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Award Number: DAMD17-99-1-9305

TITLE: Psychological Distress, Cognitive Bias and Breast Cancer
       Surveillance Behavior in Women Tested for BRCA 1/2
       Mutation

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REPORT DATE: August 2002

TYPE OF REPORT: Annual Summary

PREPARED FOR: U.S. Army Medical Research and Materiel Command
              Fort Detrick, Maryland 21702-5012

DISTRIBUTION STATEMENT: Approved for Public Release;
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Form Approved
OMB No. 074-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE August 2002	3. REPORT TYPE AND DATES COVERED Annual Summary (1 Jul 2001 - 1 Jul 2002)

4. TITLE AND SUBTITLE
Psychological Distress, Cognitive Bias and Breast Cancer Surveillance Behavior in Women Tested for BRCA 1/2 Mutation

5. FUNDING NUMBERS
DAMD17-99-1-9305

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9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

10. SPONSORING / MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for Public Release; Distribution Unlimited

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 Words)
This research project examines psychological distress and processing of information associated with breast cancer risk. Understanding the types and magnitude of women's distress and impaired processing of cancer-related information is critical because cancer-related distress has been associated with poorer compliance with screening behaviors, and impaired processing of cancer information may decrease women's knowledge and understanding of (and hence, compliance with) recommended screening guidelines. These concerns may be particularly salient among women who attend genetic counseling, as they receive complex, and oftentimes-distressing information about their risk for the disease. To date, our findings indicate that women with family histories of breast cancer may be so preoccupied with their risks for developing breast cancer that they exhibit impaired processing of cancer–related information, which may lead to poorer informed choices about their health care. We also found that these women underestimate their risks of developing other more common diseases, such as cardiovascular disease, and this may be exacerbated by biased media coverage of breast cancer. Our research has also demonstrated that distress about breast cancer is related to significantly poorer knowledge of information presented during genetic counseling. Results of this project (laboratory model of cancer-information processing), coupled with present results ("real life" assessment of distress and knowledge after genetic counseling) strongly suggest that women at increased risk for breast cancer may not be adequately processing information critical to their health care, in spite of the fact that they may stand to gain the most from counseling.

14. SUBJECT TERMS
breast cancer, genetic counseling, cognition, distress, Stroop Task

15. NUMBER OF PAGES
48

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT Unlimited

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. Z39-18
298-102

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Introduction

This research project is aimed at examining psychological distress and processing of information associated with risk for breast cancer among women at risk for the disease. To that end, we have been recruiting women with and without family histories of breast cancer and assessing their levels of self-reported distress, their cognitive processing of cancer-related information, and their perceived risks for breast cancer and other diseases. Understanding the types and magnitude of women's distress and impaired processing of cancer-related information is critical because cancer-related distress has been associated with poorer compliance with screening behaviors, and impaired processing of cancer information may decrease women's knowledge and understanding of (and hence, compliance with) recommended screening guidelines. These concerns may be particularly salient among women who attend genetic counseling, as they receive complex, and oftentimes distressing information about their risk for the disease. The research project is one part of a larger training experience for the PI. Accomplishments in both the training and research components of the award to date are described below.

Training Accomplishments

As in the first 2 years of the training program, during the past year, the PI had the opportunity to participate in the diverse didactic training offerings of the Cancer Prevention and Control and Biobehavioral Medicine programs at Mount Sinai. This is in addition to weekly meetings with Mentor Bovbjerg to discuss issues related to the research. Scheduled colloquia, as well as informal lunch meetings with Mount Sinai faculty from the Cancer Center, Departments of Oncology, Radiology, and Human Genetics were regularly attended. In addition, special seminars from invited guest lecturers were periodically scheduled, providing an opportunity to forge broader connections and establish networks of collaboration. The PI continues to work closely with Ms. Karen Brown, director of Cancer Genetic Counseling in the Department of Human Genetics, who is at the forefront of risk communications to patients. Regular biostatistical core lectures by Dr. Gary Winkel both at the Cancer Center and at the CUNY graduate center provided ample opportunity for development of advanced biostatistical and data-analytic skills. Guest lecturers included many noted scholars of biobehavioral medicine. In addition, the PI was once again afforded the opportunity to teach one class session of the Center's core course, Introduction to Behavioral Medicine, which was attended by physicians, nurses, medical students, and students in Mount Sinai's genetic counseling program. Through weekly "work-in-progress" meetings, the PI was afforded the opportunity to present his ongoing research, providing a forum to further hone presentation and communication skills. Finally, the PI had the opportunity this past year to both present his work at a national meeting in Washington, DC, and meet other investigators in the field with similar interests and share ideas.

Research Accomplishments

In this study, we aimed to assess distress and cognitive processing of cancer-related information among women in three groups 1) women with family histories of breast cancer who tested positive for BRCA1/2 mutations; 2) women with family histories of breast cancer who tested negative for BRCA1 /2 mutations; and 3) women without family histories of breast cancer who have not undergone genetic testing. We are continuing to experience difficulty recruiting women who test positive for BRCA1 /2 mutations because of low base rates for the mutation in the general population. We broadened our recruitment efforts to include affiliate hospitals in the Mount Sinai system (e.g., Elmhurst, St. Barnabus) to increase our access to these women, but still faced poor accrual. As a result we refocused our efforts in to recruit women with family histories of breast cancer who have not undergone genetic counseling. Comparing this group to a group of women without family histories of breast cancer has allowed us to explore the possibility that women with family histories of breast cancer have higher levels of persistent distress and impaired cancer-related information processing than women without such family histories. This endeavor has also allowed us to assess the sensitivity of our primary cognitive task, the cancer Stroop task, in during which subjects are asked to name the color of ink in which cancer-related words are printed on a sheet of paper. Designed to assess the degree to which the actual words distract the subject from the primary task (color naming), we indeed found that women in this study of breast cancer took longer to color-name the cancer word list relative to other comparison word lists (i.e., cardiovascular disease, general threat, positive, and neutral color-words). To date, our findings indicate that in this sample, women with family histories reported higher levels of self-reported cancer specific intrusive thoughts and avoidance, took significantly longer to color-name cancer words (i.e., increased vigilance to the cancer words distracted them from the primary task of color-naming), and had more errors on the task than did women without family histories of the disease. These findings were significant (p<.005), even after controlling for reading ability and education. Interestingly, Stroop reading times were not related to distress levels in these women, possibly suggesting that the Stroop may be sensitive to aspects of stress that are not being tapped by traditional self-report methods. Finally, consistent with the large body of literature on cognitive processing of anxiety-related stimuli, we found that memory for the cancer words in the Stroop task was poorer for women with family histories of breast cancer and for women with elevated objective risk. These findings suggest that women are initially exhibiting heightened vigilance toward putatively anxiety provoking materials (as evidenced by slower color naming times), but then demonstrate a subsequent cognitive avoidance of those same materials (as evidenced by poorer word recall). These findings were presented at the national meeting of the Society of Behavioral Medicine in Seattle in March, 2001), and the full report has been submitted to Health Psychology, and was resubmitted with minor revisions. Other findings by the PI and Mentor further emphasize the possibility that women at risk for breast cancer experience preoccupation with the disease: we recently found that, in comparison to women without family histories of breast cancer (n = 104), women with family histories of breast cancer (n = 73), while grossly overestimating their risks for breast cancer, also substantially underestimated their risks for developing other

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diseases, such as colon cancer and heart disease. These findings suggested that the emphasis on breast cancer risk may need to be balanced by educational efforts concerning risks for other diseases. This study was published in <u>Preventive Medicine</u> (see Appendix). We also completed a small laboratory-based study which demonstrated that thinking (guided imagery) about breast cancer causes increases in stress. In this study, self-reported distress and blood pressure were assessed in a sample of 26 healthy women across three conditions: 1) baseline (no imagery), 2) guided imagery of undergoing mammography, and for the purposes of comparison, 3) guided imagery of taking a trip to the park. Results indicated increased distress, systolic and diastolic blood pressure during and after the mammography imagery, compared to either baseline or neutral imagery conditions. These results were presented at the March, 2001 meeting of the American Psychosomatic Society in Monterey, CA (see Appendix). In addition to the above research which focused mainly on the impact of familial risk for breast cancer on perceived risk and distress, we have also tested the possibility that the distress associated with thoughts of breast cancer risk would be related to poorer breast cancer knowledge after genetic counseling. In this study, 107 women who underwent genetic counseling completed a 27-item breast cancer knowledge questionnaire, a questionnaire assessing breast cancer related distress, and a measure of general distress. Approximately one week following their counseling session, the women again completed the knowledge questionnaire. Findings indicated that there was a significant increase in knowledge from before to after the genetic counseling session. However there was wide variability among women, with some women showing no improvement. Improvements were smaller for minority women, less educated women, and women with high levels of general distress. These findings support our contention that distress may play a role in the processing of information provided during genetic counseling. Results were presented in Philadelphia, PA, at the 50th annual meeting of the American Society of Human Genetics in October, 2000 (see Appendix). Although these data raise the strong possibility that distress may impact breast cancer information processing, the 27-item questionnaire we used has yet to be validated. As a result, with the guidance of genetic counselors, we have also undertaken the development of a broad questionnaire (see Appendix) that assesses knowledge of the range of information provided during genetic counseling. At this time, we have completed our accrual of questionnaires in our validation study, in which the questionnaire was completed by health care practitioners employed in a cancer setting, health care practitioners employed in other medical settings, genetic counselees, women with family histories of breast cancer who have not attended genetic counseling and women without family histories of breast cancer. 75 subjects have been recruited and data analyses preliminarily indicate high levels of internal consistency and a confirmed factor structure. Ultimately, this validated questionnaire will allow us to assess the degree to which knowledge is increased by genetic counseling, and the degree to which psychological distress interferes with that process using an instrument validated to measure knowledge. Other published results supported by the award are listed below.

Key Research Accomplishments During Three-year Project Period:

- Characterized distress levels in women with family histories of breast cancer

- Demonstrated that breast cancer mortality in the family, as well as caring for a breast cancer patient significantly impacts distress levels, even years later.

- Demonstrated that this distress predicts non-compliance with recommended screening behaviors.

- Identified aberrant processing of cancer-related information in women at familial risk for breast cancer

- Identified causal relations between thoughts of breast cancer and self-reported distress and blood pressure increases.

- Demonstrated that familial risk for breast cancer is related to overestimation of breast cancer risk, but underestimation of cardiovascular disease and colon cancer risks.

- Demonstrated that mass media grossly favors coverage of breast cancer vs. cardiovascular disease which may explain the highly inflated perceptions of personal risk for breast cancer, as well as the underestimation of cardiovascular disease risk among women

- Demonstrated that amount of knowledge gained by genetic counselees during counseling is predicted by distress levels.

- Continued development of an instrument to assess knowledge gained during breast cancer genetic counseling (Knowledge Questionnaire)

Reportable Outcomes:

1. Bovbjerg, D., Erblich, J., and Valdimarsdottir, H. (1999). *Intrusive thoughts and perceived risk predict general distress in women with family histories of breast cancer.* Annals of Behavioral Medicine, 21. (Abstract).

2. Erblich, J., Bovbjerg, D., and Valdimarsdottir, H. (1999). *Caregiving and maternal breast cancer death predict current distress in women with family histories of breast cancer.* Annals of Behavioral Medicine, 21. (Abstract).

3. Erblich, J., Bovbjerg, D., and Valdimarsdottir, H. (1999). *Death of a first-degree relative from breast cancer predicts frequency of breast self-examination.* Annals of Behavioral Medicine, 21. (Abstract).

4.   Erblich, J., Bovbjerg, D., and Valdimarsdottir, H. (2000). *Looking forward and back: Distress among women at familial risk for breast cancer.* Annals of Behavioral Medicine, 22, 53-59.

5.   Erblich, J., Bovbjerg, D., and Valdimarsdottir, H. (2000). *Psychological distress, health beliefs and frequency of breast self-examination.* Journal of Behavioral Medicine, 23, 277-292.

6.   Erblich, J., Bovbjerg, D., Norman, C., Valdimarsdottir, H., and Montgomery, G. (2000). *It won't happen to me: Lower perception of heart disease risk among women with family histories of breast cancer.* Preventive Medicine 31, 714-721.

7.   Brown, K., Valdimarsdottir, H., Erblich, J., Amareld, J., Scheuer, L., Hull, J., McDermott, D., Bovbjerg, D., Hurley, K., and Offit, K. (2000). *Does genetic counseling for breast cancer predisposition increase knowledge?* American Journal of Human Genetics, 67 (suppl. 2), 106. (Abstract).

8.   Erblich, J., Bovbjerg, D., Valdimarsdottir, H., Montgomery, G., and Cloitre, M. (2001). *Selective processing of cancer-related stimuli among women with family histories of breast cancer.* Annals of Behavioral Medicine, 23. (Abstract).

9.   Bovbjerg, D., Montgomery, G., Erblich, J., Lee, M., Ng, K., and Sloan, R. (2001). *Psychophysiological reactivity to scripted imagery of undergoing mammography screening for breast cancer.* Psychosomatic Medicine, 63. (Abstract).

10. Montgomery, G., Erblich, J., DiLorenzo, T., and Bovbjerg, D. (2002). *Perceived risk of cancer: It's not what you know but who you know.* Annals of Behavioral Medicine, 25. (Abstract).

11. DiLorenzo, T., Erblich, J., Montgomery, G., Ephron, R., Shaffren, M., and Bovbjerg, D. *Family histories of disease and disease-specific worry: The role of perceived risk.* Annals of Behavioral Medicine, 25. (Abstract).

12. Blanchard, D., Erblich, J., Montgomery, G., and Bovbjerg, D. (in press). *Read all about it: The over-representation of breast cancer in popular magazines.* Preventive Medicine.

13. Erblich, J., Montgomery, G., Valdimarsdottir, H., Cloitre, M., and Bovbjerg, D. (revisions submitted). Biased cognitive processing of cancer-related information among women with family histories of breast cancer: Evidence from a cancer Stroop task. Health Psychology.

