Why Do Women’s Attitudes toward Mammography Change over Time? Implications for Physician-Patient Communication

Deborah N. Pearman,1 William Rakowski, Melissa A. Clark, Beverly Ehrich, Barbara K. Rimer, Michael G. Goldstein, Hugh Woolverton III, and Catherine E. Dube

Center for Gerontology and Health Care Research [D. N. P., W. R., M. A. C., B. E.], Departments of Community Health [D. N. P., W. R., M. A. C.] and Psychiatry and Human Behavior [M. G. G.], and Center for Alcohol and Addiction Studies [C. E. D.], Brown University, Providence, Rhode Island 02912; Comprehensive Cancer Center, Duke University, Durham, North Carolina 27710 [B. K. R.]; Division of Behavioral and Preventive Medicine, Miriam Hospital, Providence, Rhode Island 02912 [M. G. G.]; and Harvard Pilgrim Health Care of New England, Swansea, Massachusetts 02774 [H. W.]

Abstract

The present study examines women’s decision making about mammography over a 1-year period, using “decisional balance,” a summary of women’s positive and negative perceptions about mammography derived from the Transtheoretical Model (TTM). Data were from a survey of women ages 50–74 years who completed both the baseline and 1-year follow-up telephone surveys (n = 1144) for an intervention study to increase the use of mammography screening. A shift toward less favorable perceptions about mammography was related to being a smoker and not having a recent clinical breast examination and Pap test. Change in women’s attitudes toward mammography was also related to four dimensions of a woman’s information environment. Women who rated the opinions of a physician as somewhat or not important, those who reported that at least one family member or friend discouraged them from having a mammogram, and women who felt they lacked enough people in their social network with whom they could discuss health concerns were less likely to express favorable attitudes about mammography over 1 year. In contrast, women who consistently communicated the value of mammography to others expressed more favorable views of screening over the study period.

Interventions designed to promote breast cancer screening must recognize that a woman not only reacts to mammography information provided by significant others in her social network but may proactively reach out to others as an advocate of breast cancer screening, thus reinforcing or changing others’ opinions or behavior as well as her own.

Introduction

Increasing the proportion of women over age 50 who are screened routinely for breast cancer has been targeted as an important national priority (1). Because a physician’s recommendation is one of the strongest predictors of mammography use (2–8), primary care physicians are being encouraged to regularly counsel patients about early detection of cancer (9–10). However, as many studies have demonstrated, there are important barriers to the delivery of preventive services by primary care providers, including the incorporation of cancer screening into routine office procedures (9–12).

The gap between physicians’ knowledge and implementation of cancer screening guidelines has stimulated interest in developing interventions to overcome obstacles in the delivery of preventive services. For example, physicians who have not had specific training in patient education and counseling skills may feel unprepared to counsel patients who are less motivated to pursue preventive care. A significant challenge for academic research is to give health care professionals guidance regarding information that is important to elicit from women in order to assess readiness and motivation for breast cancer screening and to determine how to effectively intervene with those who are reluctant.

Strategies to help individuals change their health habits often yield mixed results, because health habits once learned are not easily altered (13). An increasing number of studies have shown that the TTM provides a useful framework for understanding short- and long-term behavior change. To date, the TTM has been applied to a wide range of personal health behaviors, including smoking, weight control, and screening mammography (14), as well as compliance with multiple cancer screening behaviors (15). The extension of the TTM to screening mammography has been described in detail elsewhere (16–19). An important finding from this research, relevant for clinical practice, is that a patient’s stage of readiness to adopt mammography can be determined with as few as two questions: (a) How often do you have mammograms? and (b) When were you planning to have your next mammogram? Staging women according to both past behavior and future intention provides the minimum information necessary to identify women who are at risk of either not having an initial mammogram or lapsing from the recommended schedule (19).

