Underestimation of Breast Cancer Risk: Influence on Screening Behavior

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Purpose/Objectives: To describe perceived breast cancer risk, identify the percentage of women with inaccurate risk perceptions, and examine the influence of perceived and objective risk on screening behavior.

Design: Descriptive, correlational, cross-sectional.

Setting: Community settings in a metropolitan area on the western coast of the United States.

Sample: Multicultural sample of 184 English-speaking women (57% non-Caucasian, $\bar{X}$ age = 47 ± 12 years) who have never been diagnosed with cancer.

Methods: Two perceived risk scales (verbal and comparative) and the Gail model were used to assess perceived and objective breast cancer risk, respectively.

Main Research Variables: Perceived breast cancer risk, objective breast cancer risk, screening behavior.

Findings: Participants reported that they "probably will not" get breast cancer and that their risk was "somewhat lower" than average. Family history of breast cancer was a significant predictor of perceived risk. Demographic characteristics and objective risk factors were not associated with perceived risk. Most women at high risk for breast cancer (89%) underestimated their actual risk; fewer women with low to average risk for breast cancer (9%) overestimated their risk. Age, Gail scores, and health insurance status promoted breast cancer screening; underestimation of risk had the opposite effect.

Conclusions: Inaccurate perceptions of risk do not promote optimal breast cancer screening. The finding has implications for most women at high risk for developing breast cancer who underestimate their risk.

Implications for Nursing: Oncology nurses can use risk assessment tools to provide individualized counseling regarding breast cancer risk factors and screening. Women at high risk who underestimate their risk could benefit from additional screening and from advances in cancer chemoprevention.

Breast cancer is the second-leading cause of cancer death for women in the United States. Epidemiology, molecular biology, and genetics have improved the understanding of disease etiology, whereas early detection has helped decrease morbidity and mortality (American Cancer Society [ACS], 2008). Breast cancer risk assessment tools, such as the Gail model (Gail & Constantino, 2001; Gail et al., 1989), use epidemiologic variables and information from a woman's reproductive history to provide an objective estimate of her probability of developing the disease. Healthcare providers can use risk assessment tools to estimate an individual's probability of developing breast cancer to provide tailored recommendations about risk factors and screening. Women with an average risk for developing breast cancer should obtain clinical breast examinations (CBEs) and annual mammograms starting at age 40 (ACS), whereas women at high risk should explore additional screening methods (e.g., magnetic resonance imaging) and might consider initiating screening at an earlier age and at more frequent intervals (Gail & Rimer, 1998; Humphrey, Helfand, Chan, & Woolf, 2002). A woman who has received factual information about her breast cancer risk will probably be more likely to maintain an appropriate level of screening (Leventhal, Kelly, & Leventhal, 1999; Weinstein & Nicolich, 1993).

Two meta-analyses (Katapodi, Lee, Facione, & Dodd, 2004; McCaul, Branstetter, Schroeder, & Glasgow, 1996) supported that perceived breast cancer risk has a significant positive effect on screening mammography. However, the reported Cohen's effect sizes were small (d = + 0.2 and d = + 0.16, respectively) (Katapodi et al.; McCaul et al.), suggesting that perceived risk may not be the primary force behind breast cancer screening. Risk appears to be a necessary but insufficient condition for adopting and maintaining routine.

The observed small effect sizes may be explained by an underestimation of risk that inhibits women from adopting appropriate screening. The suggestion has significant clinical implications. Women at high risk for developing breast cancer who underestimate their risk are less likely to comply with medical recommendations and benefit from advances in early detection and chemoprevention. In addition, women at low–average risk who overestimate their risk are likely to suffer unnecessary anxiety. As a result, this study sought to examine the accuracy of women's perceived breast cancer risk and whether inaccurate perceptions of risk influence breast cancer screening behavior. The specific aims were to (a) describe women's perceived breast cancer risk, (b) describe the objective risk of the sample and identify the percentage of women who have inaccurate perceptions of their actual risk, and (c) examine the influence of objective and perceived risk on breast cancer screening, namely screening mammograms, CBEs, and breast self-examinations (BSEs).

