Published in final edited form as:

Psychooncology. 2009 February ; 18(2): 169–178. doi:10.1002/pon.1393.

Adult daughters' reports of breast cancer risk reduction and early detection advice received from their mothers: an exploratory study (formerly entitled: Family communication about breast cancer prevention as reported by adult daughters in the Minnesota Breast Cancer Family Study)

Pamela S. Sinicrope, Ph.D., Christi A. Patten, Ph.D., Lara P. Clark, Tabettha A. Brockman, M.A., Emily Rock, B.A., Marlene H. Frost, Ph.D., Larra R. Petersen, Ph.D., Robert A. Vierkant, M.S., Celine M. Vachon, Ph.D., Zachary S. Fredericksen, M.S., Carol A. Janney, M.S., Thomas A. Sellars, Ph.D., and James R. Cerhan, M.D., Ph.D.

Abstract

Objective—Awareness of cancer family history is dependent upon communication between family members. Communication of this information and related decision-making could be important factors influencing breast cancer risk reduction and early detection behaviors. Using survey data from 2,328 women (mean age 62.5 years) from 372 families enrolled in the Minnesota breast cancer family study, we explored adult daughter's reports of breast cancer risk reduction advice received from their mothers.

Methods and Results—Approximately 212 (9%) of respondents reported receiving breast cancer risk reduction advice from their mothers and 130 (89%) reported acting upon such advice. Having a mother or first degree relative (FDR) with a history of breast cancer was significantly correlated with following advice to a higher degree as compared to those not having such family history ($p=0.003$).

Most frequently reported types of advice were to have mammograms (36%) and to have clinical breast exams (35%). Using multivariable logistic regression and after accounting for non-independence of the sample, significant independent correlates of receiving advice included younger age, having an affected mother, and having a higher perceived breast cancer risk. Receiving advice was also correlated with engaging in a higher number of health promoting behaviors and ever having received a mammogram.

Conclusions—Our preliminary findings are consistent with social influence theory and suggest that mother-daughter communication about reducing risk, especially among those having a FDR with breast cancer, could be a potential pathway through which BC family history is associated with the adoption of breast cancer screening and risk reduction behaviors.

Keywords

breast cancer; communication; family; social influence; mammography; psychosocial

Introduction

Declines in breast cancer mortality have been attributed to the regular use of screening mammography (yearly after age 40) and to improvement in treatments[1]. Despite this decline in mortality and increase in utilization of screening mammography, 40,480 women are expected to die from this cancer in 2008.[2] If a breast cancer is detected in-situ, the 5-year survival is 98%, compared to 81% with regional spread and 26% with distant metastases[3]. The Healthy People 2010 [4] goal to “reduce the breast cancer death rate by 20%,” can be achieved through cancer risk reduction (i.e., eating a low-fat diet, increasing exercise, cutting down on alcohol, and not smoking)[5-7] and early detection of breast cancer (i.e., clinical breast examination, mammogram, and breast self examination)[8] at its earliest stages. Aside from being female, age is the most significant risk factor for breast cancer, with the majority of cancers occurring after age 40. A family history of breast cancer also increases risk for this disease and accounts for 20-30% of all breast cancers[3]. Studies have shown that those having a first degree relative (FDR) with breast cancer are at 2-3 times higher risk of developing this cancer compared to those with no family history[9-11].

Behavioral scientists have played a role in reducing breast cancer mortality through increasing understanding of the psycho-social and behavioral factors involved in cancer screening and prevention and through incorporating such factors in cancer screening interventions, particularly with screening mammography[12]. Studies have shown that psychosocial and behavioral correlates of screening mammography include: a family history of breast cancer [13, 14]high perceived risk for getting breast cancer[15], a high degree of cancer worry and concern[16-19], a high degree of self-efficacy [20-23] for performing the tasks required to get a mammogram, and physician recommendation[24-29].

While there is a relationship between family history of breast cancer and screening mammography, current research on the association of family history to lifestyle behaviors is mixed, whereby one study found a positive association[30]; other studies have not been able to show such an association[14, 31].

The pathways through which the association between breast cancer family history and screening operate are not well understood. Additional research into communication between mothers and daughters about what they do to prevent breast cancer may help to explain this relationship and potentially provide another avenue to promote breast cancer risk reduction and early detection of breast cancer.

Population-based studies and other research indicate that social relationships have an influence on health behaviors[32-34], and consistent with social cognitive and social ecological theories of health promotion[32-35], the family is a logical and natural social context with the potential to affect and be affected by disease prevention behaviors[36-38]. Thus, mothers may be a fundamental source to educate and promote breast cancer awareness and risk reduction behaviors among daughters.[39-41]

For instance, a mother’s advice may influence health behaviors that their daughter(s) may utilize to learn more about their risk for breast cancer and follow through with cancer risk reduction and early detection behaviors.