Assessing stage of adoption is a central feature of the TTM; it gives a provider a way to initially classify a woman’s readiness to obtain a mammogram. However, it is still necessary to know why a woman might modify her screening behavior. A second component of the TTM, decisional balance, denotes a person’s overall attitudes with respect to changing a health habit. Decisional balance is calculated by subtracting

1 The abbreviations used are: TTM, Transtheoretical Model; CBE, clinical breast examination.
negative perceptions about a health practice (cons) from positive perceptions (pros). A woman’s decisional balance for mammography reflects whether she perceives more benefits and fewer barriers to screening (i.e., a positive score) or more barriers and fewer benefits to having the procedure (i.e., a negative score). This balance between positive and negative perceptions can alert a clinician as to who is likely to adopt regular mammography (i.e., pros > cons) and who is at risk of not having routine mammograms (i.e., cons > pros). Because a woman’s attitudes about mammography are correlated with her stage of adoption, helping a woman become more favorable toward mammography is important for fostering movement from one stage of adoption to the next (20–21).

Just as stage of adoption is not sufficient to fully assess a patient’s attitudes and opinions, it is also necessary to know how mammography-related attitudes are actually developed. The choice to have a mammogram can be better understood in the context of the information environment of women. The concept of an information environment has been advanced as an important research and clinical issue for understanding how individuals make health-related decisions, including the decision to have a mammogram. Communication research has traditionally focused on two aspects of the information environment: (a) how an individual acquires health-related information (information seeking); and (b) who the individual identifies as sources of health-related information, which may include family members, friends, a physician, as well as the mass media (22–25). Among women who have had at least one mammogram, physicians and health organizations are perceived as credible and accurate sources of cancer-related information, followed by family members and friends (25). On the other hand, family and friends are often relied on for professional health-related advice that may go beyond the source’s expertise (25).

Some expectancy-value models, such as the Theory of Reasoned Action, have examined the normative influence of family and friends on the decision to seek cancer screening. According to the Theory of Reasoned Action, a woman’s decision to have a mammogram is influenced, in part, by the opinions of significant others within her social network, as well as knowledge of the screening behavior of similar-aged peers (26). The information environment is important because it directs attention not only to the sources women turn to for cancer and other health-related information but also to how information seeking modifies a woman’s attitudes toward early detection of cancer.

The information environment should not be defined solely in terms of information seeking. An implicit assumption underlying earlier studies of the information environment is that the transmission of cancer-related information is unidirectional, going from certain people to a specific individual. A central hypothesis underlying our current research is that the information environment is dynamic and interactive. Women not only react to health-related information provided by significant others but proactively reach out to people in their social network and do or do not recommend preventive procedures to others, thus reinforcing or changing others’ opinions or behaviors, as well as their own. We previously found that women who consistently communicated the benefits of mammography to other women demonstrated a trend toward more regular screening (27). Results from this study (27) provided a rationale for proposing a broader conceptualization of the information environment and for investigating whether a woman’s attitudes toward mammography might be accounted for, at least in part, by how women both receive and relay information about cancer screening.

Prior studies have examined correlates of attitudes toward mammography, but these analyses were not longitudinal, nor did they control for covariates that measured women’s information environment (20–21). The present study was therefore designed to extend current knowledge in two ways. First, longitudinal analyses were used to investigate women’s perceptions about the positive and negative aspects of mammography and how the balance between the two (decisional balance) changed over 1 year. Second, the conceptualization of the information environment included a woman’s information-seeking style, as well as the perception of herself as a disseminator of mammography-related information. An understanding of the total information environment of women may enhance intervention strategies aimed at improving physician-patient communication about breast cancer screening.

Materials and Methods

Sample

Data for this study come from the baseline and 1-year follow-up surveys of women’s cancer-related knowledge, attitudes, and practices that were conducted for an intervention study to increase the use of mammography screening. Study participants were recruited randomly from a membership roster of a staff model health maintenance organization with five sites serving Rhode Island and southeastern Massachusetts. All study participants had been seen for a visit in the departments of obstetrics/gynecology, family practice, or internal medicine within an 8-month period before recruitment. Women who were employed in these departments, pregnant or nursing, under observation for breast problems, or had a history of breast cancer were excluded. Seventy-four percent of the women reached by phone, and who were eligible to take part in the study, agreed to participate.