Theoretical Framework and Background

Perceived risk of a health issue refers to a risk judgment about the probability that the health issue will be experienced. Several theoretical frameworks that aim to explain and predict health-related behavior concur that perceived risk significantly affects the adoption of protective behaviors. The Adoption Precaution Model (Weinstein, 1988) suggests that individuals become aware of a health issue when they hear relevant information from common sources, such as the media and acquaintances. However, general information about a health issue does not establish who is likely to be affected. As a result, most individuals hold an optimistic bias, meaning that they underestimate their actual risk or perceive that they are less likely than others to encounter the health issue. Acknowledging personal susceptibility occurs when an individual receives education about personal risk factors, has a close experience with the health issue, or receives information about the risk status and protective behaviors of her or his peers (Weinstein & Klein, 1995). Individuals who perceive themselves to be at high risk for a health issue may be more likely to take appropriate actions to reduce their risk, which should result in a positive correlation between perceived risk and adoption of precautions (Weinstein & Nicolich, 1993).

The phenomenon of optimistic bias, meaning people systematically believe that they are better than others in various ways or that they are less likely to encounter life's negative events, has been demonstrated by a number of researchers (Alicke, Klotz, Breitenbecher, Yurak, & Vredenburg, 1995; Messick, Bloom, Boldizar, & Samuelson, 1985; Svenson, 1981). However, studies that examined perceived breast cancer risk report conflicting findings. Some studies reported that most women do not consider factual information when estimating their breast cancer risk (Daly et al., 1996; Katapodi et al., 2004). When asked to compare their breast cancer risk to the risk of their friends and peers or that of an average, same-aged woman, women generally had an optimistic bias (Absetz, Aro, Rehnberg, & Sutton, 2000; Aiken, Fenaughty, West, Johnson, & Luckett, 1995; Clarke, Lovegrove, Williams, & Machperson, 2000; Facione, 2002; McDonald, Thorne, Pearson, & Adams-Campbell, 1999). In addition, when comparing subjective risk to objective risk based on the Gail model, 57%–80% of women recruited from regional and national databases significantly underestimated their breast cancer risk (Haas et al., 2005; Sabatino et al., 2004). The findings are consistent with suggestions of the Precaution Adoption Model. However, a significant number of studies that compared subjective risk estimates to Gail model estimates reported that, in general, women overestimate their breast cancer risk (Buxton et al., 2003; Daly et al.; Davids, Schapira, McAuliffe, & Nattinger, 2004; Dolan, Lee, & McGrae-McDermott, 1997; Metcalfe & Narod, 2002).

The conflicting findings have been attributed, in part, to the confounding effects of different recruitment sites and measurement errors of numeric scales (Katapodi et al., 2004). Recruitment from healthcare settings or through an affected relative probably introduces a selection bias of women who have recent and vivid experiences with breast cancer and greater access to care. Therefore, a community-based sample may provide a more representative account of women's subjective breast cancer risk estimates. In addition, numeric measures of perceived risk fail to capture the intuitive interpretation of probability assessments. Individuals compare probability values against intuitive, qualitative standards to make sense of their meaning. The intuitive meaning assigned to numeric probability (high or low) depends on the standard used for the comparative assessment (Teigen & Brun, 2000; Windschitl, Martin, & Flugstad, 2002). The comparison standard could be either the individual's perceived standing on relevant risk factors or an exemplar, such as the perceived risk status of peers (Kahneman & Miller, 1986; Weinstein, 1984).

The present study attempted to address the issues mentioned previously by examining the absolute and comparative breast cancer risk estimates of a community-dwelling sample. The study determined the percentage of women with inaccurate perceptions of breast cancer risk and examined whether perceptions of risk that err on the side of underestimation interfere with optimal breast cancer screening.

Methods

Recruitment and Procedures

This cross-sectional, descriptive, correlational study recruited a community sample within a radius of 40 miles from a west coast metropolitan area. Advertisements were placed in local newspapers as well as newspapers that target ethnic minority groups. In addition, flyers were posted on bulletin boards in places that women were likely to visit, such as workplaces, senior and cultural centers, libraries, restaurants and coffee shops, churches and temples, and shelters for homeless or battered women.

Women were eligible to participate if they were aged 30–85 years, had never been diagnosed with any type of cancer, and were willing to complete a questionnaire in English. The minimum age limit of 30 years was chosen because some aggressive types of breast cancer occur in women that age (ACS, 2008). The age limit of 85 years is the maximum age that a woman's breast cancer risk can be estimated with the Gail model. Women with a prior diagnosis of cancer were excluded because they would be more likely to have received extensive education about their cancer risk and risk factors.

