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Comparison of breast cancer awareness and attitudes toward screenings in women with and without a family history

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Abstract

Background This study compares breast cancer awareness and attitudes toward screenings in women with and without a family history of breast cancer.

Methods This descriptive and correlational research included 1,620 women—807 with a family history and 813 without. Data were collected using a Personal Information Form, Breast Cancer Awareness Scale (B-CAS), and Attitudes Toward Cancer Screenings Scale. SPSS 27 software was used for data analysis, including chi-square test, Pearson correlation, and descriptive statistics.

Results The mean age of women with a family history was 31.22 ± 8.97 , while those without had a mean age of 27.15 ± 8.78 . Women with a family history scored higher on the B-CAS and the Attitudes Toward Cancer Screenings Scale, particularly in knowledge of risk factors, symptom awareness, screening barriers, and health behaviors ($p < 0.001$).

Conclusion Women with a family history of breast cancer have greater awareness and knowledge of risk factors than those without.

Keywords Breast neoplasms, Awareness, Attitude to health, Early detection of cancer, Risk factors

Background

Cancer in the 21st century represents a major public health problem worldwide, imposing a significant social and economic burden [1]. Since the first global estimates of the cancer burden were published in the 1980s, breast cancer has been consistently reported as the most frequently diagnosed cancer type among women [2].

Today, breast cancer remains the most common cancer among women worldwide and contributes substantially to the global cancer burden, accounting for approximately 24% of morbidity and mortality among women affected by cancer [2–6].

According to the most recent data from the International Agency for Research on Cancer (IARC) and GLOBOCAN 2022, approximately 2.0 million new cases of

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breast cancer were diagnosed worldwide in 2022. Breast cancer was ranked as the second most commonly diagnosed cancer, accounting for 11.5% of all new cancer cases, and the fourth leading cause of cancer-related deaths, representing 6.8% of total cancer mortality [1, 2, 4, 6–9].

The main risk factors for breast cancer include advanced age, high body mass index or obesity, exposure to tobacco and alcohol, physical inactivity, stress and anxiety, high-fat diet, early menarche, late first pregnancy, short breastfeeding duration, use of hormonal medications such as menopausal therapy or oral contraceptives, radiation exposure to the chest, breast density, and a family history of breast cancer [10, 11]. Additionally, the increasing life expectancy in the developing world, urbanization, and the adoption of Western lifestyles have contributed to the rising incidence of breast cancer [7]. These factors can trigger breast cancer pathogenesis either individually or collectively [11]. Genetic predisposition accounts for 5–10% of breast cancer cases, while a family history of breast cancer constitutes approximately 20–30% of these cases [12]. A family history is one of the best-known factors significantly affecting breast cancer risk, with an odds ratio of 1.71 (95% CI 1.59–1.84), meaning that the ones with a family history of the disease are about 71% more likely to develop breast cancer compared to those without such history [13]. In another study using a large patient cohort, women with a family history of breast cancer in two or more relatives were found to have a 2.5 times higher risk (95% CI 1.83–3.47) of developing the disease [14]. Another study reported that the prevalence of breast cancer in young women with a positive family history is approximately 7–13% [15]. All this data suggests that a family history of breast cancer should be considered one of the most important screening factors in breast cancer prevention [16].

Gaining knowledge about breast cancer risk factors and implementing early detection methods can effectively reduce mortality rates and improve patient prognosis [7]. Awareness of the disease (including screening methods and early signs) plays an important and effective role in developing and implementing screening programs in the community. The information acquired can significantly increase the chance of early detection of breast cancer, leading to improvements in survival rates and quality of life [4].

When breast cancer is diagnosed at an early stage, it can improve prognosis and overall outcomes, reducing mortality rates; therefore, screening programs have begun to be implemented in many countries [3, 8, 9]. Regular breast cancer screening can reduce breast cancer deaths by 60% within 10 years of diagnosis [17]. In this context, raising community awareness about breast screening methods and early warning signs of breast

cancer can aid in early diagnosis of the disease. Various screening methods are available for the early detection of breast cancer-related changes, including mammograms, self-breast examinations, and clinical breast examinations performed by trained health professionals [8]. Early detection strategies focus on facilitating timely access to cancer treatment by reducing barriers to care and/or improving access to effective diagnostic services. The goal is to increase the proportion of breast cancers detected at an early stage, thereby enabling more effective treatment and reducing the risk of mortality associated with the disease [7]. In this context, awareness is an important condition for promoting behavioral change. The risk of breast cancer can be reduced by decreasing exposure to modifiable risk factors through behavioral changes. Increased awareness of both modifiable (e.g., alcohol consumption) and non-modifiable (e.g., family history of breast cancer) risk factors can encourage positive health behaviors and the utilization of recommended preventive health services [15].

Methods

Aim

The purpose of this research is to compare breast cancer awareness and attitudes towards cancer screenings among women with and without a family history of breast cancer.

Objectives of the research

To identify factors that influence attitudes toward cancer screening programs.

To determine new targets and programs for cancer screening awareness in public health nursing.

To assess the attitudes of women with a family history of breast cancer toward screening programs for breast cancer, which has a high treatment success rates when diagnosed early.

Research questions

What are the levels of breast cancer awareness among women with and without a family history of breast cancer?

What are the attitudes toward cancer screenings among women with and without a family history of breast cancer?

Is there a relationship between breast cancer awareness and attitudes toward cancer screenings among women with and without a family history of breast cancer?

Are there significant differences in breast cancer awareness and attitudes toward cancer screenings

between women with and without a family history of breast cancer?

Research hypotheses

H0: There is no significant difference in breast cancer awareness levels between women with and without a family history of breast cancer.

H1: There is a significant difference in breast cancer awareness levels between women with and without a family history of breast cancer.

H0: There is no significant difference in attitudes toward cancer screenings between women with and without a family history of breast cancer.