Participants were randomly assigned after the baseline interview to one of three intervention groups: (a) stage-matched materials—all women received written materials by mail tailored to stage of mammography adoption; (b) standard materials—all women received written materials by mail about breast cancer screening designed without regard to stage of mammography adoption; and (c) no materials—all usual care controls. Also as part of this study, all providers in the three primary care departments received an in-service educational session about the TTM, barriers to screening, and issues in communicating with patients about screening.

This report is restricted to women ages 50–74 who completed both the baseline and 1-year follow-up telephone surveys (n = 1144); approximately one-third were in each of the three intervention groups. The timing of the 1-year follow-up interview had no relationship to a woman’s screening status. Some women were due for their next mammogram before the 1-year follow-up, and other women were due after that. Therefore, controlling for group membership, a change in women’s attitudes toward screening can be studied separately from the outcome variable of receiving a mammogram.

Variable Definitions

The outcome measure for this study, decisional balance for mammography, was defined in two ways, as a continuous variable and as a categorical variable.

Decisional Balance Score. Decisional balance is a summary measure derived by subtracting a woman’s unfavorable percep-
tions of mammography from her favorable assessments of the procedure. Identical statements in both the baseline and 1-year follow-up surveys measured respondents' favorable and unfavorable perceptions about mammography using a five-point scale ranging from strongly disagree (1) to strongly agree (5). Six statements highlighted favorable perceptions of mammography (pro scale), and seven statements highlighted unfavorable perceptions of mammography (con scale). The items in the two surveys were drawn from prior studies (20–21). To measure the change (D) in women's attitudes toward mammography, we computed the difference between decisional balance at baseline (T1) and at year 1 (T2), or $D = T2 - T1$.

**Categorical Decisional Balance Index.** Two cut points were used to construct a three-category decisional balance index for the baseline and 1-year follow-up surveys to examine transitions in perceptions about mammography. Because of the 1–5 measurement scale, decisional balance at baseline could range from $-4$ (maximum cons and minimum pros) through 4 (minimum cons and maximum pros). The first group consisted of women who expressed very positive views about cancer screening, with decisional balance scores ranging from 3.51 to 4.00. The second group represented women who expressed moderately favorable perceptions about mammography, with decisional balance scores ranging from 2.51 to 3.50. Women in the third group expressed negative to slightly favorable perceptions about mammography. Their decisional balance score fell between $-4.00$ and 2.50.

Independent variables for the analysis were assessed at baseline. The survey included demographic characteristics, health status, health behaviors, barriers to screening, and questions designed to assess the information environment.

**Demographic Characteristics.** Demographic characteristics included age (50–64 years and 65–74 years); education (less than high school, high school graduate, and some college or graduate); and income (less than $15,000, $15,000–$29,999, $30,000–$39,999, $40,000+, and don’t know/refused).

**Health Status and Health Behaviors.** Two indicators of health status at baseline were self-rated health (very good/excellent, good, and poor/fair) and having had a benign breast lump or tumor (no/yes). Three other variables reflected women's preventive health orientation: (a) recency of CBE and Pap test (both tests in past year, only one test in prior year, or neither test in past year); (b) breast self-examination (monthly, less than monthly, or don’t know how or don’t do exam); and (c) smoking status (nonsmoker or current smoker).

**Barriers and Intervention Status.** Participants were asked to list two or three reasons (barriers) why they might not have a mammogram in the future. Responses were coded as no barriers versus one or more barriers. In addition, because the 1-year data collection occurred after the intervention began, a variable was used to account for group membership (stage-matched, standard, or no materials).

**Information Environment.** The information environment of women at baseline was measured by seven indicators. Three variables assessed information seeking. Women were asked to what extent they valued: (a) the mammography opinions of a health care provider or medical expert; (b) the mammography opinions of a family member, friend, or other women; and (c) their own mammography opinions. Each of the three variables was scored 0 if the respondent highly valued the information and scored 1 if the information was only somewhat important or not important at all.