Particularly relevant to breast cancer screening, two studies reported that women are more likely than men to provide advice about and encourage health promoting practices among spouses and children[42, 43]. Research in breast cancer screening among those having a family history of breast cancer has shown that social influence plays a key role in cancer screening decisions[44, 45], with specific emphasis and development in the area of communication about genetic testing[46-48]. For instance, studies have shown that

communication about genetic testing among family members may influence women's attitude toward and the type of decisions women make about breast cancer risk reduction and early detection behaviors. [49, 50]

A qualitative study [51] of healthy women who had attended a cancer genetics risk clinic reported how these women communicated about breast cancer family history and genetic testing and findings revealed that only some families were open in discussing family history. Among those who were open to improving communication, the desire to improve their families' health was an important motivator. A study by Rees et al[52], explored the information needs of 97 adult daughters whose mothers had early breast cancer and found that there was a good flow of information between the mothers and daughters, but that the daughters received most of their knowledge from outside sources.

To date, no studies have been published that explore communication in the form of advice that mothers provide to their daughters about breast cancer risk reduction and early detection of breast cancer; and therefore, the relationship between mother-daughter advice and breast cancer risk reduction and early detection of breast cancer is unknown. In this study, we explore communication between mothers and daughters and its relationship to breast cancer related factors in a large sample of women from the Minnesota breast cancer family study. Our aims were to: 1) determine the number of women who reported receiving breast cancer risk reduction and early detection of breast cancer advice from their mothers; 2) describe, "in their own words," the types of breast cancer risk reduction and early detection of breast cancer advice received; 3) identify demographic, psychosocial and behavioral correlates of receiving breast cancer risk reduction and early detection of breast cancer advice; and 4) report the degree to which the advice received influenced respondents' breast cancer prevention and early detection of breast cancer behaviors.

Methods

This study was approved by the Institutional Review Board at the Mayo Clinic - Rochester. Details of the baseline [53] and first follow-up (FU-1) [54] phase of the Minnesota Breast Cancer Family Study have been previously described. Briefly, a family study of breast cancer was initiated in 1944 at the University of Minnesota. Breast cancer probands were women ascertained at the Tumor Clinic of the University of Minnesota Hospital between 1944 and 1952 (n=544). From 1990-1996, 426 (78%) families were updated; each proband's first and second degree female relatives and spouses of male relatives were contacted, and extensive risk factor data were collected by telephone interview on 6,194 women (94.6% of those eligible). Additional follow-ups of the families were conducted in 2001 and 2003 using a mailed survey, followed by phone contacts for non-responders. The 2003 survey included an update of demographic data and cancer status, as well as a survey that assessed participants' attitudes and behaviors related to breast cancer prevention. Pre-addressed stamped envelopes were included with each questionnaire. When possible, individuals not returning forms within 4 weeks of mail-out were contacted by telephone and asked to complete and return the questionnaire. Of the 4493 women alive and eligible to complete the 2003 survey, 3158 (70.3%) participated, 671 refused (14.9%), 310 (6.9%) we were unable to contact after repeated attempts (contact information presumed to be accurate), and 354 (7.9%) were lost to follow-up. Of those participating, 2459 completed the full survey, and 699 completed an abbreviated survey that included only priority questions.

Measures

Dependent Variable: Advice-received—Three questions inquired about advice respondents received from their mothers to prevent breast cancer. Respondents were asked, "Did your mother provide any advice to you about things you should do to lower your breast

cancer risk?" Response categories included, "Yes," "No," and "Not Applicable." Those responding "yes" to having received advice were asked two additional questions. The first open-ended question was: "What advice did she provide?" The second question was: "To what degree did that advice influence what you have done?" Categories of response were on a 4-point Likert scale ranging from "Not at all" to "Significantly."

Sociodemographic Characteristics—Participant's age, education, marital status, and number of children were assessed.

Personal and Family History of Cancer—Self-report of the respondent's personal and family history of breast cancer was collected at each survey. We previously showed a 99% concordance between self-reported breast cancer and medical record validation[54].

Health Behavior—The purpose of this question was to quickly assess whether respondents were engaging in health promoting behaviors via the question: "Which of the following approaches have you used for your overall health, or for the prevention or early detection of breast cancer? (Mark all that apply). The eleven options included behaviors reported by women in our focus groups that they engaged in to improve their overall health and/or decrease their breast cancer risk (i.e. physical activity, decrease smoking and alcohol use).

Perceived Cancer Risk and Degree of Cancer Worry/Concern—Perceived cancer risk was measured via the question, "How would you rate your risk of breast cancer? If you have had a diagnosis of breast cancer, how would you rate your risk of a second breast cancer?" Responses were on a five-point Likert scale from "No risk" to "Extremely high risk." Degree of cancer worry/concern was measured via the question, "How often do you worry about breast cancer?" Responses were also on a 5-point Likert scale from "Not at all" to "Almost all the time." These measures were validated by Frost et al[55] and are in line with recommendations from McCaul on how to assess frequency of cancer worry/concern [56].

Breast Cancer Screening Behavior—Participants' breast cancer screening behaviors (i.e. breast self-exam (BSE), clinical breast exam, and screening mammography) and the frequency of these behaviors, were collected via 10 self-report questions.[54] For example, those who took part in the survey were asked, "Have you had a breast exam by a clinician for the detection of breast cancer?" Response categories were, "Yes" and "No." Those who responded "yes" were also asked, "How many have you had in the last 3 years?" Response categories ranged continuously from "0" to "3 or more."

