

Predictors of the Intention to Perform Preventive Behaviors Against the Occurrence of Breast Cancer

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ABSTRACT

Background: Breast cancer is the most common cancer in women. The purpose of study was to determine the predictors of the intention to perform preventive behaviors against the occurrence of breast cancer (BC) based on the protection motivation theory (PMT).

Methods: This research was a cross-sectional study that was conducted on 400 women aged 18 to 70 living in Babol city with a multi-stage sampling method. The data collection tool was a researcher-made questionnaire containing demographic information, questions on BC risk factors based on the constructs of PMT. data was entered into SPSS V20 and analyzed with chi-square, independent t-test, ANOVA, Pearson correlation-test and linear regression at a significance level of 0.05.

Results: More than of the participants were single. 66% of participants had no risk factors, 12.5% had one risk factor, 7.5% had three risk factors, and 1.5% had more than four risk factors. The strongest predictors of the intention to perform preventive behaviors against BC were perceived severity ($\beta = 0.280$), number of risk factors ($\beta = 0.206$), death of a relative due to BC ($\beta = 0.147$), and self-efficacy ($\beta = 0.141$). Among PMT constructs, perceived severity and self-efficacy constructs were the strongest predictors of preventive behaviors against BC.

Conclusion: The PMT plays an important predictive role in the intention to perform cancer prevention behaviors. In this context, it is necessary to design and implement training programs based on these constructs of this model, especially the perceived intensity, self-efficacy and response efficiency.

Keywords: Motivation-behavioral skills, intentions, preventive health care, breast cancer

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Introduction

Breast cancer (BC) is the most common cancer in women and the second cause of death from all cancers (1). Although a number of risk factors have been identified, the main causes of BC are still not fully understood. According to the World Health Organization, 2.3 million women have been diagnosed with BC, leading to 685,000 deaths worldwide (19.9 per 100,000 women per year) in 2020 alone (2). The incidence of this disease is increasing worldwide. According to the estimate of the World Cancer Observatory, the incidence of BC will increase to more than three million patients in 2046, which indicates an increase of 46% (3). Approximately one out of every eight women in the world has the risk of developing BC cancer during their lifetime (4).

According to the statistics of the Disease Management Center of the Ministry of Health, BC in Iran ranks first among all cancers in women (5) and is the third most common cancer (6). One out of every 10 to 15 Iranian women is likely to get BC (3) and every year about 7 to 9 thousand new cases of BC are detected in the country (7). The age of getting this cancer in Iran is estimated to be earlier than in developed countries (the most common age of getting this cancer is 35 to 45) (8).

Breast cancer is a non-communicable disease that various factors increase the risk of it, such as family history, white race, early menstruation, late puberty, genetic factors, age over 30 years, etc. Also, smoking, oral contraceptive pills, lack of physical activity, unhealthy lifestyle, history of ovarian and endometrial cancer also play an effective role in the occurrence of this disease (8-11). The change in lifestyle has caused breast cancer to grow in developing countries as well as in industrialized countries (12). It is clear that the increase in the incidence of breast cancer in developing countries follows the trend of increasing mortality from the disease (6). Considering that cancer cells grow slowly, diagnosis and treatment in the early stages are effective and necessary (13), and its diagnosis in the early stages prevents the progress of this disease and increases the survival rate of patients

and reduces the mortality caused by it (14, 15).

Perception of high risk has an impact on adoption of BC prevention behaviors and early detection of the disease (2, 16). If the perception of the risk of a disease increases, then taking protective measures may also increase (17). Understanding the risk of a disease will play an important role in performing preventive behaviors and adopting a healthy lifestyle.

Understanding the risk of disease or injury is a subjective assessment of risk and means a subjective judgment regarding the characteristics and severity of a risk (perceived vulnerability and severity and fear of a phenomenon or disease) and it varies from person to person (17). If people do not see themselves exposed to a disease (low perceived vulnerability) and underestimate the risk of a disease (low perceived severity), they will not pay attention to the early signs of the disease, and the perception of low risk can be an obstacle to doing preventive behaviors and changing lifestyle (18). One of the health education theories that deals with the understanding of risk and the motivation and intention of people to protect themselves against health-threatening risks is PMT.

PMT is a health promotion model that states that a degree of risk-related information can create the necessary motivation to determine the severity of risk, vulnerability and his ability to reduce this risk in people (19).