APPENDICES

1. Looking Forward and Back: Distress Among Women at Familial Risk for Breast Cancer
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2. Psychological Distress, Health Beliefs, and Frequency of Breast Self-Examination
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    Family Histories of Breast Cancer
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4. Read All About It: The Over-Representation of Breast Cancer in Popular Magazines
    Blanchard, Erblich, Montgomery, and Bovbjerg

5. Abstracts

LOOKING FORWARD AND BACK:
DISTRESS AMONG WOMEN AT FAMILIAL RISK FOR BREAST CANCER[1,2,3]

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ABSTRACT

Healthy women with family histories of breast cancer in a first-degree relative (FH+) have been reported to exhibit higher levels of breast cancer-related distress than women without family histories of breast cancer (FH−). Recent data suggest that this may be particularly true for women who had a parent die of cancer. In line with theories emphasizing the psychological impacts of past stressors and concerns for the future, the present study examined the hypotheses that past cancer stressors (i.e. maternal breast cancer caregiving and death, "Looking Back") and perceptions of one's own heightened future risk for developing the disease ("Looking Forward") would predict current levels of distress. One hundred forty-eight healthy women (57 FH+, 91 FH−) recruited from large medical centers in the New York City area completed measures of breast cancer-related distress, general psychological distress, and items assessing whether or not they had taken care of their mother with breast cancer or had had their mother die from the disease. Consistent with previous research, results indicated that FH+ women whose mothers had died of breast cancer had significantly higher breast cancer-related distress than either FH+ women whose mothers had not died of breast cancer or FH− women (p < .05). Further analyses revealed that FH+ women who had cared for their mothers with breast cancer had higher cancer-related distress than women who did not (p < .01), and that FH+ women whose experience included both caregiving and the death of their mother from breast cancer had the highest levels of cancer-related distress (p < .01) and depressive symptoms (p < .05). Findings also indicated that FH+ women with heightened perceptions of risk for breast cancer had higher levels of distress, independent of past stressors. These findings suggest that psychosocial interventions for women with family histories of breast cancer might be appropriately focused on these issues.

(Ann Behav Med 2000, 22(1):53–59)

INTRODUCTION

Having a family history of breast cancer (FH+) is a significant risk factor for the development of the disease. Epidemiological studies have indicated that healthy women who have one or more first-degree relatives diagnosed with breast cancer are at two- to three-fold risk of developing breast cancer themselves (1). As FH+ women must live with the increased threat of developing breast cancer, researchers have hypothesized that they may experience elevated levels of psychological distress. Consistent with this possibility, early case reports by Hyland et al. (2) suggested that women with family histories of breast cancer exhibit symptoms of anxiety and poor psychological adjustment, possibly because of distress over meeting the same fate as their family member(s).

More recent empirical studies have generally corroborated these initial clinical impressions, providing evidence that FH+ women experience elevated levels of both cancer-specific and generalized psychological distress (3–8). For example, a number of studies by Lerman and colleagues (3–5) report elevated levels of general psychological distress in FH+ women recruited with family members in active treatment, and two of those studies report elevated levels of cancer-specific distress, as demonstrated by intrusive thoughts about breast cancer. A recent report from our group (6) comparing FH+ women to a concurrently assessed comparison group of FH− women from the same community indicated that FH+ women experienced higher levels of both cancer-specific and general psychological distress than did FH− women, even though they all had been recently informed that their mammography results were normal and their affected relatives had not been in active treatment for at least 6 months.

Although the preponderance of data appear to support the view that FH+ women are generally more distressed than FH− women, a few studies have highlighted the variability in levels of distress. For example, Wellisch et al. (9) and Lerman et al. (3) noted large individual differences in levels of distress among FH+ women, with some women reporting little or no distress. Individual differences in distress among FH+ women have been proposed as one explanation for occasional failures to detect differences in distress between FH+ and FH− women (e.g. [9]).

Surprisingly few studies have examined predictors of psychological distress in FH+ women. In one recent study from our group, Zakowski et al. (10) hypothesized that, in addition to perceptions of future breast cancer risk, exposure to past cancer-related events might be related to distress in FH+ women. Consistent with that hypothesis, that study revealed that not only was perceived breast cancer risk associated with increased distress in FH+ women, but FH+ women who had had a parent die of cancer also exhibited elevated levels of distress. These results underscored the potential impact of women's individual experiences related to their family histories of breast cancer. One related experience likely to have a powerful impact is having served as a caregiver to a mother with breast cancer. Support for this possibil-

ity comes from an extensive body of literature indicating that caregivers experience considerable psychological distress, particularly depressive symptoms, which may persist long after the interval during which the caregiving had occurred (e.g. 11,12). Indeed, recent theorizing (13) has argued that the dual process of caregiving and death of a family member as a result of serious disease can have a profound psychological impact. Other theorists (14) have also more generally emphasized the potential negative effects of past stressors in combination with concerns about future events related to the source of past stress. Following these lines of reasoning, we hypothesized that: (a) past cancer-related events (i.e. maternal breast cancer caregiving and death, "Looking Back"), and (b) perceptions of future personal risk for developing breast cancer ("Looking Forward") would predict current levels of distress.

A number of studies have also raised the possibility that the timing of a stressful life event, specifically one's age at the time and the recency of the event, may affect subsequent distress levels (10,15). Research on FH+ women has also suggested that chronological variables related to a mother's disease may be related to distress levels. For instance, Wellisch et al. (15) found that the recency of maternal·diagnosis predicted current distress in daughters of breast cancer patients. On the other hand, Zakowski et al. (10), when examining the relations between distress and chronological variables, found that mother's age at the time of cancer death, daughter's age then, and recency of death did not predict daughter's distress. As chronological variables have not been well-studied to date and may be potentially important predictors of distress in FH+ women, we explored the possibility that such variables would impact distress.

The purpose of the present study, then, was to replicate the previous findings from our group on the impact of parental cancer death on distress in an independent sample of women, and to extend previous research by contemporaneously examining the potential impact of caregiving, as well as maternal·breast cancer death and perception of future risk, on psychological distress. A better understanding of the impact of these cancer-related variables would provide information useful for appropriate targeting of interventions to the FH+ women likely to experience the highest levels of psychological distress.

METHOD

Subjects

One hundred forty-eight women with ($n = 57$) and without ($n = 91$) first-degree relatives with breast cancer participated in the study. Subjects were recruited as part of a larger study by advertisements placed in three medical centers in New York City requesting participants for a study of mind–body effects and family history of breast cancer. To accrue sufficient numbers of FH+ women, we oversampled for women who had family histories of breast cancer. Fewer than 10% of women refused to participate once contacted. To reduce sample heterogeneity, all women were healthy by self-report with no personal history of cancer or other serious chronic illness (e.g. diabetes) at the time of the assessment. Women were assessed no earlier than 1 month after a cancer screening appointment to minimize acute screening-related anxiety. Additionally, women with family histories of breast cancer were excluded if their relative had been in active treatment for breast cancer within the previous 6 months. Mean age of the sample was 42.4 years ($SD = 10.8$). Over a third of the sample had family histories of breast cancer; a third had objective risk estimates of greater than 11% according to the Claus et al. (16)

formulation of familial risk based on pedigree analyses. Most were minority participants (75% African–American, 10% Hispanic, 1% Asian, 1% Native American). Over a third had completed college; a third were currently married. Mean age at menarche was 12.5 (± 2.0), mean age at first live birth was 22.0 (± 5.0), and mean number of children was 1.1 (± 1.8).

Measures

Subjects completed questionnaires assessing demographics and family history of cancer. They also reported possible risk factors for breast cancer, including age at menarche, age at first live birth, and number of children (17). Additionally, the family history questionnaire assessed whether or not the participant's mother had died of breast cancer and whether or not the participant had served as a caregiver during her mother's illness (Did you take care of your mother [emotionally or physically] when she had cancer? Yes/No).

General psychological distress over the past 3 weeks was measured using the Brief Symptom Inventory (BSI) (18). The BSI has nine subscales and three global distress indices. T-scores of 60 or above on the BSI scales are regarded as clinically significant, and T-scores of 63 and above are regarded as sufficiently severe to raise the possibility of a psychiatric diagnosis (18). To reduce the possibility of Type I error, we only used one global distress index (the Global Severity Index [GSI]), as well as the depression and anxiety subscales. Consistent with previous research (3,6), cancer-specific distress over the past 3 weeks was measured using the Impact of Events Scale (IES) (19), which is comprised of two subscales: intrusive thoughts and avoidance. "Breast Cancer" served as the "event" on the IES. Finally, subjects reported how likely they felt they were to develop breast cancer sometime during their lives, on a scale of 0% (*not at all likely*) to 100% (*extremely likely*) (6,10,20).

Procedures

Subjects provided written informed consent prior to participation. Questionnaires were completed in the presence of an investigator who was available to clarify any items, though they were permitted to complete the demographic portion of the questionnaire at home and return it in a prepaid mailer. Subjects were offered $20 plus the cost of public transportation to and from the study visit.

Data Analysis

Similar to the methodology of Zakowski et al. (10), we divided the FH+ women into two subgroups: (a) women whose mothers died of breast cancer (the "FH+Death+" Subgroup; $n = 20$); and (b) women whose mothers did not die of breast cancer (the "FH+Death−" Subgroup; $n = 37$). We then divided the FH+ women into two additional subgroups cutting across the FH+Death+/− grouping factor: (a) women who served as caregivers for their mothers with breast cancer (the "FH+Care+" Subgroup; $n = 36$); and (b) women who did not serve as caregivers to their mothers with breast cancer (the "FH+Care−" Subgroup; $n = 21$), yielding a 2×2 ("Death $\times$ Care") factorial analysis of variance (ANOVA) model. In addition, we compared these subgroups of FH+ women to a "Control" group of FH− women ($n = 91$). Family history was not included as a factor in the ANOVA model because a FH− woman by definition could not have experienced her mother's breast cancer death nor cared for her when she had breast cancer. Mothers' mean age at diagnosis was 51.4 years ($SD = 12.4$), subjects' mean age at the time was

25.4 years (SD = 13.2), and the diagnosis had been made an average of 16.1 years earlier (SD = 11.4). The FH+Death+ Subgroup of women was an average of 26.9 years of age (SD = 12.0) when their mothers died of breast cancer, and their mothers were 52.6 years of age at the time (SD = 9.6). The death (cutting across Care Subgroups) had occurred an average of 14 years (SD = 9.9) prior to the study. The Care+ Subgroup of women was an average 32.3 years of age (SD = 12.2) at the onset of caregiving for mothers who averaged 55 years of age (SD = 12.7). The onset of caregiving (cutting across Death Subgroups) had occurred an average of 10.9 years (SD = 8.8) prior to the study. As mentioned previously, we examined the possibility that chronological variables predicted distress among FH+ women. Finally, as Zakowski et al. (10) suggested that perceived risk for developing breast cancer may mediate the relations between parental cancer death and distress, we included a mediational analysis (21) in our study as well.

RESULTS

Group Characteristics

Before we conducted our primary analyses, we compared the demographics of the FH+ and FH− groups to examine possible confounds. These groups did not differ in age, ethnicity, education level, or income level. Because some trends (p < .20) toward subgroup demographic differences were observed (Table 1), we included ethnicity, education, and income as covariates in all subgroup analyses. All statistical values reflect the inclusion of these covariates in the analyses. Means, standard errors, and T-scores (for BSI indices) of all distress measures are reported for all groups and subgroups in Table 2.

Comparison of Cancer-Specific and General Distress between FH+ and FH− Groups

Independent sample t-tests were used to assess differences in distress levels between FH+ and FH− Groups. In contrast with our previous findings with other samples (6,10), women's levels of intrusive thoughts (M = 7.3, SE = 1.1) and avoidance (8.5 ± 1.3) in the FH+ Group were statistically comparable to levels of intrusive thoughts (5.2 ± 0.8), $t(146)$ = 1.56, p > .05, and avoidance (6.4 ± 1.0), $t(146)$ = 1.33, p > .05, of women in the FH− Group. Similarly, women's levels of general distress (0.52 ± 0.06, T = 58), depressive symptoms (0.56 ± 0.09, T = 58), and symptoms of anxiety (0.57 ± 0.08, T = 57) in the FH+ Group were statistically comparable to levels of general distress (0.51 ± 0.05, T = 58), $t(146)$ = .15, p > .05; depressive symptoms (0.51 ± 0.07, T = 57), $t(146)$ = .40, p > .05; and symptoms of anxiety (0.52 ± 0.07, T = 56), $t(146)$ = .44, p > .05, of women in the FH− Group (Table 2).

Comparison of Cancer-Specific and General Distress between Subgroups

Although we did not detect main effect distress differences between FH+ and FH− women, our FH+ Subgroup analyses were consistent with the findings of Zakowski et al. (10). As indicated in Table 2, the FH+Death+ Subgroup had higher levels of both breast cancer-specific intrusive thoughts (10.2 ± 2.2), $F(2, 145)$ = 3.71, p < .05; and avoidance (12.2 ± 2.6), $F(2, 145)$ = 4.02, p < .05; than did both the FH+Death− Subgroup (5.7 ± 1.1 intrusive thoughts, 6.5 ± 1.3 avoidance), and the FH− Group. Additionally, the FH+Death− Subgroup reported cancer-specific distress levels that were statistically comparable to those of the

TABLE 1
Demographic Characteristics by Group and Subgroup

	Age Mean (SE)	Ethnicity % Black	Education % High School	Income % > 20 K
FH− (n = 91)	41.8 (11.0)	75.3	43.5	51.8
FH+ (n = 57)	43.4 (10.3)	72.8	31.6	69.2
FH+Death+ (n = 20)	41.6 (9.4)	85.0[a]	32.4	68.4
FH+Death− (n = 37)	44.4 (10.9)	65.7[a]	30.0	69.7
FH+Care+ (n = 36)	43.7 (9.6)	80.5[b]	22.2[g]	70.6
FH+Care− (n = 21)	42.6 (11.9)	57.9[b]	47.6[g]	66.7
FH+Death+Care+ (n = 14)	41.8 (9.4)	85.7[c]	21.4[h,i]	61.5
FH+Death+Care− (n = 6)	41.2 (10.2)	83.3[d]	50.0[h,j]	83.3[l]
FH+Death−Care+ (n = 22)	45.0 (9.7)	77.2[e]	22.7[j,k]	76.2
FH+Death−Care− (n = 15)	43.3 (12.9)	46.1[c,d,e]	46.7[i,k]	58.3[l]

Note. Figures with matching superscripts differ at p < .20.