Potential participants responded by calling a dedicated telephone number to express interest in the study. Two hundred and three women called; however, 19 were excluded (3 had a previous cancer diagnosis, 12 were younger than age 30, and 4 decided that they were not interested). Participants completed an informed consent form and the study survey in a place and time of their choice; each was compensated $15. The study protocol was approved by the ethics committee of a major research institution and the institutional review board of the funding agent.

Measurements

Perceived breast cancer risk: Perceived breast cancer risk was measured with two scales, a **verbal** and a **comparative scale**. The scales were introduced in different sections of the questionnaire; the verbal scale preceded the comparative. The verbal scale asked participants to rate their chances for developing breast cancer in their lifetime on a scale from 0 (definitely will not) to 10 (definitely will). To provide women with appropriate context and to avoid a misinterpretation of the item, which has been reported elsewhere (Woloshin, Schwartz, Black, & Welch, 1999), the numbers were coupled with five verbal anchors: "definitely will not" (0–1), "probably will not" (2–3), "50-50" (4–6), "probably will" (7–8), and "definitely will" (9–10). About 10% of participants marked a point between two numbers or marked a verbal anchor instead of circling a number; in those instances, the corresponding number closest to the center of the scale was used.

In the comparative scale, participants were asked to compare themselves with other women their age, such as friends or peers, and state their chances of getting breast cancer in their lifetime on a five-point scale ranging from 1 (much lower) to 5 (much higher).

Similar scales have been used by other investigators, who reported their psychometric properties (Gurmankin-Levy, Williams, Quistberg, & Armstrong, 2006). The verbal scale had low sensitivity (0.37) but high specificity (0.93) in identifying women with very high perceived risk as well as high sensitivity (0.81) and specificity (0.93) in identifying women with very low perceived risk. The comparative scale had high sensitivity (0.90) and specificity (0.99) in identifying women with very high perceived breast cancer risk as well as high sensitivity (0.89) and specificity (0.91) in identifying women with very low perceived breast cancer risk. In the present study, internal consistency reliability between the two scales was high (Cronbach alpha = 0.78).

Objective breast cancer risk: The Gail model was used to calculate each participant's possibility of developing breast cancer during the next five years (five-year Gail score) and during her lifetime (lifetime Gail score). Age, number of affected first-degree relatives (e.g., mother, sister), number of breast biopsies, and reproductive history (age of menarche and age of first live birth) are used to determine the Gail score. The calculations were made with the online version of the **Breast Cancer Risk Assessment Tool** (National Cancer Institute, 2002). In accordance with recommendations from the American Society of Clinical Oncology (1996), participants also were asked to indicate their number of affected second-degree relatives (e.g., grandmother, aunt, uncle) to get a more comprehensive understanding of women's experiences with breast cancer.

Breast cancer screening: Demographic characteristics and breast cancer screening behavior were assessed with a series of questions used in the 2001 survey of the Behavioral Risk Factors Surveillance System (Centers for Disease Control and Prevention, 2002). Participants were asked how much time had passed since their last mammogram and their last CBE. Based on those questions, two variables were created to assess the frequency of mammograms and CBEs. For both questions, answers ranged from 0 (never) or 1 (within the past year) to 5 (five or more years ago). Participants also were asked how often they performed a BSE; answers ranged from 0 (never) to 4 (very often [more than monthly]).

Statistical Analyses

Data were analyzed with the SPSS® 14 statistical program. Distributions were checked for normality. Risk scales, five-year and lifetime Gail scores, and variables assessing frequency of screening behavior were treated as continuous variables. Regression analyses were used to identify predictors of perceived breast cancer risk; bivariate analyses (Pearson correlation coefficient) were used to examine the influence of perceived and objective breast cancer risk on screening behaviors. Collinearity was assessed with the VIF (variance inflation factor), which was lower than 1.5 for all predictors in all models tested. The goodness of fit for each linear regression model was assessed with model effect size (R^2) and analysis of variance. The unique contribution of each predictor after controlling for other predictors was assessed with squared partial correlation (sr^2). Power analysis indicated that a sample of N = 147 would provide power = 0.8 to detect moderate correlations among predictive variables ($R^2 = 0.13$), with alpha = 0.05.