Statistical methods

Qualitative Analysis—To analyze the open-ended question, "what [breast cancer prevention] advice did she provide?" qualitative methods were used. A content analysis coding scheme was employed inductively by formulating the coding categories while reading the texts of interest [57]. In short, a trained research assistant reviewed and coded open-ended responses to uncover emerging themes and categories of response[57]. To develop the set of codes and procedures for coding, a random sample of 50 responses was initially coded by the research assistant. For purposes of coder check verification, the coding of these 50 was then verified by three of the investigators with expertise in cancer prevention and screening. Of the 50, only 7 of the responses (14%) were discrepant among the research assistant and the three investigators. Once consensus was reached, the set of codes was finalized and all remaining responses were then coded into 7 categories by the research assistant.

Quantitative Analysis—Data were descriptively summarized using frequencies and percents for all categorical variables, and means and standard deviations for all continuous variables. We compared selected study variables across women who did and did not report having received advice from their mothers about breast cancer prevention using t-tests for all continuous variables and chi-square tests or, if any of the expected cell counts were less than five, Fisher's exact tests, for categorical variables. We then assessed the independent associations of each of these variables with receiving advice by simultaneously including them via multivariate logistic regression analysis, modeling advice as the outcome variable. Subsequent analyses were performed just on women who reported having received breast cancer risk reduction and early detection of breast cancer advice from their mothers. In this sub group, we compared family history of breast cancer with types of advice received using chi-square tests or Fisher's exact tests as appropriate, and with degree to which such advice influenced respondents' behavior, using Cochran-Mantel-Haenszel tests for trend. We also assessed if types of advice received differed by age using t-tests. Primary analyses assumed independence across all observations. However, we also considered analyses that account for possible non-independence of effects, realizing that lifestyle and medical behaviors may be correlated among individuals within the same family. This was carried out using generalized estimating equation methodology. Family specific correlations for each outcome were modeled using an exchangeable covariance matrix. All statistical tests were two-sided, and all analyses were carried out using the SAS system (SAS Institute, Inc., Cary, NC).

Results

Respondent characteristics

3,158 women completed the third follow-up questionnaire. Of these, 2,328 women from 372 families provided information about whether or not they received advice about breast cancer risk reduction and early detection of breast cancer from their mothers. Their mean age was 62.5 years (standard deviation 13.4, range 28 to 96), and 52% reported a post-high school education. Of the 2328, 59% (n=1362) were blood-related to the proband and 41% (n=965) were "marry-ins", women in the study who were not blood-related to the proband. Figure One provides a summary of tablespecific sample sizes for our analyses.

Receipt of advice from mothers

Overall, 212 (9%) of the women reported receiving advice from their mothers for breast cancer risk reduction and early detection of breast cancer. In this group, 73% (155) were blood-related to the proband and 27% (57) were marry-ins.

Descriptions of advice received from mothers

Among the 212 women who reported having received advice from their mother to reduce their breast cancer risk, 209 provided information on the types of advice they received. The types of advice received were organized into seven distinct categories as follows: 1) Perform breast self-examination (BSE), 2) Have a mammogram, 3) Have a clinical breast exam, 4) Know family history of breast cancer, 5) Avoid hormone replacement therapy, 6) Live a healthy lifestyle (i.e., change health behaviors), and 7) Other. Overall, 145 (69.4%) of these women reported one type of advice from their mother, 53 (25.4%) reported two types of advice, and 11(5.3%) reported three types of advice from their mothers. Table 1 shows the frequency of endorsement of the 7 categories of types of advice from mothers and examples of each kind of advice. The most frequent types of advice were to have mammograms (36%) and to have clinical breast exams (35%).

We also examined differences in the types of advice that mothers provided to their daughters based upon the mothers' personal history of breast cancer and the breast cancer history of a

first degree relative. These analyses were restricted to the subset of 152 women who were blood relatives of probands. For the 7 types of advice reported, there were no significant differences detected between respondents whose mothers had personal histories of breast cancer and those whose mothers did not. Moreover, there were no significant differences found between respondents with and without a first degree family history of breast cancer for the 7 types of advice, with the exception that women with a first degree family history of breast cancer were less likely to report having received advice about clinical breast exams (25%) compared to women with a second degree family history (41%, $p=0.04$). This apparent association was no longer statistically significant after adjusting for the effects of age via logistic regression analysis.

Extent to which women reported following mother's advice

Women who reported having received advice from their mother were asked, "To what degree did that advice influence what you have done?" Of the 209 women, 202 responded to this question. Frequencies of responses among these 202 women were 3 (1.5%) for "not at all," 19 (9.4%) for "a little," 66 (32.7 %) for "moderately," and 114 (56.4 %) for "significantly." We found differences in extent of influence by levels of family history ($p=0.02$). This difference seems to be driven by the fact that FDRs are more greatly influenced than either second degree relatives (SDR) or "marry-ins." (See table 2).