H1: There is a significant difference in attitudes toward cancer screenings between women with and without a family history of breast cancer.

Type of research

The research is descriptive and correlational in nature.

Place and time of research

The research was conducted online through various digital platforms (WhatsApp, Facebook, Instagram). Data were collected via surveys distributed online from March to August 2024.

Population, sampling method, and size

The population of the research includes 21,956,491 women aged 15–49 in Turkey [18]. The sample size was determined using a formula for known populations with a 95% confidence interval and a 5% margin of error, calculated through a program [19], resulting in a sample size of 384 women. Data were collected between March and August 2024 via online platforms using a convenience sampling method. This method allows researchers to collect data from the population in the easiest, fastest, and most cost-effective manner, making it one of the most preferred methods [20]. During the data collection period, 1,710 women accessed and completed the survey. After excluding incomplete questionnaires, 1,620 women who met the inclusion criteria and provided complete responses were included in the final analysis.

Inclusion criteria

- Women aged 15–49.
- At least literate.
- Voluntarily willing to participate.
- Proficient in reading and understanding Turkish.
- Ownership of a smartphone, computer, tablet, or wireless internet access.

Exclusion criteria

- Women younger than 15 or older than 49.
- Incomplete survey responses.
- Inability to read and understand Turkish.
- Lack of a smartphone, computer, tablet, or wireless internet access.

Data collection tools

The study consists of three sections: the study questionnaire, Personal Information Form, Breast Cancer Awareness Scale (B-CAS), and Attitude Scale Towards Cancer Screenings.

Personal information form

This form was prepared by the researchers based on the literature and includes 12 questions related to the individual's age, marital status, education level, and family history of breast cancer [4, 11, 15, 22].

Breast Cancer Awareness Scale (B-CAS)

The Breast Cancer Awareness Scale (B-CAS) was previously developed and published by Altuntuğ et al. [21] and was not developed specifically for this study. The scale consists of 35 items organized into five dimensions and uses a five-point Likert-type format. The dimensions “Knowledge of Risk Factors” and “Knowledge of Signs and Symptoms” are marked as “Yes,” “I don’t know,” and “No.” Scoring assigns 2 points for “Yes,” 1 point for “I don’t know,” and 0 points for “No.” The factors related to “Attitude Towards Breast Cancer Prevention,” “Barriers to Breast Screening,” and “Health Behaviors Regarding Breast Cancer Awareness” are evaluated on a five-point Likert scale ranging from “1: Strongly Disagree” to “5: Strongly Agree.” The minimum score attainable on the scale is 18, while the maximum score is 124. A score close to 18 indicates low breast cancer awareness, while a score closer to 124 indicates high breast cancer awareness. In this study, the Breast Cancer Awareness Scale was evaluated for internal consistency using the Cronbach’s alpha coefficient. The Cronbach’s alpha values for the subdimensions of the scale were found to be as follows: $\alpha = 0.849$ for the first dimension (9 items), $\alpha = 0.916$ for the second dimension (8 items), $\alpha = 0.942$ for the third dimension (6 items), $\alpha = 0.666$ for the fourth dimension (4 items), and $\alpha = 0.721$ for the fifth dimension (8 items). The overall Cronbach’s alpha coefficient of the scale was calculated as $\alpha = 0.862$. These findings indicate that the scale demonstrates acceptable to good reliability within the current study sample.

Attitude scale towards cancer screenings

The Attitude Scale Towards Cancer Screenings was previously developed and published by Yildirim Öztürk et

al. [22] and was not developed specifically for this study. This five-point Likert-type scale consists of 24 items and one dimension. The items are answered on a scale from “5: Totally Agree” to “1: Totally Disagree.” The minimum score that can be obtained from the scale is 24, while the maximum score is 120. A score close to 24 indicates a negative attitude toward cancer screenings, while a score close to 120 indicates a positive attitude. In this study, the Cronbach’s alpha coefficient was calculated to determine the internal consistency of the Attitude Scale Towards Cancer Screening, and the coefficient was found to be $\alpha=0.910$. This value indicates that the scale has a high level of internal consistency within the study sample and is appropriate for use.

Data evaluation

Data will be analyzed using IBM SPSS Statistics for Windows, version 27.0 [23]. Descriptive statistics such as counts, percentage distributions, means, standard deviations, and chi-square (χ^2) tests will be used for data comparison. The normality of the data will be determined using the Shapiro-Wilk Test. For sample sizes larger than 30, The Kolmogorov-Smirnov test will be utilized, while the Shapiro-Wilk test will be applied for sample sizes smaller than 30. A significant result at the 5% level ($p<0.05$) will indicate that the data are not normally distributed. It is important to note that these tests may be overly stringent for large samples and may not yield valid findings in research involving Likert scales [24]. In a normally distributed dataset, skewness should be 0, and kurtosis should equal [25]. It is accepted that if the skewness and kurtosis values used in normality analyses fall within the ± 2 range, the data are considered normally distributed [23]. Independent samples t-tests will be used to compare scale means between two groups that show normal distribution, while One-Way ANOVA tests will be used for three or more groups that show normal distribution. LSD and Games-Howell tests will be utilized as post hoc tests. The relationships between factors will be analyzed using Pearson correlation analysis [26]. Correlation analysis serves to identify the directions and levels of relationships among variables [27]. This method determines whether there is a positive or negative relationship between variables and, if so, the strength of that relationship. Both Pearson and Spearman correlation analyses can be used for this determination. When interpreting the findings of correlation analysis, the levels of correlation coefficients are considered. Pearson coefficients (r) are evaluated as follows: $r=0.00$ indicates no relationship, $r=0.01-0.29$ indicates a low level of relationship, $r=0.30-0.70$ indicates a moderate level of relationship, $r=0.71-0.99$ indicates a high level of relationship, and $r=1.00$ indicates a perfect relationship [28]. Simple linear regression analysis was performed to examine the

effect of breast cancer awareness on attitudes toward cancer screening. The statistical significance level is set at $p<0.05$ [29].