Results

The final sample included 184 women ($\bar{X}$ age = 47 ± 12 years, range = 30–84); most (57%) self-identified as non-Caucasian. Forty-nine percent had attended four or more years of college, but 8% had not completed high school. Most (77%) had health insurance. The median annual household income was $30,000–$39,999, with 21% reporting an income less than $10,000. Most participants (64%) did not have a family history of breast cancer (see Table 1).

Perceived Breast Cancer Risk

Overall, participants responded that they would "probably not" get breast cancer ($\bar{X}$ = 3.58 ± 1.7, range = 0–8). Eighteen participants (12%) reported that they "definitely will not" get breast cancer, whereas eight participants (4%) reported that they "probably will" get the disease.

On the comparative scale, participants responded that their risk was "somewhat lower" than that of an average, same-aged woman ($\bar{X}$ = 2.63 ± 0.88, range = 1–5). Sixty participants (33%) rated their risk as "much lower" or "somewhat lower" compared to the risk of an average, same-aged woman, whereas 19 participants (10%) rated their risk as "somewhat higher" or "much higher."

Two regression analyses were used to examine whether demographic characteristics and objective risk factors from the Gail model were associated with perceived breast cancer risk. Education, income, race or culture, age, age at first menstrual period, age at first live birth, number of breast biopsies, number of affected first-degree relatives, and number of affected second-degree relatives were the predictor variables, whereas verbal and comparative risk scales were the dependent variables. The goodness of fit for the two models was significant (p = 0.017 and $p < 0.001$, respectively), and family history of breast cancer was a common predictor of increased perceived breast cancer risk (see Table 2).

Table 1. Demographic Characteristics

Variable	$\bar{X}$	SD	Range
Age (years)	47.59	12.05	30–84

Variable	n	%
Age (years)		
30–39	56	30
40–49	50	27
50–69	61	33
70–85	11	6
Missing	6	3
Race or culture		
Caucasian (non-Hispanic)	79	43
African American (non-Hispanic)	50	27
Hispanic	25	14
Asian	30	16
Education		
Grades 1–8	7	4
Grades 9–11	8	4
Grade 12 or GED	31	17
College (1–3 years)	48	26
College (4 years or more)	90	49
Income ($)		
Less than 10,000	39	21
10,000–19,999	16	9
20,000–29,999	33	18
30,000–39,999	28	15
40,000–49,999	17	9
50,000–59,999	16	9
60,000–69,999	6	3
70,000–79,999	2	1
More than 80,000	19	10
Missing	8	4
Family history		
No family history	117	64
One or more affected second-degree relatives	39	21
One or more affected first-degree relatives	19	11
Missing	9	5

N = 184
Note. Because of rounding, not all percentages total 100.

Accurate and Inaccurate Perceptions of Breast Cancer Risk

The mean lifetime Gail score of the sample was 10.24% (± 6.05) (median = 9.7, range = 2.2–39.3), and most participants (77%) had a lifetime Gail score below the population average (12.3%) (ACS, 2008). The mean five-year Gail score of the sample was 0.95% (± 0.08) (median = 0.7, range = 0.1–5). However, 15% of the women (N = 25) had a five-year Gail score greater than 1.67%. Clinical data suggest that women with a five-year Gail score greater than 1.67% are at high risk for developing breast cancer and may want to consider chemoprevention with tamoxifen or raloxifen (Chlebowski et al., 2002; Cummings et al., 1999; Fisher et al., 1998; Reddy & Chow, 2000). As a result, the five-year Gail score was used in the present study to identify women in the sample who were at high risk.

The present study examined the percentage of women with an inaccurate perception of their breast cancer risk. Most women at high risk for breast cancer (five-year Gail score greater than 1.67%) had an inaccurate perception of their breast cancer risk. On the verbal scale, 23 of 24 women at high risk responded that they had "low or average chances of getting breast cancer." On the comparative scale, 20 of 25 women at high risk reported that their risk for breast cancer was "lower than the risk of average, same-aged women." Some women at high risk believed that their risk was the same as that of the general population. Fewer women with low or average risk overestimated their breast cancer risk (see Table 3).

