

Predicting breast cancer screening behavior based on childhood and adolescent behavioral inhibition and risk perception in women over 20 years old

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Abstract

Background

Breast cancer remains one of the most common cancers among women worldwide. Behavioral inhibition and risk perception are two psychological factors that may influence screening behaviors. However, few studies have specifically examined the combined impact of behavioral inhibition and risk perception. This study aims to address this gap by elucidating the psychological barriers to breast cancer screening.

Methods

This descriptive-analytical, cross-sectional study was conducted in 2024 among women aged 20 and older in the city of Qom. Cluster sampling was employed, resulting in a sample of 315 participants. The standardized questionnaire was used consisted of four sections: demographic information, behavioral inhibition, breast cancer risk perception, and screening behavior. The tools used demonstrated adequate validity and reliability, and the data were analyzed using SPSS software. Statistical tests, including correlation coefficients and logistic regression, were utilized to explore the relationships among the variables.

Results

The mean age of the participants was 34.98 ± 9.41 years. Pearson correlation coefficient analysis indicated a significant relationship between behavior and components of behavioral inhibition ($p < 0.001$, $r = 0.259$) and risk perception ($p = 0.033$, $r = -0.120$). Furthermore, the regression analysis revealed that both behavioral inhibition and risk perception could predict screening behavior ($p < 0.05$), with risk perception having a greater contribution to the prediction of behavior.

Conclusion

The present study indicates that behavioral inhibition acts as a barrier while risk perception serves as a facilitating factor, which can guide therapeutic and psychological interventions.

Introduction

Breast cancer remains one of the most prevalent cancers among women worldwide, with late diagnosis leading to poor treatment outcomes and low survival rates (1). Alarming, statistics indicate that every minute, four women are diagnosed with breast cancer globally, and one woman succumbs to the disease. On average, one in every twenty women will be diagnosed with breast cancer at some point in their lives (2). These figures highlight a significant global health issue with far-reaching implications for

health systems, healthcare providers, and the quality of life of patients. Early detection through regular breast cancer screening plays a crucial role in improving these outcomes (3). Mammography, ultrasound, MRI, and clinical breast examinations represent a range of screening methods whose effectiveness varies based on factors such as age, risk factors, and breast tissue density (4). When cancers are diagnosed at early stages, treatment tends to be less invasive and more likely to succeed, contributing to increased survival rates and better health outcomes. However, studies indicate that many women, especially younger women, do not engage in recommended screening behaviors (5). For instance, studies conducted in Iran have shown that only 20 percent of young women participate in screening programs (6). This gap between guidelines and actual participation raises important questions regarding barriers to engagement and how to address these issues across various cultural and healthcare contexts. Factors such as perceived sensitivity, perceived barriers, and health system-related issues (like accessibility, cost, and service availability) shape participation rates (7). Furthermore, fear, anxiety, and a lack of understanding regarding risks have been identified as significant barriers, raising critical questions about the underlying psychological factors that influence women's health choices (8, 9). Previous studies have demonstrated a positive correlation between psychosocial determinants and the intention and behavior related to screening across diverse populations (10, 11). Behavioral inhibition and risk perception are also two psychological factors that may impact participation in health-promoting behaviors such as breast cancer screening (12). Behavioral inhibition, often characterized by a tendency to withdraw from potentially threatening situations, may lead to avoidance of medical interventions (13). Functionally, behavioral inhibition has been associated with heightened anticipated anxiety and avoidant coping, which can manifest as delays or refusals to undergo screening (14). Additionally, risk perception may play a pivotal role in the likelihood of engaging in screening methods (15). Individuals who overestimate the risks associated with screening procedures or become preoccupied with false-positive results may experience heightened anxiety that prevents them from pursuing screening (16). Consequently, these constructs may shape decision-making processes and influence an individual's feelings about their health status. Despite these insights, the nuanced relationship between these psychological constructs and breast cancer screening has not been sufficiently explored (17). Furthermore, evidence suggests that early life experiences significantly shape future health behaviors (18). Research conducted by Daines CL et al. (2021) indicates that childhood and adolescent experiences significantly influence adult health behaviors (19). However, previous studies have primarily focused on adult years, with less attention given to the formative childhood and adolescent experiences that may influence health behaviors later in life (20, 21). Behavioral inhibition developed during childhood is often linked to adult anxiety. According to a study by Alex J et al. (2014), breast cancer screening, particularly mammography, can be anxiety-inducing for some women, leading to avoidance of screening methods (13, 22). While existing research has identified risk perception as a significant factor influencing breast cancer screening behaviors, few studies have specifically examined the combined effects of behavioral inhibition and risk perception on breast cancer screening (15, 17).