Results

A total of 1,620 women participated in this study, divided into two groups: those with a family history of breast cancer ($n=807$) and those without ($n=813$). The mean age was 31.22 ± 8.97 years for participants with a family history and 27.15 ± 8.78 years for those without.

The socio-demographic profile revealed that women with a family history of breast cancer were predominantly married (53.5%) and had children (50.6%). In contrast, the group without a family history consisted mainly of single (66.3%) and childless (68.1%) individuals. While both groups were characterized by high levels of university education and medium income, a higher prevalence of chronic illness was observed in the group with a family history (50.4%) compared to the group without (17.7%) (Table 1).

Regarding health-seeking behaviors and awareness, women with a family history demonstrated higher engagement in preventive measures. Specifically, the majority of this group had received education about breast cancer (62.8%), performed regular breast self-examinations (BSE) (71.9%), and participated in screening programs. Conversely, participants without a family history reported lower rates of breast cancer education and BSE performance, indicating a potential gap in proactive health behaviors among those without perceived familial risk (Table 1).

The breast cancer awareness scale scores for women with a family history of breast cancer and those without are 74.84 ± 14.06 and 71.81 ± 15.6 , respectively; scores for the knowledge of risk factors subscale are 12.56 ± 3.64 and 10.05 ± 4.74 ; scores for the knowledge of symptoms and findings subscale are 12.64 ± 3.37 and 11.34 ± 5.30 ; scores for the attitudes toward breast cancer prevention subscale are 19.33 ± 7.74 and 19.36 ± 7.83 ; scores for the barriers to breast screening subscale are 8.74 ± 3.34 and 8.29 ± 3.65 ; and scores for the health behavior subscale related to breast cancer awareness are 21.58 ± 5.34 and 22.77 ± 6.23 . The scores from the attitudes toward cancer screening scale are 86.72 ± 17.47 and 84.79 ± 19.88 .

It has been found that women with a family history of breast cancer have higher scores in the breast cancer awareness scale, knowledge of risk factors, knowledge of symptoms and findings, barriers to breast screening, health behavior related to breast cancer awareness, and attitudes toward cancer screening than women without a family history, and this difference is statistically significant ($p<0.001$). However, the attitudes toward breast cancer prevention subscale of the breast cancer awareness scale did not show a statistically significant

Table 1 Comparison of Descriptive Characteristics of Women With and Without a Family History of Breast Cancer ($N = 1620$)

Variables	Categories	Women With a Family History of Breast Cancer ($n = 807$)	Women Without a Family History of Breast Cancer ($n = 813$)
		$\bar{x} \pm SD$	$\bar{x} \pm SD$
Age		31.22 ± 8.97	27.15 ± 8.78
		n (%)	n (%)
Marital Status	Married	432 (53.5)	274 (33.7)
	Single	375 (46.5)	539 (66.3)
Childbearing Status	Yes	408 (50.6)	259 (31.9)
	No	399 (49.4)	554 (68.1)
Educational Level	Literate	66 (8.2)	22 (2.7)
	Primary Education	111 (13.8)	64 (7.9)
	High School	177 (21.9)	196 (24.1)
Occupation	University	453 (56.1)	531 (65.3)
	Unemployed	240 (29.7)	202 (24.8)
	Worker	211 (26.1)	153 (18.8)
	Civil Servant	188 (23.3)	195 (24.0)
	Retired	3 (0.4)	263 (32.3)
Place of Residence	Student	165 (20.4)	202 (24.8)
	City	353 (43.7)	489 (60.1)
	District	319 (39.5)	274 (33.7)
Income Level	Village	135 (16.7)	50 (6.2)
	Low	248 (30.7)	119 (14.6)
	Medium	464 (57.5)	639 (78.6)
Chronic Illness	High	95 (11.8)	55 (6.8)
	Yes	407 (50.4)	144 (17.7)
BSE Practice	No	400 (49.6)	669 (82.3)
	Yes	580 (71.9)	388 (47.7)
Breast Cancer Education	No	227 (28.1)	425 (52.3)
	Yes	507 (62.8)	283 (34.8)
Breast Cancer Screening (Clinical Breast Exam, Mammography)	No	300 (37.2)	530 (65.2)
	Yes	423 (52.4)	155 (19.1)
	No	270 (47.6)	658 (80.9)

difference between women with and without a family history ($p > 0.005$).

The average scores on the Breast Cancer Awareness Scale significantly differ based on women's place of residence, income status, and self-examination practices ($p < 0.05$) (Table 2). Those living in districts have higher average scores than those living in cities, individuals with low income have higher scores than those with medium and high income, and those who perform self-breast examinations (SBE) have higher scores than those who do not.

The average scores of the attitudes toward cancer screening scale significantly differ based on women's parental status, education level, occupation, presence of

chronic diseases, whether they have received education about breast cancer, and whether they undergo cancer screenings (clinical breast examination, mammography) ($p < 0.05$) (Table 2). Women with children have higher scores than those without, literate individuals score higher than high school and university graduates, literate individuals and elementary school graduates have higher scores than university graduates, unemployed participants score higher than students, and non-working individuals have higher scores than civil servants and students. Additionally, those with chronic diseases have higher scores than those without, those who have received education about breast cancer have higher scores than those who have not, and individuals who undergo cancer screenings (clinical breast examination, mammography) have higher scores than those who do not.

