible to arrange online or offline interactive chatrooms or interactive learning experiences for people to share their experiences with each other.[45,46]

Limitations

This study has limitations. First, given that breast self-examination by the American Cancer Society is no longer recommended. However, one of the most important reasons to do regular breast self-examination is so that women know what is normal for their breasts. If women see or feel something different or unusual while performing breast self-examination, see their doctor without delay; second, the results cannot be generalized to all women working in all environments because the

information was exclusively collected from the women employed in Hamadan University of Medical Sciences; and third, the information was self-report. Therefore, it is suggested that women employed in medical universities in other provinces and the women employed in the other organizations and workplaces should be examined.

Conclusion

This study shows that both the workshops and E-learning program had similar effects. Given their cost-effectiveness and feasibility, we recommend that health care planners adopt effective educational interventions to encourage all women to perform self-examinations for breast cancer.

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Author Contributions

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