The findings of this study will contribute to the existing body of knowledge and provide valuable insights into effective strategies for enhancing breast cancer screening compliance among women. This study

aims to address this gap by determining and predicting breast cancer screening behavior based on childhood and adolescent behavioral inhibition and risk perception in women over the age of 20. This research seeks to clarify the psychological barriers that may hinder participation in screening programs.

Methods

The present study is a descriptive-analytical and cross-sectional research conducted in 2024 among women over 20 years old attending healthcare centers in Qom. A multi-stage cluster sampling method was employed. In the first stage, eight healthcare centers were selected randomly from the eight urban districts of Qom. Subsequently, a list of eligible women was extracted from each center, and samples were selected randomly based on the inclusion criteria.

The sample size was calculated using the formula for estimating sample size in cross-sectional studies, considering a Type I error rate of 0.05, the variance of breast cancer screening behavior according to the study by Rakhshani et al., and a precision level of 0.4. This resulted in an estimated sample size of 315 participants (23).

Inclusion criteria for the study were being over 20 years of age, providing written informed consent to participate, and the absence of a breast cancer diagnosis. Women with a history of chronic illnesses, mental disorders, or a personal or first-degree relative history of breast cancer were excluded from the study.

The data collection instrument was a standardized questionnaire that comprised four sections:

The first section of the questionnaire included demographic characteristics consisting of six questions, covering age, marital status, education, income, occupation, and access to health services.

The second part of the questionnaire assessed behavioral inhibition through 16 questions using the Behavioral Inhibition Scale developed by Goldstone and Parker (24). The aim was to measure childhood behavioral inhibition (prior to the age of 13) in adults. It employed a five-point Likert scale (No = 0, Rarely = 1, Sometimes = 2, Often = 3, Almost Always = 4). To obtain the total score of the questionnaire, the scores of all questions were summed. Higher scores on this scale indicated greater levels of childhood behavioral inhibition in the respondent, and vice versa. Internal consistency for this tool was reported at 0.90 using Cronbach's alpha in the study by Goldstone and Parker, while its reliability was 0.86 through test-retest methods. Mohammadi (2007) reported an internal consistency of 0.74 for this tool in a sample of 400 Iranian students, with a convergent validity coefficient of 0.55 when correlated with the Adult Behavioral Inhibition Scale, and a reliability of 0.71 using a two-week test-retest interval (25).

The third section encompassed 10 questions assessing risk perception employing the Breast Cancer Perception Scale developed by Thailand et al. (26). Its aim was to measure perceived social stigma, perceived fear, and perceived risk of breast cancer. Responses were rated on a five-point Likert scale from Strongly Disagree (1) to Strongly Agree (5). The total score was calculated by summing the

responses, with higher scores indicating greater risk perception on the part of the respondent. Internal consistency for this scale, as reported by Thailand et al., ranged from 0.815 to 0.950 using Cronbach's alpha. Meshayekh Amiri and colleagues (2023) reported an overall internal consistency of 0.68 for this tool in a sample of 327 Iranian women, with CVI and CVR scores determined at 0.98 and 0.95, respectively, and a reliability of 0.97 using a two-week test-retest method (27).

The final section of the questionnaire comprised three questions, utilizing the Breast Cancer Screening Behavior Scale based on the PEN-3 model by Naghibi et al. (2016) (28), whose validity and reliability were assessed and confirmed in their study. The objective was to measure performance in utilizing early detection methods for breast cancer among women. Responses were given as Yes, No, with scores of 0 and 1. Total scores were calculated by summing all question responses, with higher scores indicating better performance in breast cancer screening. The validity of the scale was established through content validity assessment in Naghibi et al.'s study. The reliability of the questionnaire was reported at 0.80 using Cronbach's alpha for the performance section of screening.