This theory has two steps; The first step is threat assessment and the second step is countermeasure assessment (20). The protection motivation theory suggests that people are motivated to protect themselves if they believe:

1. The risk is likely to occur (perceived susceptibility)
2. The consequences of the risk are severe (perceived severity)
3. The rewards of engaging in risky behavior are less than the rewards of protective behavior
4. They have the ability to effectively take protective action (self-efficacy)
5. Protective actions will be effective at reducing

the risk (response efficacy)

6. The costs of taking protective action are outweighed by the benefits

In other words, people are motivated to adopt protective behaviors if they feel the threat is real

and serious, they can effectively manage the threat, and the benefits of protection exceed the costs. This motivation to protect oneself is directly linked to the intention to engage in protective actions(21).

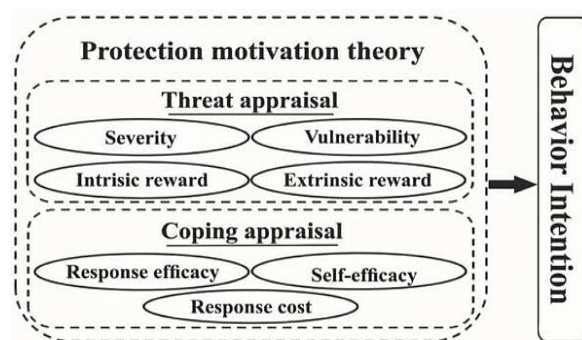


Figure 1. Protection motivation theory (adopted from source number 22).

The results of the study by Zahedi et al showed that the average risk perception of BC among the participants in the study is low (6). In a study in Nigeria, only 18% of rural women and 15% of urban women had a perceived vulnerability to BC (23). It seems that the easiest and low cost way to prevent BC is to identify behavioral risk factors and avoid known risk factors.

In this context, in health education by identifying the factors affecting women's intention to perform cancer prevention behaviors, it is possible to plan the necessary educational interventions and lifestyle modification in order to reduce the incidence, early diagnosis, timely treatment of the disease and reduce mortality. Considering that no study has been conducted in Babol city to determine the predictors of BC, this research aims to determine the predictors of the intention to perform preventive behaviors against the occurrence of BC based on the PMT in women of Babol city, Iran in 2021.

Methods

This research is a cross-sectional study. The studied population included women aged 18 to 70 living in the city of Babol (2020), who after obtaining the code of ethics and making the necessary administrative arrangements, 400 samples were included in the study by multi-stage

sampling method. Due to the fact that as many samples as possible are indicative of the desired community and can be generalized and that there was a visible difference between the residents of the geographical areas of Babol city, in order to have samples from all areas, we used a multi-stage sampling method.

In this way, randomly two health centers were selected from each part of the city (North, South, East, West and Center). In each center, the samples were selected according to the sample size and with the systematic sampling method.

After explaining the objectives of the research by the trained personnel and obtaining the consent of the participants, the midwives performed a breast examination, then anonymous questionnaires were completed by the subjects under study. The questionnaire consist of demographic questions (residence, marital status, education level, employment status, income), also included 16 questions related to BC risk factors and 33 questions related to the PMT, which were designed and adjusted by the researcher.

The PMT questionnaire includes 33 questions with dimensions of perceived severity (7 questions), perceived vulnerability (7 questions), perceived cost (4 questions), perceived rewards (3 questions), self-efficacy (4 questions), response efficiency (4 questions) Fear (3 questions) and protection

motivation were with one question. PMT questions were measured using a 5-point Likert scale from "strongly agree" to "strongly disagree" and in some questions from "not at all" to "very much". The criteria for entering the research included being 18 to 70 years old and willing to participate in the study. The criteria for leaving the research included the incompleteness of more than 10% of the participants' information. To determine the face validity, the questionnaire was given to 7 experts and their comments on the clarity, transparency and appearance of the questionnaire were examined and included in the final version.

The content validity of the questionnaire was confirmed by using the opinions of relevant specialists regarding the content validity ratio and the content validity index. The content validity index score was 0.99 and the content validity ratio was 0.92. To determine the reliability of the questionnaire, the method of calculating the Cronbach's alpha coefficient was used, and finally, the Cronbach's alpha coefficient for all constructs of the PMT was obtained above 0.79, and the reliability of the questionnaire was confirmed.