A moderate negative correlation was found between women's breast cancer awareness scale and their attitudes toward cancer screenings ($r = -0.430$; $p < 0.001$). A low negative correlation was detected between the breast cancer awareness scale subdimension of knowledge of symptoms and findings and the attitudes toward cancer screenings scale ($r = -0.120$; $p < 0.001$). A moderate negative correlation was also found between the breast cancer awareness scale subdimension of attitudes toward breast cancer prevention and the attitudes toward cancer screenings scale ($r = -0.413$; $p < 0.001$). A low positive correlation was identified between women's ages and the breast cancer awareness scale ($r = 0.082$; $p < 0.001$). Additionally, a low positive correlation was found between women's ages and the breast cancer awareness scale subdimensions of knowledge of risk factors ($r = 0.124$; $p < 0.001$), knowledge of symptoms and findings ($r = 0.113$; $p < 0.001$), and barriers to breast screening ($r = 0.113$; $p < 0.001$) (Table 3).

A simple linear regression model was employed to determine the effect of participants' breast cancer awareness on their attitudes toward cancer screening. The statistical estimates related to the model were found to be significant and acceptable (Table 4; $p < 0.001$). The results indicated that participants' breast cancer awareness explained 18.5% of the variance in their attitudes toward cancer screening [$F(1, 1619) = 366.590$, $R^2 = 0.185$].

Discussion

Breast cancer is one of the most commonly diagnosed cancers among women worldwide and remains a leading cause of cancer-related mortality [30]. Reducing risk factors, increasing awareness, and promoting widespread participation in cancer screenings are essential for breast cancer prevention [31]. It is well-known that genetic predisposition plays a major role in breast cancer [32]. Our findings align with previous research indicating that

Table 2 Comparison of Women's Descriptive Characteristics with Breast Cancer Awareness Scale and Attitude Towards Cancer Screenings Scale (N = 1620)

Variables	Categories	n	Breast Cancer Awareness Scale	Attitude Towards Cancer Screenings Scale
			$\bar{x} \pm SD$	$\bar{x} \pm SD$
Childbearing Status	Yes	667	73.63 $\pm$ 15.064	87.15 $\pm$ 18.755
	No	953	73.10 $\pm$ 14.847	84.76 $\pm$ 18.685
	Test*/Significance		t=0.697 p=0.486	t=2.529 p=0.012
Educational Level	Literate (a)	88	72.61 $\pm$ 16.52	91.66 $\pm$ 18.12
	Primary Education (b)	175	72.49 $\pm$ 14.54	89.78 $\pm$ 20.32
	High School (c)	373	74.70 $\pm$ 14.01	83.28 $\pm$ 18.48
	University (d)	984	73.01 $\pm$ 15.18	85.44 $\pm$ 18.40
	Test**/Significance		F=1.457 p=0.224	F=7.959 p<0.001 a> c.d a.b> d
Occupation	Unemployed (a)	442	73.45 $\pm$ 14.68	87.62 $\pm$ 18.74
	Worker (b)	364	72.17 $\pm$ 15.66	86.86 $\pm$ 18.81
	Civil Servant (c)	383	74.43 $\pm$ 15.26	84.32 $\pm$ 19.29
	Retired (d)	3	75.00 $\pm$ 21.00	75.00 $\pm$ 5.19
	Student (e)	428	73.15 $\pm$ 14.19	84.23 $\pm$ 18.03
	Test***Significance		F=1.101 p=0.354	F=2.931 p=0.020 a.b> e a> c.e
Place of Residence	City (a)	842	72.37 $\pm$ 15.51	85.44 $\pm$ 19.35
	District (b)	593	74.45 $\pm$ 14.40	85.37 $\pm$ 18.24
	Village (c)	185	74.02 $\pm$ 13.64	88.37 $\pm$ 17.33
	Test**/Significance		F=3.635 p=0.027 b> a	F=2.052 p=0.129
Income Level	Low (a)	367	75.30 $\pm$ 14.09	85.39 $\pm$ 16.92
	Medium (b)	1103	72.93 $\pm$ 15.23	85.42 $\pm$ 19.49
	High (c)	150	71.38 $\pm$ 14.25	89.03 $\pm$ 17.05
	Test**/Significance		F=4.898 p=0.008 a> b.c	F=2.533 p=0.080
Chronic Illness	Yes	551	73.78 $\pm$ 15.750	87.07 $\pm$ 19.258
	No	1069	73.08 $\pm$ 14.497	85.07 $\pm$ 18.447
	Test*/Significance		t=0.890 p=0.374	t=2.043 p=0.041
BSE Practice	Yes	968	74.21 $\pm$ 14.79	85.75 $\pm$ 18.40
	No	652	72.00 $\pm$ 15.06	85.75 $\pm$ 19.24
	Test*/Significance		t=2.921 p=0.004	t=0.00 p=1.000
Breast Cancer Education	Yes	790	73.76 $\pm$ 15.25	86.84 $\pm$ 18.97
	No	830	72.91 $\pm$ 14.61	84.71 $\pm$ 18.47
	Test*/Significance		t=1.145 p=0.252	t=2.279 p=0.023
Breast Cancer Screening (Clinical Breast Exam, Mammography)	Yes	578	73.58 $\pm$ 15.95	87.48 $\pm$ 19.12
	No	1042	73.17 $\pm$ 14.34	84.79 $\pm$ 18.47
	Test*/Significance		t=0.527 p=0.598	t=2.776 p=0.006

*Independent t-test was used. **Games-Howell test was used. ***LSD test was used. The parts highlighted in bold indicate which group the statistically significant difference originates from

women with a family history of breast cancer have higher awareness of the disease compared to those without such a history [30, 33]. The experience of witnessing the onset of the disease within the family enhances individuals' perception of the disease and its associated risk factors, contributing to early diagnosis [33]. Our research shows that women with a family history of breast cancer possess greater knowledge of risk factors. The presence of the disease in the family increases risk perception and positively impacts breast lump awareness [33, 34]. A study conducted among university students found that participants

had poor knowledge, with family and personal history being the most recognized risk factors [35]. Women with a family history of breast cancer are also more familiar with the symptoms of the disease. However, among the at-risk group, nipple discharge remains the least recognized symptom [33, 36].