Information sharing and communication were measured with four indicators:

(a) We asked about the tenor of prior messages about the value of mammography from a mother, sister, daughter, and friend. A four-point scale [encouraged, discouraged, sometimes encouraged and sometimes discouraged (a mixed message), and did not discuss] was used. In preliminary analyses, women who received mixed messages had attitudes comparable to those who had been discouraged from having a mammogram, so these response choices were combined. The final index was coded dichotomously. Scores were 0 for those who were encouraged by all network members or whose network members did not discuss mammography and 1 for those who had been discouraged by at least one member of their network.

(b) Perceptions of the availability of network members to discuss health concerns were defined dichotomously. Responses were coded 0 if the respondent reported that she had enough family and friends as needed to discuss health matters and was satisfied with the support received; responses were coded 1 if the woman stated that she lacked sufficient family and friends to consult with about health matters or that she was dissatisfied with the support received. Respondents who reported that they had no one to talk to about health concerns but were satisfied with the support received ($n = 17$) were coded as not having a sufficient support network for discussing health concerns because of the ambiguity of this answer.

(c) A third dichotomous variable measured whether anyone in the respondent’s social network, including her mother, sister, mother’s mother, mother’s sister, daughter, and/or friend, had been diagnosed with breast cancer (0 = none versus 1 = one or more).

(d) The respondent’s perception of herself as a disseminator of mammography-related information was assessed by five items (I talk about mammography with friends; I give my friends encouragement when they say they are planning to have a mammogram; I sometimes think of ways that could get more women to have mammograms; The more I know about mammography the more I can help other women who want to know about it; and I can talk with one other person about mammography). Responses were measured on a five-point scale (strongly disagree, disagree, undecided, agree, and strongly agree). The five items were combined into a scale (Cronbach $\alpha = 0.70$). Higher scores reflected a woman’s readiness to think about mammography in ways that extended beyond her own screening experiences.

**Statistical Analysis**

The presentation of results occurs in three sections: (a) the statements comprising the pro and con indices for the summary decisional balance score are presented descriptively; (b) transitions in women’s attitudes toward mammography over 1 year are noted, based on a $\chi^2$ contingency table analysis of the three-category decisional balance index; and (c) findings from the multivariate regression analyses of the correlates of decisional balance are shown.

For the longitudinal analyses, we used a stepwise model-building procedure to identify the factors correlated with a change in decisional balance over the study period. Baseline decisional balance was entered first into the model (step 1). In step 2, variables that measured a woman’s demographic characteristics, barriers to screening, and intervention status were entered simultaneously into the model, along with baseline decisional balance. In step 3, baseline decisional balance and significant variables from step 2 were forced into the model, along with the health status and preventive health orientation measures. In step 4, baseline decisional balance and any significant correlates from steps 2 and 3 were forced into the
model, and the seven variables measuring a woman’s information environment were entered. The final multiple regression model (step 5) was recomputed with baseline decisional balance and only a subset of variables—those covariates that were statistically significant from any of the prior steps; \( P = 0.05 \). The final model represents, therefore, a subset of variables from each of the five steps.

We controlled for baseline decisional balance as a covariate in the multivariate regression model on the assumption that a woman’s initial assessment of mammography screening would be correlated with her perceptions of cancer screening 1 year later. In addition, by controlling for baseline decisional balance, we adjusted for regression to the mean (28). The net result was that the other covariates in the regression model were able to predict the unaccounted for or residual variance in decisional balance change.

**Results**

**Pro and Con Scales.** Table 1 displays item wording and descriptive statistics for the pro and con statements used for computing the summary decisional balance score. Six statements measured a woman’s positive perceptions (pros) of mammography (Cronbach \( \alpha = 0.74 \) at baseline and 0.76 at 1-year follow-up). A set of seven statements assessed a woman’s negative perceptions (cons) of mammography (Cronbach \( \alpha = 0.72 \) at baseline and 0.78 at 1-year follow-up).

**Transitions in Women’s Attitudes toward Mammography.** Fig. 1 shows the results of the cross-tabulations between the three-category classification of decisional balance at baseline and the 1-year follow-up. The data displayed in Fig. 1 answer two questions central to our study: (a) Do women’s views of mammography remain relatively stable over the study period or do they change? and (b) Among women who change their opinions about mammography, is the direction of the change more likely to be positive or negative?