Table 2. Predictors of Perceived Breast Cancer Risk

Predictor	Verbal Scale ($R^2 = 0.15$, $\Delta F = 2.21$, $p = 0.017$)			Comparative Scale ($R^2 = 0.22$, $\Delta F = 3.75$, $p < 0.001$)		
	sr^2	B	95% CI	sr^2	B	95% CI
Education	0.001	0.04	–0.25–0.34	0.038	0.18	0.03–0.33
Income	0.013	–0.07	–0.17–0.03	0.009	–0.03	–0.08–0.02
Asian versus Caucasian regression dummy variable	0.003	0.27	–0.52–1.06	0.004	0.15	–0.25–0.56
African American versus Caucasian regression dummy variable	0.007	0.36	–0.36–1.08	0.001	–0.003	–0.37–0.37
Hispanic versus Caucasian regression dummy variable	0.001	0.15	–0.69–0.99	0.001	–0.06	–0.49–0.37
Age	0.013	–0.02	–0.03–0.02	0.011	–0.02**	–0.03–(–0.02)
Age at first menstrual period	0.017	0.2*	0.03–0.6	0.001	0.01	–0.11–0.13
Age at first live birth	0.004	–0.01	–0.02–0.02	0.001	0.001	–0.01–0.01
Number of breast biopsies	0.004	0.14	–0.19–0.5	0.001	0.03	–0.15–0.2
Number of affected first-degree relatives	0.009	0.36	–0.39–0.8	0.043	0.41*	0.1–0.71
Number of affected second-degree relatives	0.052	0.56*	0.2–0.96	0.012	0.44**	0.25–0.63

* $p < 0.05$; ** $p < 0.001$
ΔF—change in F test, comparing this model to the null model; B—standardized regression coefficient indicating change in the criterion variable associated with the specific predictor; CI—confidence interval; R^2—proportion of variance in criterion variable explained by the equation; sr^2—squared partial correlation (proportion of variance explained by one predictor while other predictors are controlled)

Influence of Perceived and Objective Breast Cancer Risk on Screening Behavior

Frequency of screening mammograms was assessed for women who were older than age 40 (N = 115, range = 40–84 years, $\bar{X}$ age = 53 ± 9). Most (74%) reported having a screening mammogram within the past two years. Frequency of CBE and BSE was assessed for all women in the sample. Most (54%) reported having a CBE within the past 12 months. However, 16% reported that their last CBE had been more than two years ago. A significant number of participants (46%) reported that they performed BSEs "never" or "rarely" (see Table 4).

No correlation was found among measures of perceived breast cancer risk and screening behavior. Older women, women with health insurance, and women with higher five-year Gail scores were more likely to have received a recent screening mammogram. Women with higher five-year and lifetime Gail scores were not more likely to perform BSEs than women with low and average risk (see Table 5).

Discussion

The present study described assessments of perceived breast cancer risk; examined the influence of demographic characteristics and objective risk factors on perceived risk; examined the percentage of women that have an inaccurate perception of their risk; and described the correlations among objective risk, perceived risk, and breast cancer screening.

Most women in the present study believed that they were not likely to get breast cancer in their lifetime and

Table 3. Percentage of Accurate and Inaccurate Risk Responses on the Verbal and Comparative Scales

Group	Verbal Scale Score 6 or Less[a]		Verbal Scale Score Higher Than 6[b]		Comparative Scale Score 3 or Less[c]		Comparative Scale Score Higher Than 3[d]	
	n	%	n	%	n	%	n	%
Low risk (N = 151)								
Accurate perception	144	96	–	–	137	91	–	–
Overestimated (pessimistic bias)	–	–	6	4	–	–	14	9
High risk (N = 25)								
Underestimated (optimistic bias)	23	96	–	–	20	80	–	–
Accurate perception	–	–	1	4	–	–	5	20

[a] Participants perceived that they definitely or probably will not get breast cancer or that they have a 50% chance.
[b] Participants perceived that they definitely or probably will get breast cancer.
[c] Participants perceived their risk to be lower than or the same as average, same-aged women.
[d] Participants perceived their risk to be higher than average, same-aged women.
Note. Data are missing for the verbal scale.

that their risk for developing breast cancer was lower than that of average, same-aged women. The finding is consistent with other studies (Aiken et al., 1995; Clarke et al., 2000; Facione, 2002; Lipkus et al., 2000; McDonald et al., 1999) and with suggestions that most individuals believe they are less likely than others to encounter health issues (Weinstein & Klein, 1995).