There is no significant difference in preventive attitudes between women with and without a family history of breast cancer, a finding often attributed to sociodemographic factors [35, 37, 38]. However, women with a family history of breast cancer scored significantly higher

Table 3 Evaluation of the Relationship Between Women's Breast Cancer Awareness Scale, Sub-dimensions, Attitude Scale Scores Towards Cancer Screening, and Their Ages ($N = 1620$)

		1	1-A	1-B	1-C	1-D	1-E	2	Yaş
1- Breast Cancer Awareness Scale	<i>r</i>	1	0.499**	0.596**	0.747**	0.317**	0.537**	-0.430**	0.082**
	<i>p</i>		0.000	0.000	0.000	0.000	0.000	0.000	0.001
1-A Knowledge of Risk Factors	<i>r</i>		1	0.645**	0.152**	-0.055*	-0.146**	-0.019	0.124**
	<i>p</i>			0.000	0.000	0.028	0.000	0.444	0.000
1-B Knowledge of Signs and Symptoms	<i>r</i>			1	0.215**	-0.021	-0.008	-0.120**	0.113**
	<i>p</i>				0.000	0.409	0.751	0.000	0.000
1-C Attitude Towards Breast Cancer Prevention	<i>r</i>				1	0.041	0.272**	-0.413**	-0.027
	<i>p</i>					0.101	0.000	0.000	0.274
1-D Barriers to Breast Screening	<i>r</i>					1	0.211**	-0.044	0.113**
	<i>p</i>						0.000	0.077	0.000
1-E Health Behavior Related to Breast Cancer Awareness	<i>r</i>						1	-0.415**	-0.003
	<i>p</i>							0.000	0.918
2- Attitude Scale Towards Cancer Screening	<i>r</i>							1	0.035
	<i>p</i>								0.159
Age	<i>r</i>		0.082**	0.124**	0.113**	-0.027	0.113**	-0.003	0.035
	<i>p</i>		0.001	0.000	0.000	0.274	0.000	0.918	0.159

*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed). The parts highlighted in bold indicate statistical significance

Table 4 The Effect of Participants' Breast Cancer Awareness on Their Attitudes Toward Cancer Screening

Dependent Variable ATCS Total	B	SE	Beta	t	<i>p</i>	95.0% Confidence Interval for B	
						Lower Bound	Upper Bound
(Constant)	125.302	2.108		59.435	<0.001	121.167	129.438
BCAS Total	-0.539	0.028	-0.430	-19.147	<0.001	-0.595	-0.484

$F(1, 1619) = 366.590$; $R = 0.430$; $R^2 = 0.185$; Adjusted $R^2 = 0.184$; Durbin Watson = 1.600; $p < 0.001$. The parts highlighted in bold indicate statistical significance

on the barriers to breast screening subdimension. These women reported barriers such as waiting for symptoms to resolve naturally, challenges in scheduling medical appointments, and fear of a cancer diagnosis [36, 38]. Despite these obstacles, family history positively influenced their attitudes toward screenings.

The high health behavior scores among women with a family history of breast cancer suggest that they have gained awareness and that their health behaviors are positively affected. These individuals are more knowledgeable about risk factors and tend to seek medical services earlier as a result [33, 37]. Furthermore, it has been noted that witnessing close friends experience the disease also increases their awareness [39, 40]. Consistent with the literature, women with a family history of breast cancer participate more frequently in health screenings [38]. However, it has been reported that women with a family history of breast cancer in third-degree relatives are not significantly influenced in their screening participation [40, 41]. Interestingly, awareness levels of breast cancer among individuals living in districts were found to be higher compared to those living in cities. Although awareness is generally considered higher in larger urban areas [37, 41], some studies have found no

such correlation among city dwellers [39]. In this study, it is suggested that the awareness of district residents may be influenced by individual and social characteristics. Individuals with lower income levels have been found to have higher awareness of breast cancer compared to those with medium and high income levels. However, the literature generally indicates that individuals with higher income levels exhibit better disease awareness [42, 43]. A study conducted in Europe reported that low economic status negatively affects awareness among women and reduces participation rates in screenings [44]. This study suggests that breast cancer awareness may also be influenced by other individual and social factors beyond income level.

Women who perform clinical breast self-exams (CBSE) show higher awareness compared to those who do not engage in such screenings. However, the literature indicates that despite awareness of CBSE, many women participate in screenings irregularly, which leads to lower overall awareness [45]. Low awareness is known to negatively affect symptom observation behaviors, leading to diagnoses at later stages of the disease [33]. Our study confirms that the awareness of women regarding CBSE aligns with their participation in these screenings.

Women with children have been found to exhibit more positive attitudes towards cancer screenings compared to those without children. This result is supported by Tamin [40], who reported that women with children demonstrate higher breast cancer awareness and greater participation in screening programs. It can be inferred that motherhood fosters a sense of responsibility and encourage women to prioritize their health.

Women with lower levels of formal education have scored higher on attitude scales towards cancer screenings compared to those who have completed secondary or higher education. It has been established that lower awareness of disease and participation in screenings among women with lower education levels is an expected finding in the literature [43, 46]. Women with higher education levels tend to recognize symptoms better and have improved skills in seeking medical help [46]. Similarly, Tamin [40] noted that individuals with lower education levels have higher participation in screenings. Additionally, age has been identified as an important factor influencing women's attitudes towards screenings [38]. In our study, the negative relationship between education and attitudes towards screenings may be related to the larger proportion of older women in the sample, many of whom are illiterate or have only completed primary education.