Correlates of receiving breast cancer prevention advice from mothers

Table 3 presents respondent demographic, behavioral, and psychosocial factors by whether or not the respondent reported receiving breast cancer prevention advice from their mother. Compared with those who did not receive advice, women who received advice from their mothers were generally younger, more likely to be married, had fewer children, had a mother with a diagnosis of breast cancer, and were more likely to be a blood-related family member (to the proband) rather than a "marry-in." In addition, women who reported receiving advice from their mothers reported higher levels of perceived risk and cancer worry/concern and engaged in more general health promoting activities. Finally, women who received advice were more likely to report ever having performed BSE ($p=0.02$), ever having a mammogram ($p=0.009$), and having a mammogram in the past 3 years ($p=0.006$). Analysis of mammography was limited to women age 40. No significant differences were observed between these groups by their personal history of breast cancer. We repeated all of these analyses restricted to the subset of blood relatives of the probands (i.e., excluding "marry-ins") and found a similar pattern of results with the exception of the "mean health behavior score," which was no longer statistically significant, although it trended in the same direction.

We then assessed the independent effects of these variables using a multivariate logistic regression model. After simultaneously accounting for the effects of each measure in Table 3, the following variables remained significantly correlated with receiving advice: younger age, mother's history of breast cancer, higher perceived risk, ever having received a mammogram, and a higher number of health promoting behaviors. All other variables were no longer independently associated with advice. Analyses incorporating generalized estimating equations to account for the possibility that data are correlated with family structure did not appreciably change results (data not shown).

Discussion

This study explored a potential pathway through which breast cancer family history could be associated with engaging in breast cancer risk reduction and early detection behaviors -- communication between mothers and daughters about what daughters should do to lower

their breast cancer risk. Overall, 9% (212) of women in our study reported they had received advice from their mothers on what they should do to lower their breast cancer risk. The seven types of advice received fell into 7 categories: 1) perform breast self-examination (BSE), 2) have a mammogram, 3) have a clinical breast exam, 4) know family history of breast cancer, 5) avoid hormone replacement therapy; 6) live a healthy lifestyle (i.e., health behavior changes), and 7) other.

Overall, the percentage of women who reported receiving advice was much higher among blood related women (11.3%) as compared to the marry-ins (5.9%). This finding suggests that giving advice may be more prevalent among mothers and daughters having a family history of breast cancer. However, since we do not know the breast cancer family history of the marry-ins in this sample, this finding needs to be interpreted with caution. Interestingly, our multivariate analysis found younger age, having an affected mother, higher perceived cancer risk, ever having received a mammogram, and engaging in a higher number of health behaviors to be independently and significantly correlated with receiving advice. Interestingly, while degree of cancer worry / concern was found to be univariately associated with receiving advice, the association was no longer significant after multivariate adjustment. While other studies have found worry/concern and perceived risk to be associated with cancer screening [56] and with interest and uptake of genetic testing[56, 58-60], no studies have assessed the relationship of these variables to communication as the outcome of interest, particularly with the receipt of communication. Work by Kevin McCaul discusses the fact that while risk and worry often operate independently on behavior, they are also related to one another as well as to family history.[61, 62]

The interrelatedness of cancer worry / concern to other variables in our model (such as perceived risk or family history) need to be further investigated to understand the meaning of this finding.

When analyzing these results by degree of family history of cancer, we find that those having a first degree relative with breast cancer reported following the advice received to a higher degree than those not reporting a first degree relative with breast cancer or to the “marry-ins.” We saw less of a difference on extent of influence between the SDRs and the “marry-ins.” This could be attributable to the fact that some of these marry-ins do in fact have a family history that we were unable to measure. This finding could be suggestive of a potential pathway through which strong family history of breast cancer is associated with increased reporting of breast cancer screening compared with those having no family history [63-65]

Our findings are limited by the cross-sectional nature of our study design which precluded us from ascertaining the cause effect relationship between advice and breast cancer risk reduction and early detection behaviors. We also do not know how often this type of advice was provided. Also, our information on breast cancer risk reduction and early detection behaviors is all by self-report and we cannot verify the accuracy of such reports. Finally, the sample from this study was primarily Caucasian, which precludes our ability to understand how communication may be similar or different in other ethnic groups. Further research on communication in families using a multi-ethnic sample is necessary.

In light of women’s reports that they follow their mother’s advice, only 9% of the women in our study recalled receiving advice from their mother. Although the proportion of women receiving advice from their mothers in the general population is unknown, we could speculate that it might be even lower than in this cohort of women who may have more awareness regarding breast cancer due to family history. This finding related to a lack of mother-daughter communication about breast cancer risk reduction and early detection of

breast cancer could be attributed to the age of our respondents relative to the timing of innovations in breast cancer treatment, prevention, and promotion. Women in our study who reported not having received advice had a mean age of 63.1 years, and in their mothers' generation there was less promotion of breast cancer prevention and awareness than in the current one, and it is likely that there are generational differences in communication about breast cancer risk reduction and early detection of breast cancer. For example, the American Cancer Society first introduced guidelines for mammography to the public in 1980[66], and between 1987 and 1998, the percentage of women over 40 years old in the United States with mammograms in the previous two years more than doubled to 67 percent[67].

Second, based on previous research [42] we explored receipt of advice from the respondent's mother only. It is possible that respondents who reported not receiving advice from their mothers may have received advice from other sources, including friends, family members, and physicians. It is possible that some women were provided advice by their mothers but did not recognize or interpret it as such, and it is unknown whether or not it was solicited. Nonetheless, our preliminary findings warrant further investigation and suggest new areas for theory-based breast cancer communication and prevention research.