Statistical Analysis

The collected data were analyzed using SPSS software version 23. Statistical tests, including Pearson correlation and logistic regression, were used to examine relationships between variables.

Ethical Considerations

Participation in the study was voluntary. Before distributing the questionnaire, the study's purpose was explained to the target group; informed written consent was obtained from the participants, and completed questionnaires were collected anonymously while adhering to data confidentiality principles. This study was approved by the Research Ethics Committee of Qom University of Medical Sciences with the code IR.MUQ.REC.1401.210.

Results

The assessment of the study participants revealed that the average age of the participants was 34.98 years, with a standard deviation of ± 9.41 . Based on the findings presented in Table 1, the majority of the participants had a university education (40.6%) and were homemakers (57.8%).

Table 1
Demographic Characteristics of Participants

Variable	Number	Percentage
Income		
Low (less than 10 million tomans)	152	48.3
Medium (between 10 million and 20 million tomans)	137	43.5
High(more than 20 million tomans)	26	8.3
Education		
Illiterate	11	3.5
Primary	42	13.3
Secondary	52	16.5
Diploma	82	26.0
University	128	40.6
Marital Status		
Single	56	17.8
Married	236	74.9
Widowed	7	2.2
Divorced	16	5.1
Occupation		
Self-employed	32	10.2
Employee	63	20.0
Homemaker	182	57.8
Other	38	12.1
Access to Health Services		
Yes	270	85.7%
No	45	14.3%

The results of the study indicated that the mean score for behavioral variables was 31.05 ± 9.86 , while the mean score for behavioral inhibition was 30.98 ± 8.39 . Additionally, the mean score for risk perception was 30.63 ± 7.02 . Other measures of dispersion for the variables are displayed in Table 2.

Table 2
Mean Values and Standard Deviations for Behavioral Inhibition and Risk Perception

Components	Minimum	Maximum	Mean	Standard Deviation	Range
Behavioral Inhibition	7	54	30.98	8.39	0–64
Risk Perception	10	50	30.63	7.02	10–50

In examining the relationship between demographic variables, Pearson correlation coefficient analysis revealed a significant correlation between age and behavioral variables ($p < 0.001$; $r = 0.371$) and risk perception ($p < 0.001$; $r = 0.191$). However, no significant relationship was observed between age and behavioral inhibition ($p = 0.895$; $r = -0.007$). Furthermore, Pearson correlation coefficient analysis indicated a significant relationship between behavior and both behavioral inhibition ($p < 0.001$; $r = 0.259$) and risk perception ($p = 0.033$; $r = -0.120$) (Table 3).

Table 3
Correlation Coefficients and Significance Levels
between Behavior, Behavioral Inhibition, and Risk
Perception

Behavior	Behavioral Inhibition	Risk Perception
P	0.000	0.033
r	0.259 (**)	-0.120 (*)

The results from Table 4 indicate that both behavioral inhibition and risk perception were able to predict behavior ($p < 0.05$). With a confidence level of 95%, the contribution of behavioral inhibition was 11.2%, and the contribution of risk perception was 25.5%. Thus, it can be confidently stated that risk perception plays the most significant role in predicting behavior.

Table 4
Multiple Regression Analysis of Behavioral Inhibition and Risk Perception Variables

Model	Unstandardized Coefficients	Standardized Coefficients	t	Significance Level
	B	Std. Error	Beta	
Constant	0.429	0.344	1.24	0.213
Behavioral Inhibition	-0.01	0.007	-0.112	-2.05
Risk Perception	0.03	0.008	0.255	4.69