Participants who were unemployed or not working showed more favorable attitudes toward cancer screenings compared to students, and those not employed had better attitudes than students and civil servants. Conversely, Mohan and Thulaseedharan [41] reported that working women undergo more screenings than housewives. Factors negatively affecting women's participation in screenings include lack of sufficient time, inadequate information about screening centers, being under 40 years old, and fear of breast cancer [35, 37, 38]. In our study, it is speculated that attitudes toward cancer screening may be influenced by these factors.

Women with chronic illnesses scored higher on the cancer screening attitude scale compared to those without. Some studies indicate that women consider their past illnesses significant and risky, leading to higher participation rates in clinical breast self-exams, mammograms, and screening programs [35, 38]. The fear of contracting a new disease may make individuals more responsive to screenings.

Women who received education about breast cancer showed more positive attitudes towards cancer screenings compared to those who did not. Awareness of cancer is largely dependent on knowledge about the disease [40, 47]. As observed in this study, familiarity with the symptoms and signs of the disease positively influences participation in screenings [34].

Individuals who underwent breast cancer screenings (clinical breast exams, mammograms) scored higher on

the cancer screening attitude scale than those who did not. Determinants of attitudes towards cancer screenings include proximity to screening centers, family history of breast cancer, and age [48]. Our study found that individuals with a family history of breast cancer were more numerous and older than those without such a history. Additionally, it was determined that many reside in urban areas where access to screening centers is relatively easy.

A medium-level negative correlation was found between the Breast Cancer Awareness Scale and the cancer screening attitude scale. Özçelik and Seçginli [38] noted that women with high levels of fear regarding breast cancer participated less in screenings. Furthermore, the absence of any symptoms has also been reported as a barrier to participation in screenings [37]. It is considered that the results of our study may have been influenced by these factors.

A low-level negative correlation was found between the knowledge of symptoms and findings subscale of the Breast Cancer Awareness Scale and the attitude scale toward cancer screenings. Although women may possess knowledge about cancer symptoms, studies indicate a low rate of participation in screenings [39, 48]. This is believed to be influenced by factors such as education, age, having symptoms, and knowledge about screening centers.

A moderate-level negative correlation was found between the attitude toward cancer prevention subscale of the Breast Cancer Awareness Scale and the attitude scale toward cancer screenings. Lifestyle changes, such as weight loss, increased physical activity, reduced alcohol consumption, and quitting smoking, are crucial for breast cancer prevention [33, 42]. Despite women's awareness of these risk factors, participation in screenings remains low [34, 49]. Barriers to screenings include being under 40 years old, living in rural areas, distance from screening centers, and fear of tumor discovery [37, 38]. In our study, it is speculated that awareness and attitudes towards breast cancer prevention may be influenced by these factors.

A low-level positive correlation was found between women's ages and the Breast Cancer Awareness Scale. Literature suggests that awareness is generally higher among women over 40 years old [37, 40, 41]. It is known that married women and those with children face an increased risk of gender-related diseases with age. Additionally, it appears that women's awareness also positively increases with age.

In this study, it was determined that participants' levels of breast cancer awareness had a significant effect on their attitudes toward cancer screening, explaining 18.5% of the variance in screening attitudes. Recent studies similarly indicate that breast cancer awareness plays a critical role in screening behaviors and attitudes, and

that increased awareness is associated with higher participation in screening programs [1, 2, 39, 49]. Based on these findings, the development of educational and counseling programs aimed at increasing awareness—particularly among women without a family history—may improve screening attitudes and promote early detection behaviors.

A low-level positive correlation was identified between women's ages and the subscales of knowledge about risk factors, knowledge of symptoms and findings, and barriers to breast screening on the Breast Cancer Awareness Scale. Rahman et al. noted in their study involving younger women that despite being aware of the symptoms and findings of the disease, they did not engage in clinical breast self-exams (CBSE), which are crucial for early detection. Research indicates that women over 40 years old have higher participation rates in screenings [33, 36, 38]. Our study supports the literature, suggesting that women who are knowledgeable about risk factors and symptoms demonstrate a more positive attitude toward screenings.

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Use of Artificial Intelligence

Artificial intelligence (AI) tools were not used in the creation, writing, or editing of this manuscript.

Authors' contributions

All authors contributed to the study conception, design, data collection, analysis, and manuscript preparation. All authors read and approved the final manuscript.

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Data availability

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

The study was approved by the İstanbul Okan University Ethics Committee for Non-Interventional Research in Science, Social, and Health Sciences. All procedures involving human participants were conducted in accordance with the ethical standards of the institutional research committee and with the Declaration of Helsinki and its later amendments. Permission was obtained from the developers of the measurement tools used in this research. Informed consent was obtained from all individuals who participated in the study. No participants under the age of 15 were included in this study; therefore, parental or legal guardian consent was not required.

Consent for publication

Not applicable.

Competing interests

The author declares that there are no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References