FH− Group (p > .05). The main effects of maternal breast cancer death on general distress, depressive symptoms, and anxiety were not significant.

To address the possibility that maternal death, per se, may account for the observed main effect of maternal breast cancer death on cancer-specific distress, we compared IES scores of women in the FH+Death+ Subgroup to scores of women whose mothers died of causes other than breast cancer (n = 80) and women whose mothers were still alive (n = 48) in the overall sample. Consistent with the study hypotheses, we found that women whose mothers died of breast cancer had significantly higher intrusive thoughts scores, $F(2, 145)$ = 4.27, p < .05, and avoidance scores, $F(2, 145)$ = 4.02, p < .05, than both women whose mothers died of causes other than breast cancer (4.6 ± 1.0 intrusive thoughts, 7.0 ± 1.4 avoidance) and than women whose mothers were still alive (5.3 ± 0.9 intrusive thoughts, 5.6 ± 1.0 avoidance). Simple effects analyses indicated that the latter two groups did not differ significantly from each other (p > .05), providing no support for the possibility that maternal death, per se, was responsible for increases in women's cancer-specific distress (IES scores). Including chronological variables (i.e. mother's age then, subject's age then, recency) did not alter these findings.

We also found that the FH+Care+ Subgroup had higher levels of breast cancer-specific intrusive thoughts (9.1 ± 1.5), $F(2, 145)$ = 3.67, p < .05; and avoidance (10.1 ± 1.8), $F(2, 145)$ = 2.57, p < .05; than did both the FH+Care− Subgroup (4.1 ± 1.1 intrusive thoughts, 5.7 ± 1.5 avoidance) and the FH− Group. In addition, the FH+Care− Subgroup reported cancer-specific distress levels that were statistically comparable to those of the FH− Group (p > .05). The FH+Care+/−Subgroups did not differ in general distress, depressive symptoms, or anxiety (Table 2). Most interestingly, the results of the Death × Care ANOVA within the FH+ Group revealed a significant interaction, such that FH+ women who experienced both maternal breast cancer death and caregiving had higher levels of intrusive thoughts, $F(4, 52)$ = 5.08, p < .05; and avoidance, $F(4, 52)$ = 3.96, p < .05, than other

TABLE 2
Means ± Standard Errors (and T-Scores) of Distress Measures by Group and Subgroup

	Intrusive Thoughts	Avoidance	General Distress	Depression	Anxiety
FH− (n = 91)	5.2 ± 0.8	6.4 ± 1.0	0.51 ± 0.05 (58)	0.51 ± 0.07 (57)	0.52 ± 0.07 (56)
FH+ (n = 57)	7.3 ± 1.1	8.5 ± 1.3	0.52 ± 0.06 (58)	0.56 ± 0.09 (58)	0.57 ± 0.08 (57)
FH+Death+ (n = 20)	10.2 ± 2.2[a]	12.2 ± 2.6[a]	0.51 ± 0.06 (58)	0.67 ± 0.13 (59)	0.59 ± 0.12 (57)
FH+Death− (n = 37)	5.7 ± 1.1	6.5 ± 1.3	0.53 ± 0.06 (58)	0.50 ± 0.12 (57)	0.56 ± 0.10 (57)
FH+Care+ (n = 36)	9.1 ± 1.5[b]	10.1 ± 1.8[b]	0.52 ± 0.06 (58)	0.55 ± 0.10 (58)	0.60 ± 0.10 (57)
FH+Care− (n = 21)	4.1 ± 1.1	5.7 ± 1.5[l]	0.53 ± 0.13 (58)	0.59 ± 0.18 (59)	0.52 ± 0.13 (56)
FH+Death+Care+ (n = 14)	13.4 ± 2.8[c]	15.4 ± 3.2[c]	0.57 ± 0.08 (59)	0.81 ± 0.17[c] (63)	0.64 ± 0.16 (57)
FH+Death+Care− (n = 6)	2.8 ± 1.1	4.8 ± 2.9	0.35 ± 0.08 (54)	0.36 ± 0.12 (54)	0.47 ± 0.17 (54)
FH+Death−Care+ (n = 22)	6.4 ± 1.5	6.8 ± 1.9	0.49 ± 0.08 (57)	0.38 ± 0.12 (54)	0.58 ± 0.12 (57)
FH+Death−Care− (n = 15)	4.7 ± 1.5	6.1 ± 1.8	0.60 ± 0.18 (59)	0.67 ± 0.24 (59)	0.53 ± 0.17 (56)

[a] Significant Main Effect of Maternal Breast Cancer Death. [b] Significant Main Effect of Caregiving. [c] Significant Death × Care Interaction. Bolded figures also differ significantly from FH− Group.
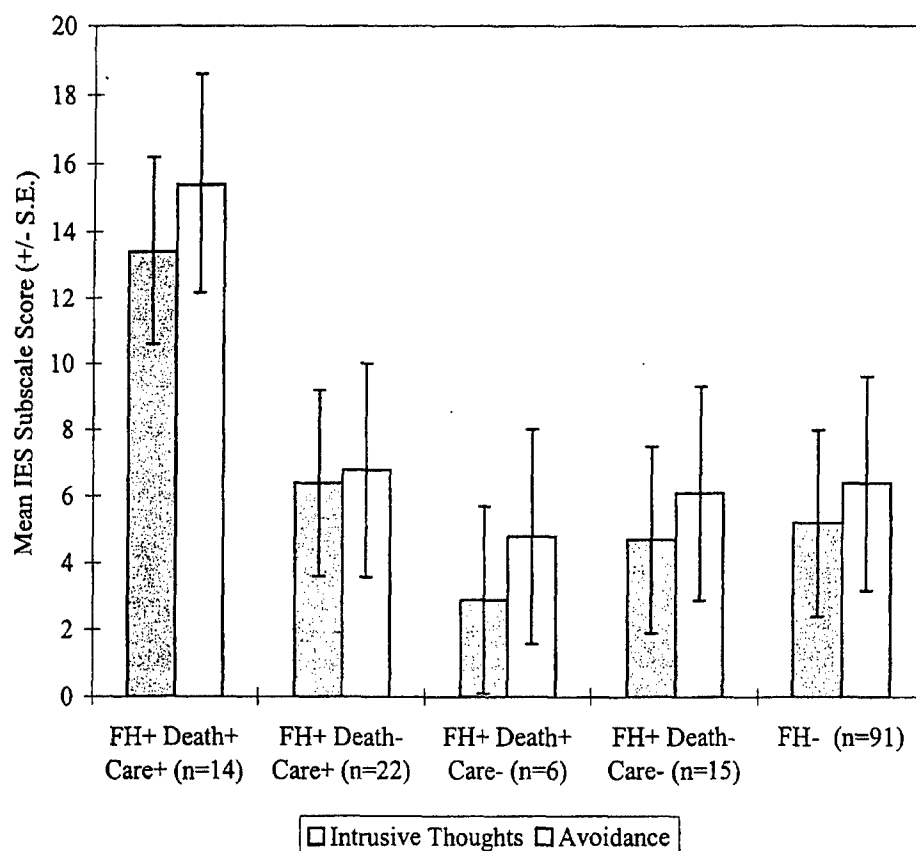

FIGURE 1:   Intrusive thoughts and avoidance in FH+ Subgroups and FH− women.

women (see Table 2 and Figure 1). Subgroup comparisons indicated that the FH+Death+Care+ Subgroup experienced higher levels of cancer-specific distress than the other Subgroups and the FH− Group. The other Subgroups of FH+ women reported cancer-specific distress levels that were statistically comparable to those of the FH− Group (p > .05). Because one of the Subgroups had a small sample size (n = 6 in the FH+Death+Care− Subgroup), we also compared the FH+Death+Care+ Subgroup to the

combination of the remaining subgroups to reconfirm our findings. Consistent with the findings above, women in the FH+ Death+ Care+ Subgroup exhibited higher mean IES scores than the mean scores of the women across all other subgroups; t(55) = 3.61, p < .0007. Including chronological variables did not alter the above findings.

We performed identical analyses to examine general psychological distress in these subgroups of women. As was the case with

cancer-specific distress, there was a significant Death × Care interaction; $F(4, 52) = 3.47$, $p < .05$; such that the FH+Death+Care+ Subgroup of women had the highest levels of depressive symptoms on the BSI. None of the post hoc subgroup analyses reached the .05 significance level. However, as was the case regarding cancer-specific distress, comparing the FH+Death+Care+ Group to all others combined yielded a significant difference in general distress. Also, the FH+Death+Care+ Subgroup's level of depressive symptoms (T-score = 63) exceeded normative values (cutoff T-score = 60), indicating that their distress was clinically significant compared to the general population of adult females (9). Interestingly, the FH+Death+Care+ Subgroup did not evidence higher levels of anxiety or global distress than the other subgroups. As before, including chronological variables did not alter these findings.

Perceived Risk as a Possible Mediator of Death/Caregiving and Distress

We examined the possibility that the relations between exposure to past cancer events and current distress may be mediated by the women's current perceptions of future risk for developing breast cancer. Consistent with our previous report (10), within the FH+ Group, perceived risk was positively correlated ($p < .05$) with IES intrusive thoughts ($r = .33$) and avoidance ($r = .28$). Interestingly, perceived risk did not correlate with BSI depression ($r = .20$), but did correlate with global distress ($r = .27$) and anxiety ($r = .41$). The Maternal Death and Caregiving Subgroups, however, did not differ in levels of perceived risk. Following the methodology proposed by Baron and Kenny (21), the present data, thus, did not support a mediational model. Variability in the women's current levels of perceived risk for breast cancer did not account for the relations between current psychological distress and the histories of caregiving and maternal breast cancer death.

Chronological Variables Related to Maternal Breast Cancer in the FH+ Group

We explored the possibility that chronological variables pertaining to breast cancer-specific experiences predict current levels of psychological distress. In contrast to the findings of Wellisch et al. (15), mothers' ages at diagnosis were not related to current levels of either cancer-specific ($rs = -0.10$ to -0.11, ns) or general distress ($rs = -0.15$ to -0.28, ns) in the FH+ Group, as indicated in Table 3. Similarly, neither subjects' ages at the time of the diagnosis nor recency of the diagnosis predicted elevated levels of current distress ($rs = -0.13$ to 0.04, ns). In the FH+Care+ Subgroup of women, none of the chronological variables (mothers' ages at the time when caregiving began, subjects' ages then, and recency of caregiving onset) predicted elevated levels of current cancer-specific or general distress ($rs = -0.20$ to 0.18, ns).

Consistent with our previous report (10), we found that, in the FH+Death+ Subgroup, the women's mothers' ages at death, women's age then, and recency of the death did not predict elevated levels of current cancer-specific distress ($rs = -0.33$ to 0.13, ns). Women's mothers' ages at death were, however, significantly negatively correlated with both BSI global distress ($r = -.52$) and anxiety ($r = -.53$) in the FH+Death+ Subgroup of women. To further characterize this relation, post hoc dichotomous analyses revealed that within the FH+Death+ Subgroup, those whose mothers died at an age below the group's median age of death (54 years; $n = 10$/group) reported significantly higher

Exploratory Correlation Analysis of Cancer-Related Chronology Variables and Distress

	Global Distress	Anxiety	Depression	Intrusive Thoughts	Avoidance
Maternal Breast Cancer Diagnosis ($n = 57$)					
Mother's age then	−.24	−.28	−.15	−.11	−.10
Subject's age then	−.08	−.13	−.02	.02	.04
Years since diagnosis	−.01	−.04	−.07	−.11	−.03
Maternal Breast Cancer Death ($n = 20$)					
Mother's age then	−.52*	−.53*	−.12	−.14	−.21
Subject's age then	−.12	−.31	.05	.13	.06
Years since death	−.21	−.02	−.32	−.33	−.26
Onset of Caregiving ($n = 36$)					
Mother's age then	−.26	−.26	.05	−.14	−.02
Subject's age then	−.21	−.19	−.03	−.15	−.05
Years since caregiving	.18	.15	.03	−.05	.09

* $p < .05$.

general distress (0.59 ± 0.07, $T = 59$ below median age versus 0.42 ± 0.10, $T = 56$ above median age), $F(1, 19) = 3.76$, $p < .05$, and anxiety symptoms (0.91 ± 0.18, $T = 61$ [clinically significant (18)] below median age versus 0.32 ± 0.11, $T = 52$ above median age), $F(1, 19) = 4.71$, $p < .05$, even after accounting for whether or not they had served as caregivers. These findings suggest that having a mother die of breast cancer at an early age is an independent predictor of high levels of general distress and clinically significant levels of anxiety ($T > 60$).

DISCUSSION

Consistent with study hypotheses and a previous report from our group (10), the present study revealed that women with family histories of breast cancer whose mothers had died of the disease experienced higher levels of both breast cancer intrusive thoughts and avoidance compared to other women, even an average of 14 years after the death. Extending our earlier report, we found in this independent sample that women whose family histories of breast cancer included serving as caregivers for their mother with breast cancer experienced heightened levels of intrusive thoughts and avoidance, as well. Perhaps the most intriguing finding, however, was that women who had family histories of breast cancer that included the experience of both having been a caregiver and having their mother die of the disease had the highest levels of both breast cancer-specific distress and general depressive symptoms, while having had one experience without the other did not predict

higher distress than was observed in the Comparison group of women without family histories of breast cancer (see Figure 1). Finally, we found that, independent of caregiving, women whose mothers died of breast cancer at a younger age had higher levels of global distress and anxiety.

In addition to providing evidence that specific past experiences associated with women's family histories of breast cancer ("Looking Back") are strongly predictive of current distress levels, the results of the present study also indicate that women's perceptions of their future risk for developing the disease ("Looking Forward") predict elevations in current levels of psychological distress. In our previous report (10), there was some support for the possibility that the pathway from past breast cancer-related experiences to elevated psychological distress may be mediated by elevated perceptions of one's own future risk for developing the disease. Interestingly, our present data did not support this mediational model; women whose family histories included both serving as a caregiver and maternal breast cancer death did not perceive themselves to be at greater risk for developing the disease. Past experiences and perception of future risk, therefore, were independent predictors of current distress. These findings are consistent with recent theoretical propositions about the dual impact of past and future concerns on current distress (14). It must be noted, however, that we cannot rule out relations between past cancer experiences and other future threats (e.g. expectations for surviving). Alternatively, the potential trauma involved in being exposed to multiple stressors such as maternal breast cancer death and caregiving may be distressing in itself, without a mediating pathway of cognitive appraisal (22). Future research should examine these possibilities.