After completing the questionnaires, the data was entered into SPSS version 20 software. To describe qualitative variables, frequency and percentage distribution indices were used, and quantitative variables were described using mean and standard deviation. In order to answer the research questions, analytical statistics tests including chi-square, independent t-test, one-way analysis of variance, Pearson correlation test and linear regression test were used. P-value less than 0.05 was considered statistically significant.

Results

The present study was conducted with the aim of determining the predictors of the intention to perform preventive behaviors against the occurrence of BC based on the BC in women of Babol city, Iran in 2021.

Most of the participants lived in the city (68.7%), more than 70% were single, and most of them had freelance jobs (32.8%) and most of them had diploma level education (23.8%). Table 1 shows the demographic characteristics of the study participants.

Table 1. Demographic characteristics of study participants (n = 400)

Variables		Number	Percent
Residence	City	275	68.7
	Village	125	31.3
Marital status	Married	89	22.3
	Single	311	77.7
Occupational status	Self-employment	131	32.8
	Student	78	19.5
	Unemployed	53	13.3
	Staff	103	25.8
	Housewife	35	8.8
Literacy level	Illiterate	82	20.5
	Under diploma	94	23.5
	Diploma	95	23.8
	Bachelor	47	11.8
	Masters	40	10
Monthly income level (dollars)	Doctoral	42	10.5
	< 46	92	21.3
	47-93	110	27.5
	94-186	110	27.5
	186 <	88	22

Regarding the difference between the constructs of PMT and demographic variables, other than education level and perceived severity (p -value < 0.001), perceived vulnerability ($p = 0.019$), fear (p -value < 0.001) and protection motivation (p -value < 0.001), no statistical difference was observed between the PMT

constructs and demographic variables (in all cases $p > 0.05$),

Regarding the status of risk factors related to BC, 92% did not have regular physical activity, 58.5% were over 45 years old, 54.5% were in contact with smokers, 49.3% had used steroids, 34% had taken oral contraceptive pills, Table 2.

Table 2. Distribution of risk factors of BC among study participants constructs of PMT and demographic variables

Risk factors		Number	Percent	Risk factors		Number	Percent
Premature puberty	Yes	27	6.8	Infertility	Yes	23	5.75
	No	373	93.3		No	377	94.2
Late menopause	Yes	20	5	Get steroids	Yes	197	49.3
	No	380	95		No	203	50.8
OCP	Yes	34	5.5	History of BC	Yes	2	0.5
	No	366	91.5		No	398	99.5
HRT (Hormone Replacement Therapy)	Yes	20	5	Contact with a smoker	Yes	218	54.5
	No	380	95		No	182	45.5
No breastfeeding	Yes	98	31.5	Hookah consumption	Yes	15	3.8
	No	135	43.4		No	385	96.2
History of abortion	Yes	13	4.2	Lack of physical activity	Yes	368	92
	No	299	95.8		No	32	8
Radiation exposure	Yes	40	10	Death of close relatives due to BC	Yes	11	2.8
	No	360	90		No	389	97.2
Obesity (BMI over 30)	Yes	103	25.7	Age over 45 years	Yes	234	58.5
	No	297	74.3		No	166	41.5

Regarding the number of risk factors, 66% of the study participants had no risk factors, 12.5% had one risk factor, 12.3% had two risk factors, 7.5% had three risk factors, and 1.5% had more than four risk factors. In relation to the correlation between the risk factors of BC with the intention to perform preventive behaviors of BC, except for the number of risk factors ($r = 211$, $p = 0.000$) and the death of one of the relatives as a result of contracting BC ($r = 260$, $p = 0.000$), there was no significant correlation between any of the risk factors and the intention to perform preventive

behaviors against BC. There was a significant statistical correlation between the number of risk factors and perceived severity ($r = 125$, $p = 0.013$), perceived vulnerability ($r = 142$, $p = 0.005$), fear ($r = 151$, $p = 0.003$). Statistical correlation between the death of a relative due to BC and perceived severity ($r = 132$, $p = 0.008$), perceived vulnerability ($r = 101$, $p = 0.044$), fear ($r = 104$, $p = 0.038$,) there was There was no statistically significant correlation between any of the other risk factors and the PMT constructs ($p > 0.05$), Table 3.