According to Weinstein (1987), optimistic bias is not influenced by sociodemographic characteristics. However, research suggests that older women are less likely to perceive that they are at risk for breast cancer, whereas women with higher education are more likely to perceive a higher risk (Katapodi et al., 2004; McQueen, Swank, Bastian, & Vernon, 2008). The suggestions were substantiated in the present study on the comparative risk scale: Older age was a negative predictor, whereas higher education was a positive predictor of comparative risk. Educational interventions should target older women and women with low literacy levels to emphasize that breast cancer risk usually increases with age, dispel misconceptions about risk factors, and correct erroneous perceptions of risk.

Women at increased risk because of a positive family history are more likely to acknowledge their risk. The finding is consistent in many studies (Buxton et al., 2003; Davids et al., 2004; Haas et al., 2005; Katapodi et al., 2004; McQueen et al., 2008), including the present study. However, most participants in the sample did not recognize epidemiologic and reproductive history factors included in the Gail model as breast cancer risk factors. The finding has significant implications. Although Daly et al. (1996) reported that risk factors associated with the Gail model do not predict perceived risk, little progress has been made to educate lay women about the relative contribution of factors associated with reproductive history in breast carcinogenesis (Daly et al.). In addition, women at high risk who do not have a positive family history are less likely to acknowledge their risk accurately and take appropriate health-protective measures. The finding was substantiated with a large sample, in which most women at high risk without a family history were less likely to perceive higher risk (Haas et al.). Healthcare professionals should clearly convey the difference between reproductive versus familial breast cancer risk factors and communicate how different risk factors influence the overall probability of developing the disease.

Similar to other studies (Davids et al., 2004; Haas et al., 2005; Sabatino et al., 2004), the present study used the five-year Gail score of 1.67% to classify participants according to an objective risk estimate and to describe the percentage of women at high and low risk who have erroneous risk perceptions. Only a small proportion (4%–9%) of women at low or average risk in the present sample overestimated their risk for developing breast cancer. Other studies reported that 28%–82% of women with low or average risk overestimate their risk (Buxton et al., 2003; Davids et al.); however, reports of risk overestimation could be influenced by the population and type of risk measure. In contrast, most women at high risk in the present study (80%–96%) underestimated their risk, which is consistent across studies (Haas et al.; Hughes, Lerman, & Lustbader, 1996). From a clinical point of view, attending to women at high risk for developing breast cancer should be a priority. Most underestimate their breast cancer risk when they could benefit from an informed decision regarding breast cancer chemoprevention. Those gaps in the knowledge of lay women are significant opportunities for improving healthcare services. Nurses also should attend to women at low or average risk who overestimate their risk to help them avoid unnecessary anxiety or the overuse of health services.

The rate of screening mammography and CBE in the sample was high but not optimal; about 75% of women reported having a mammogram and a CBE within the past two years. However, most (76%) reported performing a BSE every other month. Findings from a nationwide representative sample suggested that one third of women at high risk did not receive screening appropriate for their level of risk (Sabatino et al., 2004). The present study's findings indicate that screening behaviors, such as time since last mammogram and time since last CBE, were largely influenced by access to healthcare services (e.g., health insurance) and by objective breast cancer risk factors (e.g., age, five-year Gail score), suggesting that the main driving force

Table 4. Breast Cancer Screening Behavior in Women With No History of Cancer

Screening Behavior	n	%
Time since last mammogram (years) (N = 115)[a]		
Less than 1	62	54
1 to less than 2	23	20
2 to less than 3	4	3
3 to less than 5	4	3
5 or more	5	4
Missing	17	15
Time since last clinical breast examination (years) (N = 184)		
Less than 1	99	54
1 to less than 2	38	21
2 to less than 3	12	7
3 to less than 5	4	2
5 or more	15	8
Missing	16	9
Frequency of breast self-examination (N = 184)		
Never	14	8
Rarely	69	38
Occasionally (every other month)	55	30
Regularly (every month)	33	18
Very often (more than once per month)	11	6
Missing	2	1

[a] Only assessed for women aged 40 years or older
Note. Because of rounding, not all percentages total 100.