The present findings are consistent with an established body of research on family caregivers, which suggests that depressive symptoms may persist even long after the cessation of caregiving (11,12). It is important to note, however, that in this first study to investigate the possible impact of caregiving in women at familial risk for breast cancer, we did not thoroughly assess the numerous aspects of the caregiving experience, which may account for additional variation in subsequent distress within this group of women. Recent theorizing (e.g. 23–25) emphasizes the types of caregiving provided (e.g. emotional support, physical assistance, financial support, etc.) as well as the caregiver's reaction (e.g. changes in self-esteem, relationships, depression, guilt, etc.). It must be emphasized, however, that the results of the present study suggest that the simple fact of having served as a caregiver to a mother who died of breast cancer is sufficient to predict levels of both cancer-specific distress and general depressive symptoms, even years after these experiences.

Additional research is needed before we can conclude that the specific experiences of maternal breast cancer caregiving and death are directly related to increased breast cancer-specific distress. Although we found no support for the possibility that death to any cause would have similar effects, we did not collect data on caregiving for causes other than breast cancer. In addition, mothers in the FH+Death+Care+ Subgroup may have been more severely ill. Future research should attempt to determine relations between both objective and perceived maternal illness severity and distress. It should also be noted that the study sample consisted of predominantly non-White women who responded to advertisements posted in medical centers. Studies of women with family histories of breast cancer have typically recruited targeted samples (e.g. relatives of cancer patients) to assure adequate recruitment of

FH+ women. To our knowledge, sampling techniques such as random-digit-dialing have not been employed to study this population. The present findings, in conjunction with previous research on distress among women with family histories of breast cancer, may justify larger scale investigations employing more comprehensive sampling techniques that would confirm generalizability of findings to the population at large. Additionally, whether or not analogous findings of disease-specific distress, caregiving, and death would be obtained in samples of individuals at risk for other diseases has not yet been examined.

In light of earlier studies concluding that women with family histories of breast cancer, as a group, exhibit higher distress levels than women without family histories, it is particularly important to be mindful that great variability exists in these women's distress levels. Indeed, in the present study, unlike previous studies with different samples (e.g. [6]), we did not find a main effect of family history on breast cancer intrusive thoughts or avoidance. The results of this study, thus, suggest the importance of examining factors beyond family history per se, to better characterize predictors of distress. Interventions might be more efficiently focused on women with family histories who cared for a mother who died of breast cancer, women whose mothers died at a younger age, and women who perceived themselves to be at high risk for breast cancer, for whom distress is likely to be highest. Health care providers interacting with the relatives of breast cancer patients may want to consider assessing their experience of specific cancer-related stressors when attempting to identify those most in need of psychological counseling.

REFERENCES

(1) Offit K, Brown K: Quantitating familial cancer risk: A resource for clinical oncologists. *Journal of Clinical Oncology.* 1994, *12:*1724–1736.

(2) Hyland JM, Novotny ES, Coyne L, Travis JW, Pruyser H: Coping with difficult-to-treat cancer patients. *Bulletin of the Menninger Clinic.* 1984, *48:*329–341.

(3) Lerman C, Kash K, Stefanek M: Younger women at increased risk for breast cancer: Perceived risk, psychological well-being, and surveillance behavior. *Monographs of the National Cancer Institute.* 1994, *16:*171–176.

(4) Lerman CL, Schwartz M: Adherence and psychological adjustment among women at high risk for breast cancer. *Breast Cancer Research and Treatment.* 1993, *28:*145–155.

(5) Lerman C, Daly M, Sands C, et al: Mammography adherence and psychological distress among women at risk for breast cancer. *Journal of the National Cancer Institute.* 1993, *85:*1074–1080.

(6) Valdimarsdottir HB, Bovbjerg DH, Kash K, et al: Psychological distress in women with a familial risk of breast cancer. *Psycho-Oncology.* 1995, *4:*133–141.

(7) Lloyd S, Watson M, Waites B, et al: Familial breast cancer: A controlled study of risk perception, psychological morbidity, and health beliefs in women attending for genetic counselling. *British Journal of Cancer.* 1996, *74:*482–487.

(8) Gilbar O: Women with high risk for breast cancer: Psychological symptoms. *Psychological Reports.* 1997, *80:*800–802.

(9) Wellisch DK, Gritz ER, Schain W, Wang HJ, Siau J: Psychological functioning of daughters of breast cancer patients: Daughters and comparison subjects. *Psychosomatics.* 1991, *32:*324–336.

(10) Zakowski SG, Valdimarsdottir HB, Bovbjerg D, et al: Predictors of intrusive thoughts and avoidance in women with family histories of breast cancer. *Annals of Behavioral Medicine.* 1997, *19:*362–369.

(11) Siegel K, Karus DG, Raveis VH, Christ GH, Mesagno FP: Depres-

sive distress among the spouses of terminally ill cancer patients. *Cancer Practice*. 1996, *4*:25–30.

(12) Kurtz ME, Kurtz JC, Given CW, Given B: Predictors of postbereavement depressive symptomatology among family caregivers of cancer patients. *Support Care Cancer*. 1997, *5*:53–60.

(13) Brown MA, Stetz K: The labor of caregiving: A theoretical model caregiving during potentially fatal illness. *Qualitative Health Research*. 1999, *9*:182–197.

(14) Bar-Tal Y, Cohen-Mansfield J, Golander H: Which stress matters? The examination of temporal aspects of stress. *Journal of Psychology*. 1998, *132*:569–576.

(15) Wellisch DK, Gritz ER, Schain W, Wang HJ, Siau J: Psychological functioning of daughters of breast cancer patients, Part II: Characterizing the distressed daughter of the breast cancer patient. *Psychosomatics*. 1992, *33*:171–179.

(16) Claus EB, Schildkraut JM, Thompson WD, Risch NJ: The genetic attributable risk of breast and ovarian cancer. *Cancer*. 1996, *77*:2318–2324.

(17) Gail MH, Brinton LA, Byar DP: Projecting individualized probabilities of developing breast cancer for White females who are being examined annually. *Journal of the National Cancer Institute*. 1989, *81*:1879–1886.

(18) Derogatis LR: *Brief Symptom Inventory, Administration, Scoring, and Procedures Manual* (3rd Ed.). Minneapolis, MN: National Computer Systems, Inc., 1993.

(19) Horowitz M, Wilner N, Alvarez W: Impact of event scale: A measure of subjective stress. *Psychosomatic Medicine*. 1979, *41*:209–218.

(20) Durfy SJ, Bowen DJ, McTiernan A, Sporleder J, Burke W: Attitudes and interest in genetic testing for breast and ovarian cancer susceptibility in diverse groups of women in western Washington. *Cancer Epidemiology, Biomarkers and Prevention*. 1999, *8*:369–375.

(21) Baron RM, Kenny DA: The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*. 1986, *51*:1173–1182.

(22) Horowitz MJ: *Stress Response Syndromes*. New York: Aronson, 1976.

(23) Nijboer C, Triemstra M, Tempelaar R, Sanderman R, van den Boss GAM: Measuring both negative and positive reactions to giving care to cancer patients: Psychometric qualities of the Caregiver Reaction Assessment (CRA). *Social Science and Medicine*. 1999, *48*:1259–1269.

(24) Schofield HL, Murphy B, Herrman HE, Bloch S, Singh B: Family caregiving: Measurement of emotional well-being and various aspects of the caregiving role. *Psychological Medicine*. 1997, *27*:647–657.

(25) Pearlin LI, Mullan JT, Semple SJ, Skaff MM: Caregiving and the stress process: An overview of concepts and their measures. *Journal of Gerontology*. 1990, *30*:583–594.

Psychological Distress, Health Beliefs, and Frequency of Breast Self-Examination

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Although monthly breast self-examination (BSE) is recommended for early breast cancer detection, most women do not comply. Few studies have examined the impact of psychological distress on BSE frequency. Recent research suggests that it may be particularly important to examine the role of distress in the recently identified phenomenon of BSE overperformance (>1/month). One hundred thirty-five healthy women with and without family histories of breast cancer completed sociodemographic, health belief, general and cancer-specific psychological distress, and BSE frequency questionnaires. The central finding of the study was that BSE underperformance and overperformance had two distinct sets of predictors: health beliefs, specifically barriers against BSE and low confidence in BSE performance, were related to BSE underperformance, while higher levels of psychological distress, particularly cancer-specific intrusive thoughts, were related to BSE overperformance. Findings underscore the need to evaluate BSE under- and overperformance separately and to develop problem-specific interventions to increase compliance with monthly BSE.

INTRODUCTION

Breast cancer is currently one of the most frequent causes of mortality among women in the United States (American Cancer Society, 1999).

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Although curative treatment for breast cancer is increasingly successful, early detection and subsequent early intervention are critical in reducing mortality rates among women (American Cancer Society, 1999; Boring et al., 1994). Of the three commonly employed methods of early breast cancer surveillance (clinical breast examination, mammography, and breast self-examination), only breast self-examination (BSE) allows women to perform a surveillance behavior independently and may often be the only screening method available for women without access to professional health care services. Although the efficacy of monthly BSE in reducing breast cancer mortality has not been supported in some studies (Holmberg et al., 1997), it has been found to increase the likelihood of detecting early breast tumors in a number of other studies (Coleman, 1991; Hill et al., 1988; Foster et al., 1978). BSE, an inexpensive and convenient method of breast cancer surveillance, is currently the only recommended screening behavior for younger women (American Cancer Society, 1999). Indeed, monthly BSE is the recommendation of the American Cancer Society (1999) for all women over age 20 as part of routine breast care. Although the vast majority of breast cancers continue to be detected by women themselves (Brain et al., 1999), research indicates that the most women perform BSE less frequently than the recommended monthly interval (Kash et al., 1992; Houts et al., 1991).

In addition to the problem of underperformance, there is growing awareness that a substantial subset of women may actually overperform BSE (e.g., Lauver and Angerame, 1990). Performing BSE more than once a month is thought to undermine its utility as a screening tool by decreasing women's sensitivity to developing abnormalities gradually, especially since frequent exams are likely not be performed as thoroughly (Epstein and Lerman, 1997; Epstein et al., 1997). Indeed, the negative aspects of overperformance were already recognized at Haagensen (1952), whose seminal paper was the first to recommend that all women should perform monthly BSE.

A number of recent studies have aimed to identify sociodemographic factors that predict frequency of women's BSE performance, in the hopes of providing means for better targeting individual and communitywide intervention and education efforts. For example, some studies have suggested that African American women are more likely to underperform BSE than Caucasian women (Kaplan et al., 1991), while one recent large-scale study concluded that African American women were more likely to overperform BSE (Epstein et al., 1997). Similarly, there is mixed support for the impact of having a first degree relative with breast cancer on women's BSE frequency (Epstein et al., 1997; Salazar and Carter, 1994; Alagna et al., 1987). Indeed, the impact of objective risk based on the number of affected relatives (Claus et al., 1996) or other known risk factors for breast cancer (e.g., age at menarche)

on BSE frequency has received little research attention. It is possible that women who have greater objective risk may be differentially motivated to perform BSE according to guidelines. Because African American women and women at familial risk for breast cancer have higher mortality rates from breast cancer (American Cancer Society, 1999), identifying predictors of BSE frequency in these women is particularly important. Other variables reported to be associated with BSE underperformance include age, education, and marital status (Duke et al., 1994; Murray and McMillan, 1993). However, studies to date have examined largely sociodemographic correlates of BSE underperformance, with little attention given to the correlates of BSE overperformance [see Epstein et al. (1997) and Lerman et al. (1994) as exceptions].

In addition to studying the impact of sociodemographic variables on BSE frequency, recent investigations have explored variables derived from Rosenstock's (1966) Health Belief Model. The Health Belief Model and recent modifications (e.g., Champion, 1993) theorize that five factors relate to the performance of a surveillance behavior: perceived seriousness of the disease, perceived susceptibility to the disease, perceived benefits of engaging in the surveillance behavior (early detection, decreased mortality, etc.), perceived barriers to engaging in the behavior (time consuming, embarrassing, etc.), and confidence in correctly performing the surveillance behavior to maximize its utility.

Numerous studies of health belief variables have found that greater perceived barriers to BSE predicted underperformance (e.g., Barron et al., 1997; Champion, 1988); fewer perceived benefits have been more equivocally related to BSE underperformance. Lower confidence in one's ability to perform BSE predicted underperformance in a number of studies (Katz et al., 1995; Duke et al., 1994; Fletcher et al., 1989; Ronis and Kaiser, 1989; Jacob et al., 1984). Lower perceived susceptibility also predicted BSE underperformance in several studies (e.g., McCaul et al., 1996; Salazar and Carter, 1994). Finally, lower perceived seriousness predicted BSE underperformance in two studies (Champion, 1993, 1988). To our knowledge, no previous studies have examined the possible roles of health belief variables in predicting BSE overperformance.

Although studies based on the Health Belief Model have sometimes assessed certain types of psychological distress related to screening behaviors (such as fear of finding a lump—a health belief "Barrier"), formal assessments of general and cancer-specific distress and their relations to BSE frequency are rare in the literature. The potential importance of psychological factors is suggested by Leventhal's Dual Process Model (Leventhal and Cameron, 1987), which posits that fear and anxiety may play a role in influencing health and screening behaviors. One study found

that general psychological distress measured by the Brief Symptom Inventory (BSI) (Derogatis and Spencer, 1982) correlated negatively with BSE frequency (Lerman et al., 1994). Kash et al. (1992) reported that general anxiety was negatively related to BSE frequency, but it is unclear how they measured BSE frequency. Other studies have found that cancer-specific distress, such as intrusive thoughts about breast cancer, correlated positively with BSE adherence (Benedict et al., 1997; McCaul et al., 1996), but BSE overperformance was not examined. Epstein et al. (1997) and Brain et al. (1999) found that high levels of cancer-specific distress correlated with BSE overperformance among women with family histories of breast cancer. Lerman and colleagues (1994), the first to assess concurrently both BSE overperformance and BSE underperformance, found that psychological distress measured by a global score on the BSI related to BSE underperformance and that cancer-specific distress related to BSE overperformance among women with family histories of breast cancer. The literature thus remains equivocal in terms of the role of psychological distress in predicting BSE frequency, especially BSE overperformance, and replication remains scarce. Additionally, the predictive value of psychological distress beyond what can be attributed to classic health belief variables has yet to be examined.