Discussion

The findings of the present study indicate a significant negative relationship between behavioral inhibition and breast cancer screening behavior. This suggests that women with higher levels of behavioral inhibition are less likely to engage in screening due to increased anxiety and worry (29). This aligns with findings from a study conducted by Almutairi et al. (2025), which showed that physical, psychological, and social factors influence the level of anxiety in women undergoing mammography screening, potentially explaining the low adherence to mammography in Saudi Arabia (30). Additionally, Verhagen et al. (2023) reported that behavioral inhibition during adolescence is associated with increased anxiety and social withdrawal in adulthood, which may explain why women avoid confronting breast cancer screening methods (13). A study by Rakhshani et al. (2018) in Iran also demonstrated that anxiety and fear of a cancer diagnosis are among the primary reasons women refrain from screening (23). However, some studies have presented fear and anxiety as dual factors, indicating that under certain conditions, they can serve as barriers, while in other situations, they may act as motivators for screening behavior (31). The lack of direct measurement of behavioral inhibition in breast cancer screening studies is evident. No study in this area has utilized specific scales designed to assess behavioral inhibition (e.g., the Adult Behavioral Inhibition Scale) (22). This represents a substantial gap, as the construct of behavioral inhibition significantly differs from related but distinct constructs such as fear and anxiety (32).

Conversely, risk perception was found to have a positive and significant relationship with breast cancer screening behavior in the current study. Additionally, regression analysis indicated that both behavioral inhibition and risk perception could predict screening behavior, with risk perception playing a greater role in this prediction. These findings are consistent with various studies. Research by Zahedi et al. (2021) in Iran demonstrated that women with a higher level of risk perception were more likely to participate in screening programs (12). Moreover, a study by Ho et al. (2025) corroborated the current findings, revealing that increasing awareness and providing individualized predictions of breast cancer risk could enhance risk perception and consequently increase participation in screening (15). Conversely, a study by De Pelsmacker et al. (2017) in Norway indicated that higher risk perception led to lower attendance and participation of women in population-based free breast cancer screening programs, which contrasts with the findings of the present study (33).

Conclusion

Overall, the results of this research indicate that behavioral inhibition can act as a hindrance, while risk perception can serve as a facilitating factor in breast cancer screening behavior. These findings underscore the importance of addressing psychological dimensions alongside educational and informational interventions in women's health promotion programs. Practically, the findings of the current study can guide educational and psychological interventions. Counseling programs aimed at reducing anxiety and fear in women with high levels of behavioral inhibition, combined with targeted training to enhance risk perception, may lead to increased participation rates in screening.

Despite this, the current study has its limitations. Firstly, due to the cross-sectional nature of the research, causal relationships cannot be inferred. Secondly, the data were collected based on self-reported questionnaires, which increases the likelihood of bias. Therefore, it is recommended that future research employ longitudinal and interventional designs to also investigate the effects of educational and psychological interventions on reducing behavioral inhibition and enhancing risk perception.

Declarations

Competing interests

Amin Arabshahi: Conceptualization, study design, literature search, and drafting of the introduction and discussion sections.

Kimiya Namazi

Data collection, article screening, and contribution to writing the Materials and Methods section.

Maryam Ahmadi

Data analysis, organization of results, and scientific editing of the manuscript.

Zabihollah Gharlipour

Overall supervision of the project, final approval of the manuscript, and responsibility for correspondence with the journal.

Ethics approval and consent to participate

This study was approved by the Research Ethics Committee of Qom University of Medical Sciences (Approval Code: IR.MUQ.REC.1401.210). Participation in the study was voluntary. Prior to data collection, the objectives of the study were explained to all participants, and written informed consent was obtained. All questionnaires were completed anonymously, and confidentiality of data was strictly maintained.

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Conflicts of interest

No item has been mentioned by the authors.

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The study was conducted as part of a research plan approved by the Research and Technology Deputy of Qom

Author Contribution

Amin Arabshahi: Conceptualization, study design, literature search, and drafting of the introduction and discussion sections. Kimiya Namazi : Data collection, article screening, and contribution to writing the Materials and Methods section. Maryam Ahmadi : Data analysis, organization of results, and scientific editing of the manuscript. Zabihollah Gharlipour: Overall supervision of the project, final approval of the manuscript, and responsibility for correspondence with the journal.

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Data Availability

All data that support the findings of this study are included in this manuscript and its supplementary information files.

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