1. Bray F, Laversanne M, Sung H, Ferlay J, Siegel RL, Soerjomataram I, et al. Global Cancer Statistics 2022: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA Cancer J Clin*. 2024;74(3):229–63.
2. Kim J, Harper A, McCormack V, Sung H, Houssami N, Morgan E, et al. Global Patterns and Trends in Breast Cancer Incidence and Mortality Across 185 Countries. *Nat Med*. 2025;31(4):1154–62.
3. Elhawary NA, Ekram SN, Sembawa HA, Tashkandi E, Bannani S, Azher ZA, et al. Descriptive Epidemiology of Female Breast Cancer Around the World: Incidence, Mortality, and Sociodemographic Risks and Disparities. *Int J Environ Health Res*. 2025;35(12):3648–62.
4. Cao W, Qin K, Li F, Chen W. Socioeconomic Inequalities in Cancer Incidence and Mortality: An Analysis of GLOBOCAN 2022. *Chin Med J (Engl)*. 2024;137(12):1407–13.
5. Harbeck N, Brufsky A, Rose CG, Korytowsky B, Chen C, Tantakoun K, et al. Real-world Effectiveness of CDK4/6i in First-Line Treatment of HR+/HER2– Advanced/Metastatic Breast Cancer: Updated Systematic Review. *Front Oncol*. 2025;15:1530391.
6. Vasconcellos JM, Bonadio RC, Mendes SV, Orsi BZ, Leis LV, Messias AP, et al. Does Undertreatment With Chemotherapy Impact The Outcomes Of Elderly Patients With Early-Stage Breast Cancer? A Real-World Data Analysis. *Clin Breast Cancer*. 2025;25(5):472–80.
7. Omar A, Bakr A, Ibrahim N. Female Medical Students' Awareness, Attitudes, And Knowledge About Early Detection Of Breast Cancer in Syrian Private University, Syria. *Heliyon*. 2020;6(4):e03793.
8. Ullah Z, Khan MN, Din ZU, Afaq S. Breast cancer awareness and associated factors amongst women in Peshawar, Pakistan: a cross-sectional study. *Breast Cancer (Auckl)*. 2021;15:11782234211025346.
9. Freeman K, Geppert J, Stinton C, Toddill D, Johnson S, Clarke A, et al. Use of artificial intelligence for image analysis in breast cancer screening programmes: systematic review of test accuracy. *BMJ*. 2021;374:n1872.
10. Lei S, Zheng R, Zhang S, Wang S, Chen R, Sun K, et al. Global Patterns of Breast Cancer Incidence and Mortality: A Population-Based Cancer Registry Data Analysis From 2000 To 2020. *Cancer Commun (Lond)*. 2021;41(11):1183–94.
11. Alsareii SA, Alqahtani SM, Alamri AM, Al-Wadei HH, Al-Ammari SA, Al-Qahtani AM, et al. Awareness of Breast Cancer Among Female Students and Faculty From Najran University, Najran, Saudi Arabia. *Asian Pac J Cancer Prev*. 2020;21(5):1415–22.
12. Choi HG, Park JH, Choi YJ, Suh YJ. Association of Family History with the Development of Breast Cancer: A Cohort Study of 129,374 Women in KoGES Data. *Int J Environ Res Public Health*. 2021;18(12):6409.13.
13. Engmann NJ, Golmakani MK, Miglioretti DL, Sprague BL, Kerlikowske K. Population-Attributable Risk Proportion of Clinical Risk Factors for Breast Cancer. *JAMA Oncol*. 2017;3(9):1228–36.
14. Brewer HR, Jones ME, Schoemaker MJ, Ashworth A, Swerdlow AJ. Family History and Risk of Breast Cancer: An Analysis Accounting for Family Structure. *Breast Cancer Res Treat*. 2017;165(1):193–200.
15. Khushalani JS, Qin J, Ekwueme DU, White A. Awareness of Breast Cancer Risk Related to a Positive Family History and Alcohol Consumption Among Women Aged 15–44 Years in the United States. *Prev Med Rep*. 2020;17:101029.
16. Liu L, Hao X, Song Z, Zhi X, Zhang S, Zhang J. Correlation Between Family History and Characteristics of Breast Cancer. *Sci Rep*. 2021;11(1):6360. <http://data.tuik.gov.tr/Bulten/Index?p=Adrese-Dayali-Nufus-Kayit->
17. Tsai HY, Chang YL, Shen CT, Chung WS, Tsai HJ, Chen FM. Effects of the COVID-19 Pandemic on Breast Cancer Screening in Taiwan. *Breast*. 2020;54:52–5. <https://www.openepi.com/SampleSize/SSPropor.htm>.
18. Türkiye İstatistik Kurumu (TÜİK). Adrese Dayalı Nüfus Kayıt Sistemi Sonuçları, 2020 [Internet]. Ankara: TÜİK; 2020 [Erişim 2024]. Erişim adresi: <https://data.tuik.gov.tr/Bulten/Index?p=Adrese-Dayali-Nufus-Kayit-Sistem-i-Sonuc-lari-2020-37210>.
19. OpenEpi. Sample Size Calculation. 2023. [cited 2024 Jan 25]. Available from: <https://www.openepi.com/SampleSize/SSPropor.htm>.
20. Yağar F, Dökme S. Niteliksel Araştırmaların Planlanması: Araştırma Soruları, Örneklem Seçimi, Geçerlilik ve Güvenirlilik. *Gazi Sağlık Bilimleri Dergisi*. 2018;3(3):1–9.