Of the women who expressed less favorable attitudes about mammography at baseline (\( n = 227 \); 19.8%), almost one-half (49.3%) also expressed less favorable attitudes 12 months later. The remaining 50% expressed more positive attitudes about mammography: 37.4% were moderately favorable, and 13.2% were very favorable toward breast cancer screening at the 1-year follow-up.

Of the women who expressed moderately favorable views about mammography at baseline (\( n = 498 \); 43.5%), three patterns were observed 1 year later: (a) 11.6% showed a shift toward less favorable perceptions about mammography; (b) more than one-half demonstrated no change in attitudes (54.2%); and (c) 34.1% conveyed very positive views 12 months later.

Among women who expressed very favorable views about breast cancer screening at baseline (\( n = 419 \); 36.6%), the majority (60.1%) remained very positive about the procedure over 12 months. In contrast, 37.7% were moderately favorable about screening at the 1-year follow-up, and only 2.1% held unfavorable opinions about mammography 12 months later.

Overall, most respondents remained consistent in their opinions about mammography between baseline and the 1-year follow-up, and only 2.1% held unfavorable opinions about mammography 12 months later. In contrast, 37.7% were moderately favorable about mammography over time; as shown in Table 2, there was an inverse relation between baseline decisional balance and the change in decisional balance between baseline and year 1 (\( \beta = \)

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**Table 1**  
Descriptive statistics for decisional balance

<table>
<thead>
<tr>
<th>Statements</th>
<th>Mean</th>
<th>SD</th>
<th>Factor loading at baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Pro scale</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Those people who are close to me will benefit if I have a mammogram.</td>
<td>4.4</td>
<td>0.98</td>
<td>0.48</td>
</tr>
<tr>
<td>I would be more likely to have a mammogram if my doctor told me how important it was.</td>
<td>4.3</td>
<td>1.28</td>
<td>0.52</td>
</tr>
<tr>
<td>Having a mammogram every year or two will give me a feeling of control over my health.</td>
<td>4.5</td>
<td>0.97</td>
<td>0.76</td>
</tr>
<tr>
<td>Regular mammograms give you peace of mind about your health.</td>
<td>4.6</td>
<td>0.86</td>
<td>0.77</td>
</tr>
<tr>
<td>Mammograms are necessary even when there is no history of breast problems in a family.</td>
<td>4.8</td>
<td>0.65</td>
<td>0.64</td>
</tr>
<tr>
<td>Mammograms are most helpful when you have one every year or two.</td>
<td>4.8</td>
<td>0.59</td>
<td>0.69</td>
</tr>
<tr>
<td>Cronbach ( \alpha )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>0.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 1</td>
<td>0.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Con scale</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If I eat a healthy diet, I will lower my risk of getting cancer far enough that I probably do not need to have a mammogram.</td>
<td>1.5</td>
<td>0.94</td>
<td>0.63</td>
</tr>
<tr>
<td>If I have a breast exam from a doctor or nurse, I don’t need to have a mammogram.</td>
<td>1.2</td>
<td>0.68</td>
<td>0.62</td>
</tr>
<tr>
<td>Mammograms have a high chance of leading to breast surgery that is not needed.</td>
<td>1.8</td>
<td>1.06</td>
<td>0.55</td>
</tr>
<tr>
<td>Once you have a couple of mammograms that are normal, you don’t need to have any more for a few years.</td>
<td>1.4</td>
<td>0.92</td>
<td>0.67</td>
</tr>
<tr>
<td>I would probably not have a mammogram if my doctor seemed to doubt that I really needed one.</td>
<td>2.2</td>
<td>1.47</td>
<td>0.57</td>
</tr>
<tr>
<td>I would probably not have a mammogram unless I had some breast symptoms or discomfort.</td>
<td>1.4</td>
<td>0.95</td>
<td>0.65</td>
</tr>
<tr>
<td>If a mammogram finds something, then whatever is there will be too far along to do anything about it anyway.</td>
<td>1.2</td>
<td>0.66</td>
<td>0.53</td>
</tr>
<tr>
<td>Cronbach ( \alpha )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td></td>
<td>0.72</td>
<td></td>
</tr>
<tr>
<td>Year 1</td>
<td></td>
<td>0.78</td>
<td></td>
</tr>
</tbody>
</table>