Our next steps will be to investigate whether these same women provided advice to their daughters about breast cancer risk reduction and early detection. We need to know more about the frequency and patterns of advice-giving – when it occurs during the developmental lifespan, how often it occurs, when it has the most impact, what type of advice has the most impact, and so on. We plan to explore advice from all sources within the family as a unit as well as from other sources, such as the healthcare provider. Within these social networks, other communication variables, such as the quality of the relationship, the frequency of communication about health related issues generally, and the most effective styles of communication (directive versus nondirective), could be assessed. Finally, we need to understand whether advice-giving is associated with the same factors as advice-receiving, specifically, perceived cancer risk and degree of cancer worry and concern. Understanding these relationships will provide researchers with essential information on how a potential family communication intervention should be structured.

The current study explored advice received in one direction, from mother to daughter; future studies should explore advice in both directions, as a newly reported study indicates that advice-giving goes both ways and upward advice-giving increases as children mature into adulthood[68]. Findings from this study with others (will continue to inform and mature the discussion about the influence of communication between families and the larger social network on breast cancer prevention behaviors.

If these associations are confirmed in future studies, then intervention strategies incorporating effective family communication strategies to increase the uptake of breast cancer screening and lifestyle behaviors may be warranted, especially among those having a FDR with breast cancer. For example, some recent work in cancer prevention targets and intervenes with family members [45, 69] and other social network members to promote health behavioral change and cancer screening[70-72]. These strategies could be expanded to promote effective communication between mothers and daughters about how to reduce breast cancer risk.

Acknowledgments

This study was funded by National Health Institute grant number PO1 CA 82267.

We would like to thank Gail Bierbaum for her assistance in editing and preparing our manuscript. We would also like to thank Tabettha Brockman for reviewing drafts of this manuscript.

References

1. Alberg AJ, et al. Epidemiology, prevention, and early detection of breast cancer. *Curr Opin Oncol.* 2000; 12(6):515–20.
2. American Cancer Society. [Accessed on 02-10-2008] Cancer Facts & Figures 2008. <http://www.cancer.org/downloads/STT/2008CAFFfinalsecured.pdf>
3. American Cancer Society. [Accessed on 02-10-2006] Cancer Facts and Figures 2006. http://www.cancer.org/docroot/STT/content/STT_1x_Cancer_Facts_Figures_2006.asp
4. US Department of Health and Human Services. Healthy People 2010. US Department of Health and Human Services; Washington, DC: 2000.
5. Linos E, Holmes MD, Willett WC. Diet and breast cancer. *Curr Oncol Rep.* 2007; 9(1):31–41. [PubMed: 17164045]
6. Hardman AE. Physical activity and cancer risk. *Proc Nutr Soc.* 2001; 60(1):107–13. [PubMed: 11310415]
7. Brewster A, Helzlsouer K. Breast cancer epidemiology, prevention, and early detection. *Curr Opin Oncol.* 2001; 13(6):420–5. [PubMed: 11673680]
8. Stein CJ, Colditz GA. Modifiable risk factors for cancer. *Br J Cancer.* 2004; 90(2):299–303. [PubMed: 14735167]
9. Sellers TA, et al. Fifty-year follow-up of cancer incidence in a historical cohort of Minnesota breast cancer families. *Cancer Epidemiol Bio Prev.* 1999; 8(12):1051–7.
10. Sattin RW, et al. Family history and the risk of breast cancer. *JAMA.* 1985; 253(13):1908–13. [PubMed: 3974080]
11. Thompson WD. Genetic epidemiology of breast cancer. *Cancer.* 1994; 74(1 Suppl):279–87. [PubMed: 8004598]
12. Vernon SW, Meissner HI, Miller SM. The role of behavioral science in cancer prevention research: planning the next steps in the collaborative process. *Cancer Epidemiol Bio Prev.* 2006; 15(3):413–5.
13. McCaul KD, et al. What is the relationship between breast cancer risk and mammography screening? A meta-analytic review. *Health Psychol.* 1996; 15(6):423–9. [PubMed: 8973921]
14. Madlensky L, et al. Preventive health behaviors and familial breast cancer. *Cancer Epidemiol Bio Prev.* 2005; 14(10):2340–5.
15. Lerman C, et al. Mammography adherence and psychological distress among women at risk for breast cancer. *J Natl Cancer Inst.* 1993; 85(13):1074–80. [PubMed: 8515494]
16. Consedine NS, Magai C, Neugut AI. The contribution of emotional characteristics to breast cancer screening among women from six ethnic groups. *Prev Med.* 2004; 38(1):64–77. [PubMed: 14672643]
17. McCaul KD, et al. A descriptive study of breast cancer worry. *J Behav Med.* 1998; 21(6):565–79. [PubMed: 9891255]
18. McCaul KD, Schroeder DM, Reid PA. Breast cancer worry and screening: some prospective data. *Health Psychol.* 1996; 15(6):430–3. [PubMed: 8973922]
19. McCaul KD, et al. What is the relationship between breast cancer risk and mammography screening? A meta-analytic review. *Health Psychol.* 1996; 15(6):423–9. [PubMed: 8973921]
20. Champion V, Skinner CS, Menon U. Development of a self-efficacy scale for mammography. *Research in Nursing & Health.* 2005; 28(4):329–36. [PubMed: 16028267]
21. Meana M, et al. Influences on breast cancer screening behaviors in Tamil immigrant women 50 years old and over. *Ethnicity & Health.* 2001; 6(3-4):179–88. [PubMed: 11696929]
22. Allen JD, et al. Intention to have a mammogram in the future among women who have underused mammography in the past. *Health Educ Behav.* 1998; 25(4):474–88. [PubMed: 9690105]
23. Savage SA, Clarke VA. Factors associated with screening mammography and breast self-examination intentions. *Health Education Research.* 1996; 11(4):409–21. [PubMed: 10163953]
24. Rauscher GH, Hawley ST, Earp JA. Baseline predictors of initiation vs. maintenance of regular mammography use among rural women. *Prev Med.* 2005; 40(6):822–30. [PubMed: 15850884]