To our knowledge, the study reported here is the first to examine concurrently psychological distress, as well as health beliefs, family history, and sociodemographic variables, as possible predictors of BSE underperformance and overperformance within a single study. These factors were assessed contemporaneously to facilitate analysis of the unique contributions of psychological distress to the prediction of BSE frequency, allowing a more encompassing picture of the factors associated with women's compliance to the recommended guideline of monthly BSE. In light of recent findings that women with family histories of breast cancer and African American women may be less likely to comply with recommended guidelines for monthly BSE, we targeted recruitment to ensure adequate representation of these groups in the study. Based on the previous literature, we hypothesized that psychological distress, health beliefs, breast cancer risk factors, and sociodemographic variables would each predict BSE frequency when considered individually. To provide the first critical test of the impact of psychological distress above and beyond other predictors, we examined the possibility that psychological distress would predict BSE frequency even after accounting for factors in the Health Belief Model. Based on the reports by Epstein et al. (1997) and Brain et al. (1999), we hypothesized that high cancer-specific distress would predict BSE overperformance and that African American women would be overrepresented in the subset of women who overperformed BSE.

METHOD

Subjects

One hundred forty-two women with ($n = 54$) and without ($n = 88$) first-degree relatives with breast cancer participated in the study. Subjects were recruited by advertisements placed in three medical centers in New York City requesting participants for a study of family history and breast cancer. To accrue sufficient numbers of women with family histories of breast cancer and African American women, our recruitment advertisement especially encouraged these women to attend. Fewer than 10% of women refused to participate once contacted. Women were eligible to participate if they were healthy by self-report and had no personal history of cancer at the time of the assessment. Women reporting taking any prescription medications or suffering from chronic illnesses (e.g., diabetes) were excluded from the study. Additionally, women with family histories of breast cancer were excluded if their relative had been in active treatment for breast cancer within the previous 6 months. We made these exclusions to decrease the likelihood that women were currently dealing with other major health-related issues that would potentially impact attitudes toward breast cancer screening. Seven subjects were excluded because of missing data, yielding a final sample of 135 women. Mean age of the sample was 41.6 years (SD = 10.1 years). Over a third of the sample had family histories of breast cancer, two-thirds were minority participants, about half had completed college, and a third were currently married (see Table I).

Measures

Subjects completed questionnaires assessing demographics and family history of cancer. They also reported possible risk factors for breast cancer, including age at menarche, age at first live birth, and number of children

Table I. Subject Characteristics: Demographics and Risk Factors

Mean age (years)	41.6 (SD = 10.1)
Education (% completed college)	53
Income (% earning above $40,000)	39
Marital status (% married)	33
Ethnicity (% Caucasian)	30
Familial risk (% with a FH to breast cancer)	38
Objective risk (% with Claus score >11)	30
Mean age at menarche	12.4 (SD = 1.9)
Mean age at first live birth	23.4 (SD = 5.6)
Mean number of children	2.7 (SD = 1.7)

(Gail et al., 1989). Objective risk estimates (>11% lifetime risk) were calculated using the Claus et al. (1996) formulation of familial risk based on pedigree analyses. In addition, subjects completed face valid items assessing health beliefs, reported to be predictors of screening behaviors in other studies (Rakowski et al., 1992; Lerman et al., 1990; Rimer et al., 1989, 1991). Perceived seriousness was assessed by having subjects rate "How serious of a disease do you think breast cancer is?" on a scale from 0 ("not serious at all") to 100 ("as serious as can be") and perceived susceptibility was assessed by having subjects rate "How likely do you think you are to develop breast cancer in your lifetime?" on a scale of 0 ("not at all likely") to 100 ("extremely likely"). These face valid measures have been used previously in studies from our own laboratory (e.g., Zakowski et al., 1997, Valdimarsdottir et al., 1995) and by others (e.g, Durfy et al., 1999) and have demonstrated stability over time [test–retest reliability = .85 (Zakowski et al., 1997)] and criterion validity (Zakowski et al., 1997; Valdimarsdottir et al., 1995). They also rated the degree to which they agreed with the benefits of BSE performance ("helps detect breast cancer early," "may relieve anxiety," "gives a feeling of control over health," "may benefit the whole family," etc.) and the barriers to BSE performance ("embarrassing," "time consuming," "unnecessary unless there are symptoms," "nothing can be done anyway at that point," etc.) on an 18-item Likert-type scale of 1 (strongly disagree) to 5 (strongly agree) based on benefits an barriers reported in a number of studies (Rakowski et al., 1992; Lerman et al., 1990; Rimer et al., 1989, 1991). Subjects also reported on a Likert-type scale of 1 to 5 how confident they were in their ability to adequately perform BSE. Reliability of health belief measures in this sample ranged from .66 to .84, comparable to coefficients reported in other studies of health beliefs (Champion, 1988).

General psychological distress was measured using the Brief Symptom Inventory (BSI) (Derogatis and Spencer, 1982). The reliability of this measure has been demonstrated by internal consistency [Cronbach's α = .80–.90 (Derogatis and Spencer, 1982)] and had a reliability coefficient of .95 in the present sample. As an additional measure of distress, mood disturbance on the day of assessment was measured using the short version of the Profile of Mood States (POMS-SV) (Shacham, 1983; DiLorenzo et al., 1999). Reliability of the POMS has been reported to be .73–.97 by the authors and was .93 in the present sample. To simplify analyses, only total scores on the BSI and POMS-SV were used. The BSI total score was calculated by summing the responses to the 53 items (Likert from 0 to 4) and dividing by 53, yielding a score range of 0 to 4. Higher numbers reflect greater general distress. The POMS-SV was scored by summing reponses (Likert 0 to 4) of negative affect items (e.g., hopeless, anxious) and subtracting responses to positive affect items (e.g., carefree, cheerful), yielding a score range of −24 to 124. Similar to the BSI, higher scores reflect greater mood disturbance. Cancer-specific

distress was measured using the Impact of Events Scale (IES) (Horowitz et al., 1979), which is comprised of two subscales: intrusive thoughts and avoidance. "Breast Cancer" served as the "event" on the IES. Internal consistency of the IES has been reported as .86–.89 (Horowitz et al., 1979) and was .93 in the present sample. The Intrusive Thoughts subscale consists of seven Likert-type items (0 to 5) assessing the frequency of thoughts about breast cancer (e.g., thought about it when I didn't mean to), yielding a score range from 0 to 35. The Avoidance subscale consists of eight Likert-type items (0 to 5) assessing the frequency of avoidant thoughts about breast cancer (e.g., I tried not to think about it), yielding a score range from 0 to 40. On both subscales, higher scores reflect more frequent thoughts. Finally, as additional measures of "cancer screening-specific" distress, subjects rated the degree to which they experienced distress when thinking about BSE and when performing BSE. They were instructed to mark a 100-mm line anchored by "not at all upset" on the left to "as upset as I could be" on the right. To minimize retrospective bias, cancer-screening-specific distress items were completed only by subjects who performed (n = 92) or thought about performing (n = 96) BSE within the previous month.

To assess compliance with the recommended guideline of monthly BSE (American Cancer Society, 1999), we asked subjects to indicate how frequently they performed BSE over the past 12 months, according to the following categories: never, once per year, once every 6 months, once every 2 months, once per month, or more often than once per month. Consistent with recent studies (Salazar, 1994; Tang et al., 1999), we categorized appropriate performance as once per month or once per 2 months (to allow for regular BSE performers who may occasionally miss some performances), and BSE underperformance as less often than every other month, and BSE overperformance as more often than monthly (Lerman et al., 1994).

Procedures

Subjects provided informed consent prior to participation. Questionnaires were completed in the presence of an investigator who was available to clarify any items, though they were permitted to complete the demographic portion of the questionnaire at home and return it in a prepaid mailer. Subjects were offered $20 plus the cost of public transportation to and from the study visit.

Data Analysis

Following the methodology of Lerman et al. (1994), our primary approach was to compare subgroups of women who (a) underperformed, (b)

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overperformed, or (c) met performance guidelines for regular BSE. Preliminary analyses evaluated each continuous predictor variable for normality, and variables which failed to meet criteria (seriousness, susceptibility, confidence, and distress variables) were dichotomized. To address concerns of nonnormality, in line with methodology of previous studies (Lerman et al., 1994), perceived seriousness (median = 100, M = 92.7, SD = 15.2) and susceptibility (median = 50, M = 38.6, SD = 30.0) were dichotomized at the median. As indicated, half of the women perceived breast cancer as "extremely serious," and half of the women rated their susceptibility to developing breast cancer in their lifetimes as "50" or greater. To facilitate chi-square and polychotomous logistic regression analyses, we generated a dichotomous "confident/not confident" variable from the original BSE confidence item. BSI Global Severity Index (median = 0.32, M = 0.44, SD = 0.43), POMS (median = 24, M = 30.8, SD = 23.1), IES Intrusive thoughts (median = 2, M = 4.1, SD = 6.5), IES Avoidance (median = 5, M = 5.7, SD = 8.8), Distress Thinking of BSE (median = 5, M = 14.3, SD = 23.0), and Distress Performing BSE scores (median = 5, M = 16.5, SD = 23.6) were all dichotomized at the median, as well. The distress variables were all positively skewed, with many subjects reporting no distress. Bivariate analyses on categorical and dichotomous variables were conducted using the chi-square statistic. Continuous variables (current age, age at menarche, age at first live birth, number of children, perceived benefits, and perceived barriers) were analyzed using the one-way ANOVA technique with Duncan's (1975) pairwise comparison test. Unique contributions of the psychological variables were assessed with a polychotomous hierarchical multiple logistic regression analysis (used when the dependent variable has more than two levels, as in the present study assessing under-, regular, and overperformance of BSE) (Hosmer and Lemeshow, 1989). All statistical tests were two-tailed.

RESULTS

Findings indicated that 36% ($n = 49$) of the women met recommended guidelines for regular BSE, while an almost-equal number of women underperformed BSE (36%, $n = 48$), and 28% ($n = 38$) of the women overperformed BSE. Bivariate analyses of the relations between BSE frequency and demographics, health beliefs, and psychological distress are presented below.

Demographics

As indicated in Table II, when considered individually, age [$F(2,133) = 5.28, p < .05$], level of education [$\chi^2(2) = 9.21, p < .05$], and ethnicity [$\chi^2(2) = 6.57, p < .05$] were related to BSE frequency. Post hoc analysis of

Table II. Bivariate Associations Between Subject Characteristics and BSE Frequency

Variable	Under performance (n = 48)	Regular performance (n = 49)	Over performance (n = 38)
Mean age (years)	38.9[a] (SD = 9.3)	42.2 (SD = 11.3)	44.2[a] (SD = 8.9)
Education (% completed college)	65[a]	57[b]	32[a,b]
Income (% above $40,000)	50[c]	30[c]	35
Ethnicity (% African American)	44[a]	55[c]	74[a,c]
Family history (% with a FH of breast cancer)	38	31	47
Objective risk (% with Claus score >11)	31	26	32
Mean age at menarche	12.2 (SD = 1.9)	12.5 (SD = 1.9)	12.6 (SD = 1.8)
Mean age at first live birth	24.4 (SD = 5.1)	23.0 (SD = 5.8)	22.7 (SD = 5.9)
Mean number of children	3.0 (SD = 2.0)	2.2 (SD = 1.6)	2.8 (SD = 1.2)

Note. [a,b]Values in each row with matching superscripts differ significantly, at $p < .05$. [c]Values in each row with matching superscripts differ at $p < .10$.

age indicated that the mean age of Underperformers (38.9; SD = 9.3) did not differ from that of Regular Performers (42.2 years; SD = 11.3 years), but did differ ($p < .05$) from that of Overperformers (44.2 years; SD = 8.9 years). Additionally, post hoc cell comparisons indicated that significantly more Underperformers and Regular Performers completed college than did Overperformers ($p < .05$). Consistent with earlier research, post hoc cell comparisons indicated that significantly more Overperformers were African American than Underperformers ($p < .05$). Marital status was not related to BSE frequency in this sample. Having a family history of breast cancer in one or more first-degree relatives, having an objective (Claus et al., 1996) lifetime risk greater than the base rate (11%), and having other objective risk factors for breast cancer (Gail et al., 1989) were also not related to BSE frequency. These findings are consistent with a number of recent studies failing to support the hypothesis of risk-related differences in BSE behavior (Alagna et al., 1987).

Health Beliefs

As indicated in Table III, perceived barriers [$F(2,133) = 9.12, p < .05$] and confidence in BSE performance [$\chi^2(2) = 7.63, p < .05$] were related to BSE frequency. Underperformers were less likely to report being confident in BSE performance and scored higher on the Perceived Barriers scale than Regular Performers and Overperformers ($p < .05$). Overperformers did not differ from Regular Performers on any of the health belief variables. Interestingly, perceived risk and perceived benefits were not related to BSE frequency.

Table III. Bivariate Associations Between Health Belief Variables and BSE Frequency

Variable	Under performance (n = 48)	Regular performance (n = 49)	Over performance (n = 38)
Perceived seriousness (% above median)	56^{c,d}	73^c	79^d
Perceived risk (% above median)	44	57	57
Mean perceived benefits	3.9 (SD = 0.6)	4.1 (SD = 0.8)	4.0 (SD = 0.8)
Mean perceived barriers	1.9^{a,b} (SD = 0.7)	1.4^a (SD = 0.6)	1.4^b (SD = 0.5)
BSE confidence (% reporting confidence)	33^{a,b}	59^a	57^b

Note. ^{a,b}Values in each row with matching superscripts differ significantly, at $p < .05$. ^{c,d}Values in each row with matching superscripts differ at $p < .10$.