**Predictors of Change in Decisional Balance.** Table 2 presents the results from the final steps of the multiple regression model. Only statistically significant covariates from the stepwise model-building procedure are displayed. Therefore, the final model represents a subset of variables from each of the prior steps. In addition, Table 2 displays the adjusted \( R^2 \) and partial \( F \) test (for \( R^2 \) change) after each set of independent variables was introduced into the model.
Fig. 1. Transitions in perceptions about mammography over 1 year. Baseline perceptions were classified as negative to slightly favorable (all women at baseline with a decisional balance score of ≤2.50), moderately favorable (all women at baseline with a decisional balance score between 2.51 and 3.50), and most favorable (all women at baseline with a decisional balance score between 3.51 and 4.00). At year one, 55.4% showed no change in perceptions about mammography, 24.9% became more favorable toward screening, and 19.7% became less favorable toward screening.

### Table 2 Multivariate regression model for decisional balance score

<table>
<thead>
<tr>
<th>Variable</th>
<th>Final model: change between baseline and year 1</th>
<th>Adjusted R² (t value) (partial F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decisional balance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline Score (−4 to +4)</td>
<td>−0.41 (−13.56)b</td>
<td>0.12</td>
</tr>
<tr>
<td>Background variables and intervention status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health variables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smokes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>Reference</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recency of CBE/Pap</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Both tests past year</td>
<td>Reference</td>
<td></td>
</tr>
<tr>
<td>Only 1 test past year</td>
<td>Reference</td>
<td></td>
</tr>
<tr>
<td>Neither test past year</td>
<td>Reference</td>
<td></td>
</tr>
<tr>
<td>Information environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mammography opinions of physician</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very important</td>
<td>Reference</td>
<td></td>
</tr>
<tr>
<td>Somewhat/not important</td>
<td>−0.07 (−2.71)b</td>
<td></td>
</tr>
<tr>
<td>Network members influence on mammography use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Encouraged, neutral</td>
<td>Reference</td>
<td></td>
</tr>
<tr>
<td>Discouraged</td>
<td>−0.05 (−2.01)b</td>
<td></td>
</tr>
<tr>
<td>Discuss health concerns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enough people, satisfied</td>
<td>Reference</td>
<td></td>
</tr>
<tr>
<td>Not enough people, dissatisfied</td>
<td>−0.06 (−2.45)b</td>
<td></td>
</tr>
<tr>
<td>Respondent as information communicator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Score (1−5)</td>
<td>0.07 (2.54)c</td>
<td></td>
</tr>
</tbody>
</table>

Notes: Only statistically significant variables are shown. The final model represents a subset of variables from each of the prior steps. NS, not significant.

* p ≤ 0.01.

Discussion

The results of this research provide additional evidence that a woman’s information environment is important in her decision to have a mammogram. Several findings are particularly salient for provider-patient communication and build upon our previous work (27), which found significant differences in self-reported screening mammography based on a woman’s information environment. Previous studies have characterized the information environment primarily in terms of a woman’s information-seeking style (22–25). Our results demonstrated that a broader conceptualization of the information environment is warranted and should include the normative influence of family, friends, and medical providers, as well as a woman’s willingness to place mammography in a context that extends beyond her own screening experiences.

It is widely accepted that a physician’s recommendation to have a mammogram is a particularly important health education intervention for breast cancer screening (29–30). Women who perceive that their physician enthusiastically endorses mammography show more positive attitudes toward mammography, and this pattern reflects real change in attitudes over time, and some is a result of regression to the mean. A shift toward less favorable perceptions about mammography over 12 months also was related to being a smoker and not having a recent CBE and Pap test.