25. O'Malley MS, et al. The association of race/ethnicity, socioeconomic status, and physician recommendation for mammography: who gets the message about breast cancer screening? *Am J Public Health*. 2001; 91(1):49–54. [PubMed: 11189825]
26. Hawley ST, et al. The role of physician recommendation in women's mammography use: is it a 2-stage process? *Medical Care*. 2000; 38(4):392–403. [PubMed: 10752971]
27. May DS, et al. Compliance with mammography guidelines: physician recommendation and patient adherence. *Prev Med*. 1999; 28(4):386–94. [PubMed: 10090868]
28. Ruchlin HS. Prevalence and correlates of breast and cervical cancer screening among older women. *Obstetrics & Gynecology*. 1997; 90(1):16–21. [PubMed: 9207805]
29. Lane DS, Caplan LS, Grimson R. Trends in mammography use and their relation to physician and other factors. *Cancer Detect Prev*. 1996; 20(4):332–41. [PubMed: 8818394]
30. Lemon SC, Zapka JG, Clemow L. Health behavior change among women with recent familial diagnosis of breast cancer. *Prev Med*. 2004; 39(2):253–62. [PubMed: 15226033]
31. Bowen DJ, et al. The relationship between perceived risk, affect, and health behaviors. *Cancer Detection & Prevention*. 2004; 28(6):409–17. [PubMed: 15582264]
32. Cohen S. Social Relationships and Health. *American Psychologist*. 2004; 59(8):676–684. [PubMed: 15554821]
33. Lewis MA, Rook KS. Social control in personal relationships: Impact on health behaviors and psychological distress. *Health Psychol*. 1999; 18(1):63–71. [PubMed: 9925047]
34. Umberson D. Family status and health behaviors: social control as a dimension of social integration. *J Health Soc Behav*. 1987; 28(3):306–19. [PubMed: 3680922]
35. Bandura A. Health promotion by social cognitive means. *Health Educ Behav*. 2004; 31(2):143–64. [PubMed: 15090118]
36. Weihs K, Fisher L, Baird M. Families, health, and behavior: A section of the commissioned report by the Committee on Health and Behavior: Research, Practice, and Policy Division of Neuroscience and Behavioral Health and Division of Health Promotion and Disease Prevention Institute of Medicine, National Academy of Sciences. *Families, Systems & Health*. 2003; 20(1):7–46.
37. Campbell TL. The effectiveness of family interventions for physical disorders. *Journal of Marital & Family Therapy*. 2003; 29(2):263–281. [PubMed: 12728782]
38. Franks P, Campbell TL, Shields CG. Social relationships and health: the relative roles of family functioning and social support. *Soc Sci Med*. 1992; 34(7):779–88. [PubMed: 1604372]
39. Umberson D. Gender, marital status and the social control of health behavior. *Soc Sci Med*. 1992; 34(8):907–17. [PubMed: 1604380]
40. Lye DN. Adult Child-Parent Relationships. *Annual Review of Sociology*. 1996; 22(1):79–102.
41. Green J, et al. Family Communication and Genetic Counseling: The Case of Hereditary Breast and Ovarian Cancer. *J Gene Counsel*. 1997; 6(1):45–60.
42. Umberson D. Gender, marital status and the social control of health behavior. *Soc Sci Med*. 1992; 34(8):907–17. [PubMed: 1604380]
43. McDowell DJ, Parke RD, Wang SJ. Differences between mothers' and fathers' advice-giving style and content: Relations with social competence and psychological functioning in middle childhood. *Merrill-Palmer Quarterly*. 2003; 49:55–76.
44. Montano DE, et al. Acceptance of flexible sigmoidoscopy screening for colorectal cancer. *Cancer Detect Prev*. 2004; 28(1):43–51. [PubMed: 15041077]
45. Manne S, et al. Correlates of colorectal cancer screening compliance and stage of adoption among siblings of individuals with early onset colorectal cancer. *Health Psychol*. 2002; 21(1):3–15. [PubMed: 11846342]
46. Halbert CH. Decisions and outcomes of genetic testing for inherited breast cancer risk. *Annals of Oncology*. 2004; 15(Suppl 1):I35–I39. [PubMed: 15280185]
47. Bowen DJ, et al. Effects of individual and family functioning on interest in genetic testing. *Community Genetics*. 2004; 7(1):25–32. [PubMed: 15475668]
48. Green J, et al. Family communication and genetic counseling: the case of hereditary breast and ovarian cancer. *J Genet Counsel*. 1997; 6:45–60.