Table 3. Status of PMT structures in study participants

Variables	Mean \pm SD	Range of attainable score
Perceives severity	19.40 \pm 8.09	7-35
Perceives vulnerability	27.80 \pm 4.72	7-35
Perceives costs	13.19 \pm 3.93	4-20
Perceives rewards	11.74 \pm 2.50	3-15
Fear	12.33 \pm 1.81	3-15
Self efficacy	9.47 \pm 3.05	4-20
Response efficacy	16.00 \pm 2.35	4-20
Protection motivation	2.98 \pm 1.30	1-5

In terms of the correlation between the constructs of PMT and the intention (protection motivation) to perform cancer prevention behaviors in the participants of the study, there was

a positive and significant correlation between the constructs of perceived vulnerability, fear, self-efficacy and response efficiency (in all cases $p < 0.010$), Table 4.

Table 4. Correlation between the constructs of PMT (Pearson correlation test)

Variables	Perceived severity	Perceived vulnerability	Perceived rewards	Perceived costs	Fear	Self-efficacy	Response efficacy	Protection motivation
Perceived severity	1							
Perceived vulnerability	0.156**	1						
Perceived rewards	0.009	-0.002	1					
Perceived costs	-0.057	0.055	-0.048	1				
Fear	0.250**	0.325**	0.035	-0.196**	1			
Self-efficacy	0.185**	0.021	0.062	-0.108*	0.097	1		
Response efficacy	-0.001	0.325**	-0.038	0.79	0.183**	0.048	1	
Protection motivation	0.369**	0.247**	-0.018	-0.063	0.198**	0.283**	0.141**	1

*P-value < 0.05

**P-value < 0.01

The variables of perceived severity, self-efficacy, response efficiency, number of risk factors and death of a relative due to BC predict 26.9% of the variance of protection motivation (intention) of preventive behaviors against BC. In this regard, the strongest predictors of the intention

to perform preventive behaviors against BC are the perceived severity ($\beta = 0.280$), the number of risk factors ($\beta = 0.206$), the death of a relative due to BC ($\beta = 0.147$), and self-efficacy ($\beta = 0.141$), Table 5.

Table 5. Predictors of intention to perform BC preventive behaviors (demographics, risk factors and PMT constructs)

Variable	B	SE	Beta	P	F	R ²
Constant	-1.188	0.533		0.027		
Perceived severity	0.045	0.007	0.280	0.000		
Self-efficacy	0.060	0.019	0.141	0.002	29.71	26.9
Response efficacy	0.072	0.024	0.130	0.003		
Death of relatives from BC	1.160	0.354	0.147	0.001		
Number of risk factors	0.238	0.055	0.206	0.000		

Discussion

The present study was conducted to determine the predictors of the intention to perform preventive behaviors against the occurrence of BC based on the PMT in women of Babol City, Iran in 2021. In this study, the perceived severity was the strongest predictor of the intention to perform cancer prevention behaviors. In Zhang et al.'s (2021) study, which investigated the determinants of breast cancer screening intention among urban Chinese women, perceived severity was significantly associated with BC screening intention (24).

In Helmes et al.'s (2022) study, women with increased BC concerns, who were affected by perceived risk (high perceived vulnerability and severity), were more motivated to undergo genetic testing to determine their BC risk (25).

In Osei et al.'s study in Ghana, most students did not believe they were vulnerable to BC (26).

The results of the study by Gao et al. (2023) showed that perceived severity can indirectly affect screening behavior through screening motives (27).

From the above studies, it can be concluded that the perceived severity is different in relation to subjects and geographical regions and different age groups, our study considered all preventive behaviors, Zhang's study measured the intention of BC screening in Chinese women, Helmes' study The intention to perform genetic testing to determine the risk of BC in women in Washington and the Ossie study was conducted on undergraduate students in Ghana who probably did not see themselves at risk for BC because they were young. Finally, Gao's study was conducted on the intention to perform BC screening in Chinese women. According to people's understanding of their situation and the complexity of performing preventive behavior, the perceived intensity was different in different groups in the aforementioned studies.

In the present study, self-efficacy was one of the strongest predictors of the intention to perform preventive behaviors against BC. In Zhang et al.'s (2021) study, self-efficacy was significantly associated with the intention to screen for BC (24).