21. Altuntuğ K, Koçak V, Ege E. The Evaluation of the Validity and Reliability of the Breast Cancer Awareness Scale (for Turkish Women). *Türk Onkoloji Dergisi*. 2021;36(2):154–64.
22. Yıldırım Öztürk EN, Uyar M, Şahin TK. Development of an Attitude Scale for Cancer Screening. *Turk J Oncol*. 2020;35(4):394–404.
23. George D, Mallery P. IBM SPSS Statistics 26 Step by Step: A Simple Guide and Reference. 16th ed. New York: Routledge; 2020.
24. Gürbüz S, Şahin F. Sosyal Bilimlerde Araştırma Yöntemleri: Felsefe, Yöntem, Analiz. 5. Baskı. Ankara: Seçkin Yayıncılık; 2018.
25. Çil Yavuz N. Finansal Ekonometri. İstanbul: Der Yayınları; 2014.
26. Heavey E. Statistics for Nursing: A Practical Approach. 4th ed. Burlington: Jones & Bartlett Learning; 2022.
27. Shiekh RHA, El-Hashash EF. A Comparison of the Pearson, Spearman Rank, and Kendall Tau Correlation Coefficients Using Quantitative Variables. *Asian J Probab Stat*. 2022;19(4):36–48.
28. Köklü N, Büyükoztürk Ş, Çokluk Bökeoğlu Ö. Sosyal Bilimler İçin İstatistik. Ankara: Pegem Yayınları; 2006.
29. Özdamar K. Modern Bilimsel Araştırma Yöntemleri. Eskişehir: Kaan Kitabevi; 2003.
30. Wang YJ, Wang F, Yu LX, Xiang YJ, Zhou F, Huang SY, et al. Worldwide Review with Meta-Analysis of Women's Awareness About Breast Cancer. *Patient Educ Couns*. 2022;105(7):1818–27.
31. Michaels E, Worthington RO, Rusiecki J. Breast, Cancer. Risk Assessment, Screening, and Primary Prevention. *Med Clin North Am*. 2023;107(2):271–84.
32. Walker-Smith TL, Peck J. Meme Kanseri Tani ve Tedavisinde Genetik ve Genomik Gelişmeler. *Kadın Sağlığı İçin Hemşirelik*. 2019;23(6):518–25.
33. Eroğlu N, Özkan İ. Meme Kanseri Hastalarının Ailesel Öykü Varlığı ile Kanseri Tanısı Alma Evresi Arasındaki İlişki. *Sürekli Tıp Eğitimi Dergisi*. 2021;30(3):152–9.
34. Irfan R, Memon H, Umrani IN, Soomro H. Breast Cancer Awareness Among Pharmacy and Physiotherapy Students of Medical University Nawabshah. *JPMAS*. 2021;71(1B):297–301.
35. Rahman SA, Al-Marzouki A, Otim M, Khalil Khayat NEH, Yousuf R, Rahman P. Awareness About Breast Cancer and Breast Self-Examination Among Female Students at the University of Sharjah: A Cross-Sectional Study. *Asian Pac J Cancer Prev*. 2019;20(6):1901–8.
36. Green SMC, Lloyd KE, Smith SG, Investigators ENGAGE. Awareness of Symptoms, Anticipated Barriers, and Delays to Help-Seeking Among Women at Higher Risk of Breast Cancer: A UK Multicentre Study. *Prev Med Rep*. 2023;34:102220.
37. Alkarak S, Badheeb AM, Al-Dowais A, Alhabes H, Almahwiti K, Aman AA, et al. Factors Affecting Breast Cancer Screening Behavior Among Women in Saudi Arabia: A Retrospective Cross-Sectional Study. *Cureus*. 2024;16(4):e58324.
38. Özçelik EK, Seçginli S. Ailesinde Meme Kanseri Öyküsü Olan Kadınlarda Meme Kanseri Tarama Davranışları. *Sürekli Tıp Eğitimi Dergisi*. 2022;31(3):183–92.
39. Rafat Munir Lawis M, Sabir M. Breast Cancer Awareness Among Sudanese Females in Omdurman City: 2021. *BMC Public Health*. 2023;23(1):1907.
40. Tamin F. Edirne İl Merkezinde 20–40 Yaş Arası Kadınların Meme Kanseri Risk ve Farkındalıklarının Değerlendirilmesi [Uzmanlık Tezi]. Edirne: Trakya Üniversitesi Tıp Fakültesi; 2021.
41. Altinel B, Akin B. Kırk ile Elli Beş Yaş Arası Kadınların Serviks Kanseri Risk Faktörlerine Göre Serviks Kanseri Taraması Yaptırma Durumları. *Anadolu Hemşirelik ve Sağlık Bilimleri Dergisi*. 2020;23(1):54–60.
42. Biswas S, Syiemlieh J, Nongrum R, Sharma S, Siddiqi M. Impact of Educational Level and Family Income on Breast Cancer Awareness Among College-Going Girls in Shillong (Meghalaya), India. *Asian Pac J Cancer Prev*. 2020;21(12):3639–46.
43. Mohan R, Thulaseedharan JV. Awareness of Risk Factors, Symptoms, and Screening of Breast Cancer: A Cross-Sectional Survey Among 35–65-Year-Old Women in Alappuzha District, Kerala, India. *J Family Med Prim Care*. 2023;12(10):2401–7.
44. Zamorano-Leon JJ, López-de-Andres A, Álvarez-González A, Astasio-Arbiza P, López-Farré AJ, de- Miguel-Diez J, et al. İspanya'da Yaşayan Kadınlar Arasında Meme Kanseri Taramasına Bağlılıkta 2011'den 2017'ye Azalma ve Rahim Ağzı Kanseri Taramasına Katılımda İyileşme Olmaması. *Maturitas*. 2020;135:27–33.
45. Saçikara Z, Koçoğlu-Tanyer D. Kırşal Bölgede Yaşayan Kadınların Serviks ve Meme Kanseri Taramalarına Katılım ve Bilgi Durumları. *Sürekli Tıp Eğitimi Dergisi*. 2021;30(1):43–52.
46. Marcu A, Black G, Vedsted P, Lyrtzopoulos G, Whitaker KL. Educational Differences in Responses to Breast Cancer Symptoms: A Qualitative Comparative Study. *Br J Health Psychol*. 2017;22(1):26–41.
47. Ceyhan B, Atakir K, Özevci G. Türkiye'deki Kadınların Meme Kanseri Tarama Yöntemlerine Yönelik Farkındalıklarının İncelenmesi. *Dünya Sağlık ve Tıp Bilimleri Dergisi*. 2022;5(2):123–33.
48. Khan M, Chollet A. Breast Cancer Screening: Common Questions and Answers. *Am Fam Physician*. 2021;103(1):33–41.
49. Hamed E, Alemrayat B, Syed MA, Daher-Nashif S, Rasheed HMA, Kane T. Breast Cancer Knowledge, Attitudes, and Practices Amongst Women in Qatar. *Int J Environ Res Public Health*. 2022;19(7):3995.

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