Psychological Variables

As indicated in Table IV, breast cancer-specific intrusive thoughts [$\chi^2(2) = 12.66$, $p < .05$] and avoidance [$\chi^2(2) = 11.49$, $p < .05$] were related to BSE overperformance. *Post hoc* comparisons indicated that 76% percent of Overperformers had high intrusive thoughts of breast cancer, significantly more than either Regular Performers or Underperformers. Similarly, 76% of Overperformers had high avoidance, significantly more than Regular Performers or Underperformers. BSE distress, general distress (BSI Global

Table IV. Bivariate Associations Between Psychologic Distress and BSE Frequency

Variable	Under performance (n = 48)	Regular performance (n = 49)	Over performance (n = 38)
BSI Global Severity Index (GSI) (% scoring above median)	50	52	60
POMS Acute Mood Disturbance (% above median)	37	49	50
Intrusive breast cancer thoughts (% above median)	42^a	46^b	76^{a,b}
Avoidance (% above median)	44^a	44^b	76^{a,b}
Emotional upset during BSE (% above median)^a	25^c	34^d	53^{c,d}
Emotional upset thinking of BSE (% above median)	52	39	51

Note. ^{a,b}Values in each row with matching superscripts differ significantly, at $p < .05$. ^{c,d}Values in each row with matching superscripts differ at $p < .10$. ^{a}Includes only subjects who performed BSE in the past month.

Severity Index), and acute mood disturbance (POMS-SV) were not related to BSE frequency at the .05 level of significance.

Hierarchical Model

To determine the unique contributions of the psychological variables to BSE frequency, a polychotomous hierarchical multiple logistic regression was performed, using BSE frequency as the outcome variable. Our strategy was to enter demographic variables first, then health belief variables, to identify the contribution of health belief factors after accounting for demographics, and finally, to enter psychological variables, to identify their unique contribution to BSE behavior after accounting for both demographics and health beliefs (Table V). To take a conservative approach, variables that reached even a marginally significant level ($p < .10$) in the bivariate analysis were entered into the regression. When demographic variables (age, education, income, and ethnicity) were entered in the first block, education significantly predicted BSE ($\chi^2(2) = 7.7$, $p < .005$). The bivariate odds ratio indicated that Overperformers were less likely to be highly educated than Regular Performers (OR = .36; 95% CI = .15, .89). Health belief variables that were significant in the bivariate analyses (barriers, confidence) were entered in the second block. Results indicated that barriers and confidence were significantly related to BSE even after accounting for education (χ^2 change = 17.2, $p < .005$). The bivariate odds ratios indicated that Underperformers were less likely to be

Table V. Hierarchical Logistic Regression Predicting Breast-Self Examination Frequency

Significant variable	χ^2 improvement	Bivariate odds ratio (95% CI)
Step 1—Demographics		
Education	7.7	Over vs. Regular .36** (.15, .89)
Step 2—Health Belief Model	17.2	
Perceived barriers		Under vs. Regular 3.57** (1.61, 7.70)
BSE confidence		.34** (.15, .79)
Step 3a—Psychologic distress (all subjects)	7.2	
Intrusive breast cancer thoughts		Over vs. Regular 3.81** (1.49, 9.74)
Step 3b—Psychologic distress (subjects who performed BSE in the past month)	13.9	
Emotional upset during BSE		2.16* (.86, 5.40) Over vs. Regular
Intrusive breast cancer thoughts		4.35** (1.55, 12.16)

Note. * $p < .10$. ** $p < .005$.

confident about BSE (OR = .34; 95% CI = .15, .79), and reported higher Barriers (OR = 3.81; 95% CI = 1.61, 7.70), than Regular Performers. In the final block, the significant psychological variables (intrusive thoughts, avoidance, and emotional upset when performing BSE) were entered. Results indicated that the intrusive breast cancer thoughts and emotional upset during BSE continued to be significantly related to BSE frequency even after accounting for the demographic and health belief variables (χ^2 change = 163.9, $p < .005$). The bivariate odds ratios indicated that Overperformers were significantly more likely to report Intrusive thoughts about breast cancer (OR = 4.35; 95% CI = 1.55, 12.16) than Regular performers.

DISCUSSION

The present study examined the impact of sociodemographics, health beliefs, and psychological distress on adherence to regular BSE. To our knowledge, this is the first study to assess the unique contribution of psychological distress as a predictor of BSE frequency over and above contributions from other variables. In addition, this is the first study to examine contemporaneously these variables' impact on BSE underperformance and overperformance in a sample including women both with and without family histories of breast cancer. Findings indicated that education, barriers, confidence, and cancer-specific distress made significant contributions to variance in BSE frequency and that cancer-specific distress was related to BSE even after accounting for the contributions of the other variables. Distress was related only to overperformance, while the health belief variables were related only to underperformance.

Our finding that 28% of women were Overperformers is consistent with Lerman et al. (1994), who found that 15–36% of their samples of women with family histories of breast cancer performed BSE more frequently than once a month. Indeed, Epstein et al. (1997) reported that 8% of women performed BSE as frequently as once a day. Future studies investigating BSE frequency within the subset of overperforming women may be useful in determining whether or not women who perform BSE daily differ from those who overperform less markedly.

The present finding that women who overperform BSE differ from women who regularly perform BSE also suggests that future studies should not combine these two groups and simply compare them to women who underperform BSE. For example, in the present study, if we were to have compared the Underperformers to the combined group of Regular Performers and Overperformers, we might have erroneously concluded that women who underperformed BSE were characterized by lower levels of cancer-specific

intrusive thoughts, when in reality, the percentage of Underperformers and Regular Performers who exhibited intrusive thoughts were almost-identical (Table IV). Hence, examining Overperformers separately from Regular Performers not only yields valuable information about BSE overperformance but also allows for more accurate conclusions about characteristics of women who underperform BSE.

In this sample, women with family histories of breast cancer were no more likely than others to perform BSE regularly. It should be noted that in the present study, women were recruited from medical centers to a study about breast cancer. One might argue that such women may well be more aware of the need for breast cancer screening than the general population, yet, surprisingly, many of the women in our sample were noncompliant with regular BSE. The possibility, thus, exists that noncompliance may be even greater in the general population. Because women with family histories are at greater risk to develop breast cancer, research and intervention efforts should focus on increasing compliance to screening guidelines in this population. The present findings suggest that such intervention efforts, now an active area of research, might most profitably be focused on removing perceived barriers, increasing BSE confidence, and alleviating cancer-specific distress.

It must be emphasized that the present findings are correlational and, thus, cannot formally demonstrate that relations between cancer-specific distress and BSE overperformance are causal in nature. It is also possible that BSE overperformance generates the cancer-specific distress observed in this sample. A third possibility is that BSE is both distressing in itself and maintained by women's distress about their risk. A vicious cycle may develop in which BSE performance causes cancer-specific distress, which in turn stimulates additional examinations, and so forth. Indeed, since the inception of BSE as a screening method, clinicians have been wary of the "cancerphobia" that may be related to overperformance (Haagensen, 1952). Also, frequency is only one important factor in effective BSE; proficiency in the techniques is equally critical. Intervention efforts should ensure not only that women are performing regular BSE, but that they are performing it correctly. Finally, as is the case in the preponderance of studies, we relied on women's self-report of BSE frequency, which could be responsive to demand characteristics; the relation between self-reports and actual frequency was not ascertained.

In sum, the present study is consistent with an emerging body of evidence suggesting that BSE overperformance may be a prevalent problem. Our study indicated that BSE overperformance has fundamentally different predictors than BSE underperformance. These findings suggest that Overperformers comprise a distinct group of women and should not be simply combined with Regular Performance in comparison to Underperformers, as

has been done in previous studies. Such oversimplification may lead to misleading and erroneous conclusions about predictors of underperformance as well as failure to characterize the potentially unique profile of women who overperform BSE.

ACKNOWLEDGMENTS

REFERENCES

Alagna, S., Morokoff, P., Bevett, J., and Reddy, D. (1987). Performance of breast self-examination by women at high risk for breast cancer. *Women Health* 12: 29–46.

American Cancer Society (1999). *Cancer Facts and Figures: 1999*, ACS, New York.

Barron, C., Houfek, J., and Foxall, M. (1997). Coping style, health beliefs, and breast self-examination. *Issues Ment. Health Nurs.* 18: 331–350.

Benedict, S., Coon, G., Hoomani, J., and Holder, P. (1997). Breast cancer detection by daughters of women with breast cancer. *Cancer Pract.* 5: 213–219.

Boring, C., Squires, T., Tong, T., and Montgomery, S. (1994) Cancer statistics. *CA Cancer J. Clin.* 44: 7–26.

Brain, K., Norman, P., Gray, J., and Mansel, R. (1999). Anxiety and adherence to breast self-examination in women with a family history of breast cancer. *Psychosom. Med.* 61: 181–187.

Champion, V. (1988). Attitudinal variables related to intention, frequency and proficiency of breast-self examination in women 35 and over. *Res. Nurs. Health* 11: 283–291.

Champion, V. (1993). Instrument refinement for breast cancer screening behaviors. *Nurs. Res.* 42: 139–143.

Claus, E., Schildkraut, J., Thompson, W., and Risch N. (1996). The genetic attributable risk of breast and ovarian cancer. *Cancer* 77: 2318–2324.

Coleman, E. (1991). Practice and effectiveness of breast self examination: A slective review of the literature (1977–1989). *J. Cancer Educ.* 6: 83–92.

Derogatis, L., and Spencer, P. (1982). *The Brief Symptom Inventory (BSI) Administration Scoring and Procedures Manual—I*, copyrighted manuscript, Baltimore.

DiLorenzo, T., Bovbjerg, D., Montgomery, G., Jacobsen, P., and Valdimarsdottir, H. (1999). The application of a shortened version of the profile of mood states in a sample of breast cancer chemotherapy patients. *Br. J. Health Psychol.* 4: 315–325.

Duke, S., Gordon-Sosby, K., Reynolds, K., and Gram, I. (1994). A study of breast cancer detection practices and beliefs in Black women attending public health clinics. *Health Educ. Res.* 9: 331–342.

Duncan, D. (1975). *t*-tests and intervals for comparisons suggested by the data. *Biometrics* 31: 339–359.

Durfy, S., Bowen, D., McTiernan, A., Sporleder, J., and Burke, W. (1999). Attitudes and interest in genetic testing for breast and ovarian cancer susceptibility in diverse groups of women in western Washington. *Cancer Epidemiol. Biomark. Prev.* 8: 369–375.

Epstein, S., and Lerman, C. (1997). Excessive health behaviors in those at risk for physical disorder. *J. Psychosom. Res.* 43: 223–225.

Epstein, S., Lin, T., Audrain, J., Stefanek, M., Rimer, B., and Lerman, C. (1997). The High-Risk Breast Cancer Consortium 1997. Excessive breast self-examination among first-degree relatives of newly diagnosed breast cancer patients. *Psychosomatics* 38: 253–261.

Fletcher, S., Morgan, T., O'Malley, M., and Earp, J. (1989). Is breast self-examination predicted by knowledge, attitudes, beliefs, or sociodemographic characteristics? *Am. J. Prev. Med.* 5: 207–215.

Foster, R., Lang, S., and Costanza, M. (1978). Breast self-examination practices and breast cancer stage. *N. Engl. J. Med.* 229: 265–270.

Gail, M., Brinton, L., and Byar, D. (1989). Projecting individualized probabilities of developing breast cancer for white females who are being examined annually. *J. Nat. Cancer Inst.* 81: 1879–1886.

Haagensen, C. (1952). Self-examination of the breasts. *JAMA* 149: 356–360.

Hill, D., White, V., Jolley, D., and Mapperson, K. (1988). Self-examination of the breast: is it beneficial? Meta-analysis of studies investigating breast self-examination and extent of disease in patients with breast cancer. *Br. Med. J.* 297: 271–275.

Holmberg, L., Ekbom, A., Calle, E., Mokdad, A., and Byers, T. (1997). Breast cancer mortality in relation to self-reported use of breast self-examination. A cohort study of 450,000 women. *Breast Cancer Res. Treat.* 43: 137–140.

Horowitz, M., Wilner, N., and Alvarez, W. (1979). Impact of event scale: A measure of subjective stress. *Psychosom. Med.* 41: 209–218.

Hosmer, D., and Lemeshow, S. (1989). *Applied Logistic Regression*, John Wiley and Sons, New York.

Houts, P., Wojtkowiak, S., Simmonds, M., Weinberg, G., and Heitjan, D. (1991). Using a state cancer registry to increase screening behaviours of sisters and daughters of breast cancer patients. *Am. J. Public Health* 81: 386–388.

Jacob, T., Penn, N., and Brown, M. (1984). Breast self-examination: Knowledge, attitudes, and performance among black women. *J. Natl. Med. Assoc.* 81: 769–776.

Kaplan, K., Weinberg, G., Small, A., and Herndon, J. (1991). Breast cancer screening among relatives of women with breast cancer. *Am. J. Public Health* 81: 1174–1179.

Kash, K., Holland, J., Halper, M., and Miller, D. (1992). Psychological distress and surveillance behaviors of women with a family history of breast cancer. *J. Nat. Cancer Inst.* 84: 24–30.

Katz, R., Meyers, K., and Walls, J. (1995). Cancer awareness and self-examination practices in young men and women. *J. Behav. Med.* 18: 377–384.

Lauver, D., and Angerame, M. (1990). Overadherence with breast self-examination recommendations. *Image J. Nurs. Scholar.* 22: 148–152.

Lerman, C., Rimer, N., Trock, B., Balshem, A., and Engstrom, P. (1990). Factors associated with repeat adherence to breast cancer screening. *Prev. Med.* 19: 279–290.

Lerman, C., Kash, K., and Stefanek, M. (1994). Younger women at increased risk for breast cancer: Perceived risk, psychological well-being, and surveillance behavior. *J. Nat. Cancer Inst. Monogr.* 16: 171–176.

Lerman, C., Narod, S., Schulman, K., Hughes, C., Gomez-Caminero, A., Bonney, G., Gold, K., Trock, B., Main, D., and Lynch, J. (1996). BRCA1 testing in families with breast-ovarian cancer: A prospective study of patient decision-making and outcomes. *JAMA* 275: 1885–1892.

Leventhal, H., and Cameron, L. (1987). Behavioral theories and the problem of compliance. *Patient Educ. Counsel.* 10: 117–138.

McCaul, K., Schroeder, D., and Reid, P. (1996). Breast cancer worry and screening: Some prospective data. *Health Psychol.* 15: 430–433.