In addition, four information environment factors were significant. Women who rated the opinions of a physician as not or somewhat important, and those who reported that at least one family member or friend discouraged them from having a mammogram expressed less favorable views of mammography over 1 year. Also, women who felt they lacked sufficient people in their social network with whom they could discuss health concerns became more negative toward cancer screening within 1 year. On the other hand, women who communicated the value of mammography to other women had more favorable attitudes toward mammography over the study period. Neither background characteristics nor intervention group status were associated with change in attitudes over time.

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In addition, four information environment factors were significant. Women who rated the opinions of a physician as not or somewhat important, and those who reported that at least one family member or friend discouraged them from having a mammogram expressed less favorable views of mammography over 1 year. Also, women who felt they lacked sufficient people in their social network with whom they could discuss health concerns became more negative toward cancer screening within 1 year. On the other hand, women who communicated the value of mammography to other women had more favorable attitudes toward mammography over the study period. Neither background characteristics nor intervention group status were associated with change in attitudes over time.

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The results of this research provide additional evidence that a woman’s information environment is important in her decision to have a mammogram. Several findings are particularly salient for provider-patient communication and build upon our previous work (27), which found significant differences in self-reported screening mammography based on a woman’s information environment. Previous studies have characterized the information environment primarily in terms of a woman’s information-seeking style (22–25). Our results demonstrated that a broader conceptualization of the information environment is warranted and should include the normative influence of family, friends, and medical providers, as well as a woman’s willingness to place mammography in a context that extends beyond her own screening experiences.

It is widely accepted that a physician’s recommendation to have a mammogram is a particularly important health education intervention for breast cancer screening (29–30). Women who perceive that their physician enthusiastically endorses mammography show more positive attitudes toward mammography, and this pattern reflects real change in attitudes over time, and some is a result of regression to the mean. A shift toward less favorable perceptions about mammography over 12 months also was related to being a smoker and not having a recent CBE and Pap test.

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mography are significantly more likely to have the procedure (4). Our results, however, indicate a more complex picture. In this study, women became more negative toward mammography over the study period if they were less inclined to value cancer-related information from a physician. This shift in attitudes occurred even after adjusting for a woman’s mammography-related opinions at baseline. Although a strong recommendation from a physician or nurse remains one of the most important triggers for women to undergo mammography, the clinician’s recommendation may not be sufficient. Health care providers also need to encourage a patient to talk about whether she sees mammography as efficacious for and accessible to her, factors that could diminish the importance a woman places on a physician’s recommendation.

We found that women who had been discouraged from having a mammogram by family members or friends reported less favorable views about mammography at the 1-year follow-up survey than at the baseline interview. A woman may view screening negatively if members of her social network believe that mammography is unnecessary and dissuade her from having the exam. Family members or friends who relay negative experiences, such as discomfort, embarrassment, or the stress of having a false positive test result, may raise doubts in a woman’s mind about the efficacy of being screened. Although the positive influence of family and friends on a woman’s decision to seek cancer screening has been emphasized (31, 32), our data suggest that the negative influence of social ties must also be considered, because this may detract from health maintenance behaviors. Therefore, clinicians need to assess if significant others in a woman’s support network offer encouragement or discouragement with respect to mammography. Given that negative and contradictory messages received from different sources may decrease a woman’s motivation to obtain a mammogram, health care providers should help patients evaluate the accuracy of the information they obtain from people in their information environment.

Active participation by patients in discussions of health care options has particular relevance for mammography screening. Health care providers with a participatory decision-making style (33) may have greater success in changing attitudes and behavior regarding mammography screening than physicians with more controlling decision-making styles. Physicians who routinely involve patients in screening decisions should consider taking a few minutes to learn about a woman’s personal experiences with mammography and her barriers to screening, as well as the experiences of people in the patient’s network. In doing so, however, providers must be prepared to address gaps in knowledge about cancer screening, counsel women regarding their concerns about screening tests, and provide strategies to overcome barriers to mammography.