Table 5. Correlation Among Demographic Characteristics, Gail Risk, Perceived Risk, and Screening Behaviors

Screening Behavior	Education	Income	Health Insurance	Five-Year Gail Score	Lifetime Gail Score	Perceived Risk Verbal Scale	Perceived Risk Comparative Scale
Length of time since last mammogram	−0.13	0.06	−0.19*	0.17*	0.05	−0.03	−0.04
Length of time since last clinical breast examination	−0.02	−0.17*	−0.25**	−0.12	−0.05	0.01	0.04
Frequency of breast self-examination	0.04	0.03	0.07	0.06	0.01	0.12	0.06

* p = 0.05; ** p = 0.01

behind screening behaviors likely is a healthcare provider recommendation.

The absence of a significant correlation among measures of perceived risk and breast cancer screening undermines the significance of perceived risk as a motivating factor for routine breast cancer screening. A positive correlation between perceived risk and behavior is based on the assumption that people are aware of their actual risk. However, most women at risk in the present study underestimated their actual risk; therefore, the expected positive correlation between perceived risk and behavior was not observed. Although the correlations among measures of risk and screening behaviors were not significant, findings were in the hypothesized direction: The perception of a low or average risk for developing breast cancer did not promote screening behavior. The finding provides an insight and a possible explanation for the small effect sizes observed in the literature (Katapodi et al., 2004; McCaul et al., 1996; McQueen et al., 2008).

Limitations

Potential limitations of the study are the convenience sample of English-speaking and mostly urban women, and that the calculation of Gail risk estimates and screening behavior was based on self-reports and may not be entirely accurate. The Gail model is the most appropriate tool for general population risk screening (Euhus, Leitch, Huth, & Peters, 2002); however, the model may be limited in its predictive ability because it does not calculate risk from affected second-degree relatives, nor does it take into account age at disease onset. Although the model has been extensively validated with Caucasian women (Constantino et al., 1999), it may underestimate the risk of breast cancer for African American women (Bondy & Newman, 2003). The predictive value of the five-year Gail risk score may be limited because 57% of women in the present study were non-Caucasian.

Nursing Implications

The present study included women recruited from community settings who did not necessarily have access to educational material and other breast health services. The sample included a representative percentage (15%) of community-dwelling women who are at high risk for developing breast cancer. The finding is consistent with a national community-dwelling sample (N = 6,410), in which about 16% of participants had a five-year Gail risk greater than 1.67% (Sabatino et al., 2004). The women at high risk could benefit from informed decision making regarding additional screening methods, initiating screening at an earlier age or at more frequent intervals, and from advances in breast cancer chemoprevention. Oncology nurses and advanced practice nurses who work in community settings could use appropriate breast cancer risk assessment tools to provide education on breast cancer risk factors and individualized counseling on breast cancer prevention and early detection.

Measuring perceived risk with the ideal probability scale has been a challenge for researchers (Diefenbach, Weinstein, & O'Reilly, 1993). In the present study, within-method triangulation with two probability scales that used verbal descriptors neutralized the contextual, wording, and anchoring limitations of each scale. Future studies should consider using research methodologies that allow a more comprehensive approach in exploring complex phenomena related to health behaviors.

Findings suggest that most women in the sample perceived that they were not likely or were less likely than others to be affected by the disease. Inaccurate perceptions of risk that err on the side of underestimation do not promote the adoption of health-protective behaviors. As suggested by the theoretical framework of the present study, inaccurate perceptions of risk might also predispose individuals to be less receptive in acknowledging personal susceptibility to breast cancer. That may be particularly challenging for most women at high risk, who underestimate their risk according to the study findings. Providing comparative risk information in a nonquantitative way may help women acknowledge their risk and adopt screening practices appropriate for their risk level. Future educational interventions should incorporate ways to assess preexisting knowledge about breast cancer risk factors, preexisting biases and stereotypes that affect readiness to learn, and receptiveness to health-related education.

The authors gratefully acknowledge the study participants and the support of Rudee Pungbangkadee, RN, PhD, and two lay health advisors, Mary Flamer and Randi Kofsky, in advertising the study in community settings.

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Digital Object Identifier: 10.1188/09.ONF.306-314

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