Murray, M., and McMillan, C. (1993). Health beliefs, locus of control, emotional control, and women's cancer screening behavior. *Br. J. Clin. Psychol.* 32: 87–100.

Rakowski, W., Dube, C., Marcus, B., Prochaska, J., Velicer, W., and Abrams, D. (1992). Assessing elements of women's decisions about mammography. *Health Psychol.* 11: 111–118.

Rimer, B., Kasper-Keintz, M., Kessler, H., Engstrom, P., and Rosan, J. (1989). Why women resist screening mammography: Patient-related barriers. *Radiology* 172: 243–246.

Rimer, B., Trock, B., Engstrom, P., Lerman, C., and King, E. (1991). Why do some women get
    regular mammograms? *Am. J. Prev. Med.* 7: 69–74.
Ronis, D., and Kaiser, M. (1989). Correlates of breast self-examination in a sample of college
    women: Analyses of linear structural relations. *J. Appl. Soc. Psychol.* 19: 1068–1084.
Rosenstock, I. (1966). Why people use health services. *Milbank Mem. Fund Q.* 44: 94–124.
Salazar, M. (1994). Breast self examination beliefs: A descriptive study. *Public Health Nurs.* 11:
    49–56.
Salazar, M., and Carter, W. (1994). A qualitative description of breast self-examination beliefs.
    Health Educ. Res. 9: 343–354.
Shacham, N. (1983). A shortened version of the profile of mood states. *J. Person. Assess.* 47:
    305–306.
Tang, T., Solomon, L., Yeh, C., and Worden, J. (1999). The role of cultural variables in breast
    self-examination and cervical cancer screening behavior in young Asian women living in
    the U.S. *J. Behav. Med.* 22: 419–436.
Valdimarsdottir, H., Bovbjerg, D., Kash, K., Holland, J., Osborne, M., and Miller, D. (1995).
    Psychological distress in women with a familial risk of breast cancer. *Psycho-Oncology* 4:
    133–141.
Zakowski, S., Valdimarsdottir, H., Bovbjerg, D., Borgen, P., Holland, J., Kash, K., Miller, D.,
    Mitnick, J., Osborne, M., and Van Zee, K. (1997) Predictors of intrusive thoughts and
    avoidance in women with family histories of breast cancer. *Ann. Behav. Med.* 19: 362–369.

It Won't Happen to Me: Lower Perception of Heart Disease Risk among Women with Family Histories of Breast Cancer[1]

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Background. The threat that breast cancer poses to American women, particularly to women with family histories of the disease, has received widespread attention in both medical and popular literatures. While this emphasis may have laudable consequences on breast cancer screening, it may also have a negative consequence, obscuring women's recognition of their risks for other health threats, such as heart disease. This study examined the possibility that women with family histories of breast cancer may be particularly susceptible to overestimating their risks of breast cancer while minimizing their risks of cardiovascular disease.

Methods. Healthy women with ($n = 73$) and without ($n = 104$) family histories of breast cancer (64% African American, 26% Caucasian, 10% other ethnicities, mean age 41.7 years) were recruited from medical centers in New York City, and completed questionnaires concerning their family histories and perceptions of risk.

Results. Consistent with the study hypothesis, women with family histories of breast cancer had significantly higher perceived lifetime risk of breast cancer ($P < 0.0002$) but lower perceived lifetime risk of heart disease ($P < 0.002$) than women without family histories. Additionally, women with family histories of breast cancer had lower perceived colon cancer risk ($P < 0.02$), suggesting that women with family histories of breast cancer may be underestimating their risks for a variety of diseases.

Conclusion. The emphasis on breast cancer risk, especially for women with family histories of the disease, may need to be balanced by educational efforts concerning women's risk of other diseases, particularly cardiovascular disease.   © 2000 American Health Foundation and Academic Press

Key Words: family history; breast cancer; heart disease; perceived risk.

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INTRODUCTION

Breast cancer is the most frequently diagnosed cancer among women in the United States [1]. Current estimates suggest that one of every eight women in the United States (12.5%) will develop breast cancer at some point during her lifetime. Having a first-degree relative with breast cancer places a woman at an even higher lifetime risk for developing the disease [2]. Indeed, research has demonstrated that these women are aware of their increased risk. A number of studies (e.g., [3,4]) have repeatedly found that perceptions of breast cancer risk among women with family histories of breast cancer are significantly higher than among women without family histories of breast cancer and far higher than objective estimates. Indeed, a number of studies (e.g., [5–7]) have demonstrated that American women in general markedly overestimate their risk of developing the disease, with many women perceiving themselves to be at extremely high lifetime risk. For example, Helzlsouer *et al.* [6] found that even employees in an oncology center, whom one might expect to be more knowledgeable than lay people, perceived themselves to be at greater than 40% lifetime risk. Evans *et al.* [7] found that while some women with family histories of breast cancer underestimated their risk, most overestimated their risk and many overestimated their risk by more than 50%. Several recent studies (e.g., [8,9]), noting the large scale dissemination of breast cancer-related information in women's magazines and other media, suggest the distinct salience of breast cancer in the lives of women in the United States.

The salience of the threat of breast cancer, particularly for women with family histories of breast cancer, raises the possibility that women may have a poorer appreciation of their risk for developing other diseases, chief among which is heart disease, which typically poses a greater lifetime risk than does breast cancer. A recent report based on data from the Framingham Heart Study, a large-scale, longitudinal cohort study, has indicated that women's lifetime risk of developing heart disease is approximately 32% [10]. This risk level is almost three times that of breast cancer, and is even higher for women with family histories of heart disease [11]. Heart disease kills almost three-quarters of a million Americans annually and is currently the leading cause of death among women in the United States [12]. Nevertheless, recent studies [13,14] have found that far more women in the general population report being concerned about breast cancer than about heart disease. Indeed, a recent population-based survey found that only a small minority of women identified heart disease as their greatest health concern, and most women were not aware that heart disease was the leading cause of death [15].

Inappropriately low perceptions of risk for disease can be problematic, as they have been linked to poor compliance with recommended health behaviors and screening for the disease in question (see McCaul et al. [16]). For example, Lerman et al. [17] found that women who perceive themselves to be at lower than average risk for breast cancer are significantly less likely than others to comply with recommended guidelines for breast self-examination and mammography. Price [18] and others (e.g., [19]) have found that perceptions of risk for colorectal cancer are positively related to compliance with screening (e.g., sigmoidoscopy). Avis et al. [20] proposed that women who perceive themselves to be at lower than average risk for heart disease may be less likely to follow a healthy diet and exercise regimen and less likely to be screened regularly for hypertension. In light of these considerations, a better understanding of the predictors of risk perception could have important implications for women's health.

To our knowledge, the potential impact of having a family history of breast cancer on women's perceptions of their risk for developing heart disease has never been examined. Indeed, little attention has been given to any factors predicting individual's perceptions of their heart disease risk. For women with family histories of breast cancer, heightened concerns about that disease might overshadow their appreciation of their heart disease risk, which is no less in this population [21,22]. The present study examined the hypothesis that women with family histories of breast cancer, known to have particularly high perceptions of breast cancer risk, may have lower perceptions of heart disease risk than

women without family histories of breast cancer. Support for this view comes from Weinstein [23,24], who has theorized that individuals with family histories of a disease have had a personal connection to the disease, and may therefore be excessively focused on their risk for that disease. Based on these theoretical considerations, we predicted that women with family histories of breast cancer would have lower perceptions of heart disease risk than women without such family histories. Additionally, as CDC annual mortality data suggest that African American women have particularly high rates of mortality from heart disease [25], we also explored potential ethnicity-related differences in perceived risk.

METHOD

Subjects

One hundred seventy-seven women participated in the study. As part of a larger study of the psychobiological effects of stress, subjects were recruited by advertisements (for a "mind–body" study of women with and without family histories of breast cancer) placed in three medical centers in New York City. We targeted recruitment for women who had family histories of breast cancer to ensure adequate representation. Fewer than 10% of women refused to participate once contacted. To reduce sources of extraneous variability in risk perceptions, all women were required to be healthy by self-report with no personal history of cancer, heart disease, or other serious chronic illness (e.g., diabetes) at the time of the assessment. Women who did not satisfy these criteria were excluded from the study. Subjects were told that they would be asked to fill out several questionnaires pertaining to their general health, as well as their attitudes and beliefs about breast cancer and other diseases.

Mean age of the sample was 41.7 years (SD = 10.1, range 25.2–71.3). Sixty-four percent of the women were African-American, 26% were Caucasian, and 10% represented other ethnicities. Women's education levels were varied; 8% of the women had not completed high school, 45% of the women had completed high school or some college, and 47% had completed college. About a third of the women reported earning under $20,000 annually, 47% earned $20,000 to $60,000, and 19% earned more than $60,000 annually. Thirty-five percent of the women were currently married. Seventy-three women had family histories of breast cancer in a first-degree relative (the "FHBC+ Group") and 104 women did not have family histories of breast cancer in a first-degree relative (the "FHBC− Group").

Measures

Subjects completed questionnaires assessing demographics, general health variables, and family histories

of cancer and heart disease. Demographic variables were dichotomized to facilitate analyses (see Table 1). Self-reports of cancer and heart disease in family members, particularly first-degree relatives, have been found to be reliable [11]. Subjects also reported how likely they thought they were to develop breast cancer sometime during their lives, on a scale of 0% (not at all likely) to 100% (extremely likely). Using the same scale, subjects also reported how likely they thought they were to develop heart disease sometime during their lives, and, for purposes of comparison, how likely they thought they were to develop colon cancer sometime during their lives (for which actual lifetime risk among women is estimated at 5.6% [1]). These perceived risk measures have been used previously in studies by us (e.g., [3,26]) and others (e.g., [27,28]), and have demonstrated stability over time (test–retest reliability = 0.85; [3]) and criterion validity [3,26].

Procedures

The study was conducted under IRB approval. Subjects provided written informed consent prior to participation. Questionnaires were completed in the presence of an investigator who was available to clarify any items. Subjects were offered $20 plus the cost of public transportation to and from the study visit.

Data Analysis

To address the study hypotheses, we compared perceptions of breast cancer, heart disease, and colon cancer risk (outcome variables) in women with and without family histories of breast cancer (predictor variable). Because some studies have suggested that demographic variables such as age, education, income, and ethnicity are predictive of variability in perceived risk for breast cancer (e.g., [29]) and heart disease (e.g., [20]), we considered these variables possible covariates in the analyses. Thus, in a preliminary set of analyses, we examined relations between demographic variables (age, education, income, and ethnicity) and indices of perceived risk. Interestingly, none of these factors was related to the perceived risk indices (Table 1). Following the recommendation of Baron and Kenny [30], who argue that covariates must be related to both predictors and outcomes to be included in a model, these variables were excluded from further analyses. Because having a family history of heart disease in a first-degree relative (e.g., myocardial infarction, angina pectoris; n = 78)

TABLE 1

Perceived Risk and Demographics

	Perceived risk (0–100%) ± SE		
	Breast cancer	Heart disease	Colon cancer
Age (median 41.4 years)[1]			
Above median (n = 89)	41.9 ± 2.8	36.0 ± 3.3	23.0 ± 2.7
Below median (n = 88)	41.0 ± 2.9	31.7 ± 2.9	22.0 ± 2.5
Education			
Completed college (n = 83)	41.2 ± 2.8	34.7 ± 3.0	21.6 ± 2.8
Did not complete college[2] (n = 94)	41.5 ± 2.9	33.2 ± 3.1	23.2 ± 2.4
Income[3]			
$40,000/year or above (n = 63)	46.9 ± 3.2	33.9 ± 3.3	22.1 ± 2.7
Less than $40,000/year (n = 113)	39.0 ± 2.6	34.2 ± 2.9	23.0 ± 2.5
Ethnicity[4]			
African-American (n = 113)	42.5 ± 2.6	34.3 ± 2.9	25.4 ± 2.6
Caucasian (n = 46)	43.4 ± 3.8	33.4 ± 3.9	20.1 ± 2.6
Smoking history (lifetime)			
Yes (n = 77)	45.3 ± 3.0	37.3 ± 3.6	25.6 ± 3.1
No (n = 99)	38.2 ± 2.7	31.5 ± 2.7	20.3 ± 2.3
Family history of breast cancer			
FHBC– (n = 104)	35.1 ± 2.5[a]	40.3 ± 2.7[b]	26.4 ± 2.4[c]
FHBC+ (n = 73)	50.0 ± 3.1[a]	27.0 ± 3.3[b]	17.3 ± 2.9[c]
Family history of heart disease			
FHHD– (n = 99)	43.2 ± 2.7	27.0 ± 2.8[d]	20.7 ± 2.5
FHHD+ (n = 78)	39.0 ± 3.0	42.7 ± 3.2[d]	24.7 ± 2.8
At least 1 female relative (n = 43)	35.1 ± 4.1	43.4 ± 5.0	20.6 ± 3.8
Male relative only (n = 35)	43.7 ± 4.6	41.9 ± 4.8	29.8 ± 4.9

[1] Age as a continuous variable did not correlate significantly with perceived risk indices.
[2] Includes 15 participants who did not complete high school.
[3] One participant did not report income.
[4] Other ethnicities were insufficiently represented to yield a meaningful comparison.
[a–d] Matching superscripts differ significantly: [a] $P < 0.0002$; [b] $P < 0.002$; [c] $P < 0.02$; [d] $P < 0.0003$.
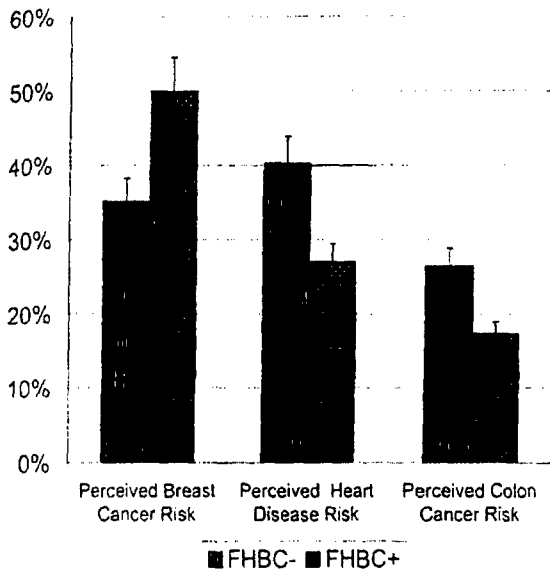
FIG. 1. Perceived risk for disease among women with and without family histories of breast cancer.

was related to perceived heart disease risk (see Table 1), we included this variable as a covariate in our analyses. (We did not include having a family history of colon cancer as a covariate because insufficient numbers of women had family histories of that disease.) Next, we performed simple, zero-order correlations on our three perceived risk variables to ascertain dependence. As perceived breast cancer, heart disease, and colon cancer risks were modestly intercorrelated (P values < 0.05), we performed a mixed-model factorial ANOVA with family history of breast cancer (FHBC+/–) as a between-group factor and perceived risk type (breast cancer, heart disease, colon cancer) as a within-subjects factor, yielding a 2 (FHBC) × 3 (Perceived Risk Type) design. To take a conservative approach, we used Greenhouse–Geisser-corrected significance levels [31]. Simple effects analyses (between-group comparisons) were calculated using independent t tests of least-squared means for unbalanced designs with a modified Bonferroni correction for Type I error [32]. Because some women (n = 35) had male first-degree relatives with heart disease, we added gender of the affected relative as a covariate. We examined the interaction of Perceived Risk Type × FHBC to test our primary hypothesis.