Women who reported that they did not have enough people in their social network with whom they could discuss health matters became more negative toward mammography over 1 year. Nearly one-quarter of the women in this study (22%) reported some degree of dissatisfaction with their social network. More research is necessary to determine the best way to deliver health messages about breast cancer screening to women who do not perceive that their social network is accessible or supportive. Given the success of peer role models and lay volunteers in encouraging women to have mammograms (34, 35), the use of same-age peers should be considered as an intervention strategy for women who express dissatisfaction with talking to family and friends about health concerns. Face-to-face patient counseling may be enhanced by telephone or mail reminder systems for mammography screening. Reminder systems have been shown to have substantial impact on a variety of screening practices (11, 12) and could be modified to include personal stories about cancer screening from women who are appropriate peer role models.

One of the most positive findings was that women who actively communicated to others the relevance of mammography tended to have more favorable decisional balance scores over 1 year. In clinical settings, tailored interventions designed to increase the use of mammography screening should consider the possible benefits of a woman’s activism as a spokesperson for breast cancer screening. Not only can the benefits of mammography be communicated effectively by health care providers, they can be reinforced by women over age 50 communicating with their same-age peers.

Besides variables measuring the information environment, smoking status and recency of CBE and Pap testing were also important. Perceptions about mammography tended to become less favorable over 1 year among women who smoked and among those who had not had a recent CBE or Pap test, variables shown to be related to women’s use of mammography screening in earlier studies (19, 27). Our previous study of cancer screening among women 50 and older also found that two-thirds of those who were current smokers had not been screened recently for both breast and cervical cancers (36). A patient’s smoking status can serve as a useful marker to prompt clinicians to explore a woman’s intention to have a mammogram in the future and to identify a population potentially at risk for underutilizing cancer screening.

In addition to why women might become more or less favorable toward screening for breast cancer over 12 months, it is important to consider whether women’s views of mammography remained relatively stable over the study period or showed considerable change. Most respondents (55%) remained consistent in their opinions about mammography between the baseline and the follow-up interviews (Fig. 1), suggesting that many women who hold either favorable or unfavorable attitudes about mammography retain this set of beliefs over 1 year. On the other hand, nearly equal proportions of women showed either an improvement (25%) or a decline (20%) in their decisional balance scores. Among women with negative decisional balance scores at baseline, a small proportion (13%) become very positive about screening over 12 months. The data also show that not all women who expressed very positive attitudes about mammography at baseline remained very favorable toward screening 1 year later. Nearly 40% of the women in the most favorable group at baseline became less favorable toward breast cancer screening at some point during the year. Some of the change depicted in Fig. 1 undoubtedly reflects less than perfect measurement, and the statistical phenomenon of regression to the mean. However, at least some of the change was real, as suggested by the results in Table 2. Women who become negative or neutral toward mammography may be especially hard to intervene with unless an intervention attempts to address the underlying reasons for women’s indifferent or negative views toward the procedure.

Several comments about this analysis should be mentioned. First, annual routine mammograms were a fully covered benefit for health maintenance organization members ages 50 and over. Our study results may not be generalizable to women who have less access to preventive health care or who have inadequate health insurance. Second, the present results cannot be generalized to all women over 50, because participation in the survey was voluntary, and 26% declined to participate. Third, 95% of the sample was white. Relationships found between the information environment and changes in a wom-
an’s attitudes toward mammography may not reflect the experiences of racial/ethnic minority women. Fourth, intervention status was not a significant correlate of who became more or less favorable toward mammography over time. Although an association between intervention status and a change in women’s attitudes toward mammography between baseline and year 1 would have been a preferable outcome, the intervention was not designed to affect decisional balance at the 1-year follow-up. Moreover, the higher-than-expected proportion of women with very favorable attitudes toward mammography at baseline (37%) may have resulted in less room for change than would have occurred in a sample of women chosen because they were past due for a mammogram or had barriers to screening.

The results of this study support the hypothesis that the information environment is critical for understanding changes in a woman’s perceptions about cancer screening. How health-related information is received and relayed modifies a woman’s mammography-related opinions over time. Future research should include both the giving and receiving of health-related information and advice as important determinants of women’s attitudes toward mammography and, ultimately, who seeks screening. Documenting the influence of the information environment has important implications for improving physician-patient communication about breast cancer screening.

References

Why do women's attitudes toward mammography change over time? Implications for physician-patient communication.

D N Pearlman, W Rakowski, M A Clark, et al.


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