49. Peterson SK. The role of the family in genetic testing: theoretical perspectives, current knowledge, and future directions. *Health Educ Behav.* 2005; 32(5):627–39. [PubMed: 16148209]
50. Hughes C, et al. All in the family: evaluation of the process and content of sisters' communication about BRCA1 and BRCA2 genetic test results. *American Journal of Medical Genetics. Supplement.* 2002; 107(2):143–50.
51. Kenen R, Arden-Jones A, Eeles R. We are talking, but are they listening? Communication patterns in families with a history of breast/ovarian cancer (HBOC). *Psycho-Oncology.* 2004; 13(5):335–45. [PubMed: 15133774]
52. Rees CE, Bath PA. Meeting the information needs of adult daughters of women with early breast cancer. Patients and health care professionals as information providers. *Cancer Nursing.* 2000; 23(1):71–9. [PubMed: 10673810]
53. Sellers TA, et al. Epidemiologic and genetic follow-up study of 544 Minnesota breast cancer families: design and methods. *Gen Epidemiol.* 1995; 12(4):417–29.
54. Sellers TA, et al. Family history, ethnicity, and relative risk of breast cancer in a prospective cohort study of older women. *Cancer Epidemiol Bio Prev.* 1999; 8(5):421–5.
55. Frost MH, et al. Perceived familial risk for cancer: Psychosocial Adjustment. *Journal of Psychosocial Oncology.* 2000; 18(1):63–82.
56. McCaul KD, Goetz P. Health Behavior Constructs: Theory, Measurement, and Research. Worry. 2007 Available from: <http://dccps.cancer.gov/brp/constructs/worry/index.html>.
57. Miles, MB.; Huberman, MA. *Qualitative Data Analysis.* Second ed. Sage Publishing, Inc.; Thousand Oaks: 1994. p. 338
58. Durfy SJ, et al. Attitudes and interest in genetic testing for breast and ovarian cancer susceptibility in diverse groups of women in western Washington. *Cancer Epidemiol Bio Prev.* 1999; 8(4 Pt 2): 369–75.
59. van Oostrom I, et al. Comparison of individuals opting for BRCA1/2 or HNPCC genetic susceptibility testing with regard to coping, illness perceptions, illness experiences, family system characteristics and hereditary cancer distress. *Patient Educ Couns.* 2007; 65(1):58–68. [PubMed: 16872788]
60. Gwyn K, Vernon SW, Conoley PM. Intention to pursue genetic testing for breast cancer among women due for screening mammography. *Cancer Epidemiol Bio Prev.* 2003; 12(2):96–102.
61. McCaul KD, Tulloch HE. Cancer screening decisions. *Monogr Natl Cancer Inst.* 1999; 25:52–58. [PubMed: 10854458]
62. Moser RP, et al. Associations of perceived risk and worry with cancer health-protective actions: data from the Health Information National Trends Survey (HINTS). *J Health Psychol.* 2007; 12(1): 53–65. [PubMed: 17158840]
63. Meissner HI, et al. Which women aren't getting mammograms and why? (United States). *Cancer Causes Control.* 2007; 18(1):61–70. [PubMed: 17186422]
64. Cui Y, et al. Mammography use in the Southern Community Cohort Study (United States). *J Health Care Poor Underserved.* 2007; 18(4 Suppl):102–17. [PubMed: 18065854]
65. Amin A, et al. Breast cancer screening compliance among young women in a free access healthcare system. *J Surg Oncol.* 2008; 97(1):20–4. [PubMed: 17918226]
66. Eddy D. ACS report on the cancer-related health checkup. CA. *A Cancer Journal for Clinicians.* 1980; 30(4):193–240.
67. Hiatt RA, et al. Cancer screening practices from National Health Interview Surveys: past, present, and future. *J Natl Cancer Inst.* 2002; 94(24):1837–46. [PubMed: 12488477]
68. Poon B, Pittinsky TL. Upward Advice Transmission in the Family: The Role of Gender in Young Adults Giving Advice to their Parents. Available at: <http://ssrn.com/abstract=832630>.
69. Patten CA, et al. Training support persons to help smokers quit: a pilot study. *American Journal of Preventive Medicine.* 2004; 26(5):386–90. [PubMed: 15165654]
70. Davis DT, et al. The urban church and cancer control: a source of social influence in minority communities. *Public Health Reports.* 1994; 109(4):500–6. [PubMed: 8041849]
71. Eng E, Parker E, Harlan C. Lay health advisor intervention strategies: a continuum from natural helping to paraprofessional helping. *Health Educ Behav.* 1997; 24(4):413–7. [PubMed: 9247821]

72. Eyler AA, et al. Physical activity social support and middle- and olderaged minority women: results from a US survey. *Soc Sci Med.* 1999; 49(6):781–9. [PubMed: 10459889]

Figure One.

Flowchart of Table-Specific Sample Sizes To Assess Reports of Women Receiving Advice From Their Mothers.