The results of Hodgkins et al.'s (1998) study showed that self-efficacy is a significant independent predictor of breast self-examination behavior (28). In the study of Neuberger et al. (2011), the regression analysis results show that self-efficacy is an important predictor of the intention to perform cancer prevention behaviors (29). In Nazari et al. study (2021), perceived self-efficacy was a predictor of BC screening behaviors (breast self-examination, clinical examination or examination by a doctor/midwife, and mammography) (30).

The results of Gao et al.'s (2023) study showed that self-efficacy can indirectly affect screening behavior through screening motivations (27).

In the present study, response efficiency was one of the predictors of the intention to perform cancer prevention behaviors. In Estebarsari et al.'s (2023) study, response efficacy was the main determinant of cancer prevention behavior intention (2).

In the study of Neuberger et al. (2011), the regression analysis results show that response efficiency is an important predictor of the intention to perform preventive behaviors (29). In the study of Nazari et al. (2021), the response efficiency was predictive of BC screening behaviors (30). The results of Gao et al.'s (2023) study showed that response efficacy can indirectly affect screening behavior through screening motivations (27).

Contrary to the results of the present study and the studies described above in Estebarsari's (2023) study, fear and response cost were the main determinants of knowledge and intention to perform breast cancer preventive behaviors (2). Also, in the study of Semagn et al. (2023), among PMT constructs, response cost and protection motivation were the most important predictors of breast self-examination (31).

In the present study, the number of risk factors was one of the predictors of the intention to perform preventive behaviors against BC. In the study by Zhang (2021) et al., medical history was one of the factors affecting the intention to screen BC and indirectly had a mediating effect on PMT constructs (24).

In the present study, the death of a relative due to BC was one of the predictors of the intention to perform preventive behaviors against BC. The experience of events and the influence of those around the person can have an effect on preventive behaviors. In a study by Osei et al. in Ghana, People with no family history of BC were 90% less likely to understand their risk of developing BC than those with a family history of BC (26).

According to the contents expressed in various studies, various constructs and factors have been stated in the studies for predicting protection motivation and preventive behaviors of BC. In the present study, perceived severity, self-efficacy, and response efficiency were the most important predictors of the intention to perform preventive behaviors against BC. In Neuberger et al.'s (2011) study, self-efficacy and response efficacy were important predictors of the intention to perform preventive behaviors (29). In Bashirian's study, perceived vulnerability and perceived severity were predictors of the intention to perform breast self-examination (BSE) (32).

In Zhang's study, perceived severity, response cost, and self-efficacy were predictors of cancer screening intention (24). It seems that individual and social characteristics can play a mediating role in the protective motivation to perform preventive behaviors against BC. In the present study, the number of risk factors and the death of a relative, in Osei's study having a family history of BC (26), in Zhang's study (2021), and having a medical history were among the predictors of the intention to perform preventive behaviors against BC (24).

In various studies, the most important common predictors of intention to perform cancer prevention behaviors were perceived severity and self-efficacy. The current research had limitations such as limited time frame, non-cooperation of some participants in completing the questionnaires accurately, incomplete information of some participants, and lack of access to some participants to complete the information. Also, the restrictions related to the epidemic of COVID-19 also limited the collection of data for this research.

Conclusion

According to the research results and similar studies, BC has an important predictive role in the protection motivation (intention) to perform cancer prevention behaviors. In this context, more work should be done on the constructs of perceived severity, self-efficacy, and response efficiency, which have a more important role in this field, and educational programs should be implemented based on these constructs. In this context, the mediating role of individual and social factors in the protection motivation to perform preventive behaviors against BC should not be neglected. It is suggested to design and implement interventional studies in the field of measuring the efficiency of PMT in promoting preventive behaviors against BC, and also to use this theory in the design and implementation of educational programs in health care centers.

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Conflict of interest

The authors have no conflict of interest to declare.

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Ethical considerations

Ethical considerations were carefully addressed and implemented in the research study, including obtaining informed consent from participants, ensuring their privacy and confidentiality, and conducting the study in accordance with relevant ethical guidelines and regulations.

Code of ethics

IR.JMU.REC.1399.044

Author's contribution

All authors (R. F, A. J and S. D) had an equal contribution and were involved in all aspects of study conception and design, data collection, data analysis, interpretation, drafting of the manuscript,

and critically revising the manuscript for intellectually important content. All the authors have read and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

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