Table 1

Frequencies of Endorsement of the 7 categories of Types of Advice from Mothers regarding Breast Cancer Prevention (N=209)¹

Category	N (%) ²	Quotes from Women
1. Perform BSE	54 (26)	<ul style="list-style-type: none"> • Self-exams; talks of her own cysts that were detected. • Encouraged monthly breast exams. • Watch for lumps and dimples. • She had me feel the lump in her breast (cancer). • Tips on what I should watch for—dimples appear.
2. Have mammogram	75 (36)	<ul style="list-style-type: none"> • Regular mammograms after 40, which I hit soon. • Have mammograms when due. Don't skip. • Get annual mammograms to catch cancer early.
3. Clinician breast exam	74 (35)	<ul style="list-style-type: none"> • Yearly check-up by a doctor. • See doctor regularly. • Have doctor checks.
4. Knowledge of family history of breast cancer	19 (9)	<ul style="list-style-type: none"> • Let doctor know about family history of breast cancer. • It runs on both sides of the family. • Grandma had breast cancer.
5. Avoid hormone replacement therapy	4 (2)	<ul style="list-style-type: none"> • To not take hormonal replacement. • Not to take a certain estrogen medication. This is what is believed to have triggered her breast cancer in 1999. • Do not take hormonal drugs.
6. Live a Healthy lifestyle	47(22)	<ul style="list-style-type: none"> • Did say exercise, eat right, lose weight. • She said, "Don't smoke, and don't live with a smoker." • Increase fruits and vegetables, decrease meat. • Keep a healthy lifestyle. • Take care of yourself.
7. Other	11 (5)	<ul style="list-style-type: none"> • Breast-feed children. • She always had a positive attitude. • Use of essential oils. • If you ever find a lump, have it removed ASAP.

¹Three women who received advice not included because they did not provide information on type of advice received.

²Percentages do not total 100% since categories are not mutually exclusive; that is, women could endorse more than one type of advice given to them by their mothers.

Table 2

Reports of Degree to Which Respondents Followed The Advice Received By Family History of Breast Cancer (n=202)

Degree to which mothers' advice influenced respondent's behavior	FDR with History of Breast Cancer (N=84) ¹	SDR with History of Breast Cancer (N=62) ¹	Marry-in (N=56) ¹	P-value ²
Not at all	0 (0)	2 (2)	1 (2)	0.02
A little	4 (6)	10 (12)	5 (9)	
Moderately	14 (23)	33 (39)	19 (34)	
Significantly	44 (71)	39 (46)	31 (55)	

¹Values presented as number (percent)

²P-value comparing all three groups calculated using Cochran-Mantel-Haenszel chi-square test for trend.

Table 3

Respondent Characteristics by Whether or Not Daughter Received Advice on Breast Cancer Prevention (N=2,328).

Characteristic	Received advice (N=212) ^I	Did not receive advice (N=2,116) ^I	univariate P-value ²	multivariate P-value ³
Mean age (SD, range)	56.3 (13.8,28-89)	63.1 (13.2,28-96)	<0.001	<0.001
Marital status			0.005	0.57
Married	175 (83)	1677 (79)		
Living with someone	3 (1)	50 (2)		
Separated or divorced	14 (7)	136 (6)		
Widowed	8 (4)	198 (9)		
Never married	12 (6)	52 (2)		
Education			0.04	0.53
High school education or GED	87 (41)	1026 (49)		
Post-high school	125 (59)	1088 (51)		
Mean number of children (SD, range)	2.7 (2.0,0-10)	3.3 (2.2,0-15)	<0.001	0.99
Personal history of breast cancer			0.19	0.51
No	202 (95)	1965 (93)		
Yes	10 (5)	151 (7)		
Mother's personal history of breast cancer			<0.001	<0.001
No	155 (73)	1917 (91)		
Yes	57(27) 199	(9)		
Relationship to closest person affected with breast cancer			<0.001	-
1 st degree	62 (29)	314 (15)		
2 nd degree	93 (44)	893 (42)		
Marry-in	57 (27)	908 (43)		
Perceived breast cancer risk	3.1 (0.9,1-5)	2.6 (0.9,1-5)	<0.001	0.002
Degree of cancer worry/concern	2.5 (1.0,1-5)	2.2 (0.9,1-5)	<0.001	0.35
Mean health behavior score (SD, range)	1.8 (1.2,0-4)	1.6 (1.1,0-4)	0.02	0.03
Mammogram in past three years ³			0.006	-
No	6 (3)	178 (9)		
Yes	188 (97)	1831 (91)		
Ever mammogram ⁴			0.009	0.05

Characteristic	Received advice (N=212) ¹	Did not receive advice (N=2,116) ¹	univariate P-value ²	multivariate P-value ³
No	1 (1)	88 (4)		
Yes	193 (99)	1929 (96)		
BSE in past three years			0.12	-
No	18 (9)	257 (12)		
Yes	191 (91)	1833 (88)		
Ever BSE			0.02	0.35
No	10 (5)	200 (10)		
Yes	200 (95)	1900 (90)		

¹Values presented as number (percent) unless otherwise indicated.

²Chi-square tests for categorical variables and t-tests for continuous and ordinal variables.

³Multivariate logistic regression analysis, simultaneously accounting for all other variables in the table. Due to multicollinearity, the following variables could not be included in the regression model: relationship to closest affected family member (correlated with mother's personal history of breast cancer), mammogram in past three years (correlated with ever received a mammogram), and BSE in past three years (correlated with ever performed BSE).

⁴Subset to women age 40 and older at time of survey.