RESULTS

Demographic / Background Variables as Predictors of Perceived Risk

The women's age, education, income, ethnicity, and smoking history were not related to their perceived risks of the three diseases (Table 1). As expected, having

a family history of heart disease (but not the gender of the affected relative) was related to higher perceived heart disease risk. FHHD +/– was, therefore, included as a covariate in the analyses examining the study's primary hypothesis concerning family history of breast cancer.

Family History of Breast Cancer as a Predictor of Perceived Risk

Consistent with the primary study hypothesis, women with family histories of breast cancer (FHBC+) had higher perceptions of breast cancer risk, but lower perceptions of heart disease risk, and lower perceptions of colon cancer risk, than did women without family histories (FHBC–), as shown in Fig. 1. Statistical analysis (ANOVA) yielded a significant FHBC × Perceived Risk Type interaction; $F(2,346) = 25.26$, $P < 0.0001$. Planned comparisons (between groups) indicated that while FHBC+ women had higher perceived breast cancer risk than did FHBC– women, $t(175) = 3.74$, $P < 0.0002$, they had lower perceived heart disease risk than FHBC– women; $t(175) = 3.13$, $P < 0.002$, and lower perceived colon cancer risk than FHBC– women, $t(175) = 2.42$, $P < 0.02$ (see Table 1).

As shown in Table 2, FHBC+ and FHBC– women did not significantly differ in age, education, ethnicity, smoking history, or perceived physical health. In addition, FHBC+ women had family histories of heart disease at a statistically comparable rate to that of FHBC– women. In this sample, FHBC+ women were more likely to report earning above $40,000 annually than

TABLE 2

Comparison of Women with (FHBC+) and without (FHBC–) Family Histories of Breast Cancer and with (FHHD+) and without (FHHD–) Heart Disease

	FHBC+ (n = 73)	FHBC– (n = 104)
Age (% above median)	53.4	48.1
Education (% completed college)	38.4	52.9
Income (% 40K or greater)	45.2[a]	29.7[a]
Ethnicity (% African-American)	65.1	75.3
Smoking history (% ever smoked)	45.8	42.3
Family history of heart disease (% FH+)	41.1	46.1
Perceived physical health (% high)	56.2	61.5

	FHHD+ (n = 78)	FHHD– (n = 99)
Age (% above median)	57.7	44.4
Education (% completed college)	53.8	41.4
Income (% 40K or greater)	42.9	30.9
Ethnicity (% African-American)	62.3	77.8
Smoking history (% ever smoked)	45.4	42.4
Family history of breast cancer (% FH+)	38.5	43.4
Perceived physical health (% high)	56.4	61.6

[a] $P < 0.05$.

FHBC− women. As indicated above, however, income was not related to any of the perceived risk indices.

Family History of Heart Disease as a Predictor of Perceived Risk

Because a significant subset of women in the study had family histories of heart disease (see above), we were able to explore the possibility that an analogous pattern of results would emerge for these women. Hence, we tested the possibility that women with family histories of heart disease (FHHD+) would have higher levels of perceived heart disease risk, but lower levels of perceived breast and colon cancer risks than women without family histories of heart disease (FHHD−). In contrast to our findings regarding family history of breast cancer, we found that, while FHHD+ women had higher levels of perceived heart disease risk than FHHD− women, they did not differ significantly from FHHD− women in their levels of perceived breast and colon cancer risks (Fig. 2). Statistical analysis (ANOVA) indicated that this FHHD × Perceived Risk Type interaction was significant; $F(2,346) = 9.05$, $P < 0.0002$. To further characterize this interaction, we performed simple effects analyses (between groups), which revealed that the FHHD+ women had higher perceived heart disease risk than did the FHHD− women, $t(175) = 3.55$, $P < 0.0005$, but did not differ in their perceptions of breast cancer risk, $t(175) = 0.72$, $P < 0.47$, or colon cancer risk, $t(175) = 0.89$, $P < 0.38$. Thus, as expected, perceptions of heart disease risk among FHHD+ women were significantly higher than among FHHD− women (Table 1), but FHHD+ women did not display a concomitant decrement in perceived risk for

FIG. 2. Perceived risk for disease among women with and without family histories of heart disease.

the other two diseases. Similar results were found when we restricted the family history criteria to include only women with first-degree relatives who suffered a myocardial infarction ($n = 55$), a more severe form of heart disease than other forms (e.g., angina pectoris). FHHD+ and FHHD− women did not differ on any of the demographic/background variables (Table 2).

DISCUSSION

Consistent with the primary study hypothesis, we found that women with family histories of breast cancer had significantly higher perceptions of risk for developing breast cancer, but significantly lower perceptions of risk for developing heart disease and colon cancer than women without family histories of breast cancer. In contrast, women with family histories of heart disease had higher levels of perceived risk of developing that disease than women without such family histories, while their levels of perceived risk for breast and colon cancer did not differ from those of women without family histories of heart disease. Interestingly, African American women, who are known to have higher levels of mortality from both heart disease and breast cancer, did not significantly differ from Caucasian women in their levels of perceived risk for the diseases.

These findings are consistent with the model of risk perceptions advanced by Weinstein [23,24], in that having a family history of a disease was associated with increased risk perceptions for development of that disease. Contrary to Weinstein, however, we found that in this sample, having a family history of a disease was not always necessarily related to lower perceived risk of other diseases. The inverse relation held when examining women with and without family histories of breast cancer, but not when examining women with and without family histories of heart disease. Thus, the results with this sample of women do not provide support for a general contention that having a family history of any one disease is necessarily related to decreased perceived risk for other diseases.

The specific factors responsible for the lower perceptions of heart disease and colon cancer among women with family histories of breast cancer have yet to be determined. Several possibilities deserve further attention. First, in addition to perceiving themselves to be at high risk of developing breast cancer during their lifetime (addressed in this study), women with family histories of breast cancer may believe that they are at risk of developing the disease at a younger age and of dying from the disease before other health risks would be likely to develop. Second, women with family histories of breast cancer may selectively attend to the high levels of breast cancer information available through the media [8], and gloss over messages about other diseases. If this is the case, they may not be sufficiently
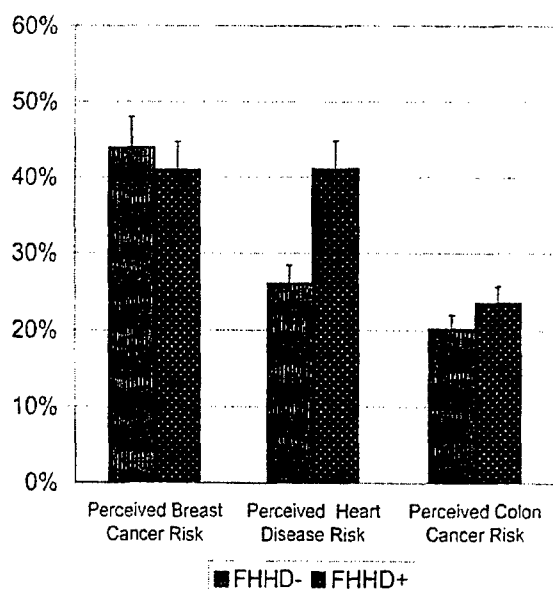
informed about heart disease or colon cancer to recognize their risks of those diseases. Third, clinicians of women with family histories of breast cancer may emphasize risk of that disease and spend less time discussing risks of other diseases.

Our finding that women with family histories of heart disease did not have lower perceived breast or colon cancer risk than women without such family histories, even after employing a stricter definition of FHHD (i.e., myocardial infarction only) is consistent with studies suggesting that saturation of cancer-related issues in the media has sensitized the general population to heightened awareness of cancer risk [8]. In addition to the potentially direct impact of the media on perceived risk, there may be indirect effects resulting from high levels of negative images of cancer as an inexorable, debilitating, and deadly disease, whose treatment is highly aversive. To the extent that thoughts about cancer are more aversive than thoughts about heart disease, such thoughts may result in an overestimation of risk for breast cancer, consistent with an extensive body of research (e.g., [33]) suggesting that people overestimate their risks for particularly aversive events (e.g., plane crashes). It is possible, therefore, that the combination of high media exposure and the aversive nature of cancer may sensitize even FHHD+ women, such that their perceptions of cancer risk remain comparable to those of FHHD− women. Indeed, in the present study, women's perceptions of risk of breast cancer were substantially inflated (compared to actual risk estimate of 12. 5%), possibly suggesting a more general tendency to view breast cancer as more aversive and threatening. Whether individuals with family histories of other highly aversive diseases (e.g., ALS) would show a similar pattern of perceived risks remains to be examined.

The dramatic overestimation of breast cancer risk found in the present study is consistent with our previous findings in another sample [26], as well as those of Helzlsouer et al. [6] who have reported that American women substantially overestimate their breast cancer risk. These findings, together with the present results indicating that FHBC+ women have lower perceived heart disease risk, underscore the importance of examining both particularly high and low perceptions of risk for various diseases, and the potentially disparate educational approaches necessary to correct such errors of estimation. Although intervention studies are necessary, our results point to the possible utility of informing women of their risks for other diseases (e.g., heart disease, colon cancer) in conjunction with counseling about breast cancer risk. In addition, the present data suggest that all women may benefit from educational efforts aimed at disseminating accurate lifetime risk estimates for breast cancer. Understanding risks for other diseases may be especially important to women at risk for breast cancer in light of recent reports [21,22] indicating that women who develop breast cancer are no less likely to develop heart disease than others. Moreover, Satariano [34] found that women who develop breast cancer actually have poorer breast cancer prognoses when diagnosed with comorbid heart disease. These findings underscore the importance of appreciating risk for heart disease even in the face of the threat of developing breast cancer.

It should be emphasized that this initial cross-sectional study cannot address several important issues. A longitudinal study is required to determine whether perceptions of disease risk change over the course of exposure to cancer- or other disease-related events throughout the life spans of women with family histories of breast cancer. Indeed, perceptions of risk may change as a function of situational factors, such as undergoing hypertension screening or mammography, or having a parent die from a disease. Prior research has already suggested that these events tend to generate disease-related worries that may be predictive of elevated risk perceptions [35], but prospective research is scarce.

Additionally, the present study examined women recruited from medical centers into a research study about breast cancer. Respondents might in some way be more sensitized to risk for familial breast cancer, and might not be representative of the general population. This possible selection bias could conceivably explain why the FHHD+ women in the present sample did not have lower breast cancer risk perceptions than FHHD− women. Nevertheless, findings of this initial study indicated that even in this group of possibly more "medically aware" women, perceptions of heart disease risk were lower among women with family histories of breast cancer. Furthermore, FHHD+ women had higher perceptions of heart disease risk even though the study was not advertised to address heart disease, suggesting that the present findings are not solely attributable to the operation of a recruitment bias. In addition, women overestimated their lifetime risks of colon cancer (17–30%, see Table 1, versus 5.6% actual risk [1]), even though they were not being recruited to a colon cancer study. Future randomly recruited community-based studies would be helpful to allow for generalization to other women. In addition, an analogous study specifically recruiting women with and without family histories of heart disease or colon cancer would help further characterize the operation of potential recruitment biases in the investigation of risk perceptions. This may be particularly important in light of the fact that many of the studies to date have relied on samples recruited for breast cancer research, which may result in samples of women with particularly high breast cancer risk perceptions.

Finally, little is known about the impact of inappropriate perceptions of heart disease risk on health behaviors. As mentioned above, a number of studies have found that breast and colon cancer risk perceptions were related to frequency of screening behavior. We are not aware, however, of any studies that have gone beyond speculation [20] to demonstrate that perceptions of heart disease risk are predictive of important behavioral endpoints such as diet, exercise, or screening for hypertension. As research continues to examine relations between perceived risk, health behaviors, and disease endpoints, intervention studies should focus on developing methods of effectively communicating risk information about multiple diseases to at-risk populations.

In sum, the present study contributes to an emerging appreciation that well-intended efforts to promote awareness of breast cancer risk in the population by both the health care community and the mass media may have had an adverse impact on perceptions of risk for heart disease, a much more likely source of morbidity and mortality. Legato et al. [13] have already reported elevated perceptions of breast cancer risk in the general population relative to perceptions of heart disease risk. Our results now indicate that this may be a particular problem among women with family histories of breast cancer.

ACKNOWLEDGMENTS

REFERENCES

1. Landis SH, Murray T, Bolden S, Wingo PA. Cancer statistics 1999. CA—Cancer J Clinicians 1999;49:8–31.

2. Claus E, Risch N, Thompson, W. Autosomal dominant inheritance of early-onset breast cancer. Cancer 1994;73:643–51.

3. Zakowski SG, Valdimarsdottir HB, Bovbjerg D, Borgen P, Holland J, Kash K, et al. Predictors of intrusive thoughts and avoidance in women with family histories of breast cancer. Ann Behav Med 1997;19:362–69.

4. Mouchawar J, Byers T, Cutter G, Dignan M, Michael S. A study of the relationship between family history of breast cancer and knowledge of breast cancer genetic testing prerequisites. Cancer Detect Prev 1999;23:22–30.

5. Wilcox S, Stefanick M. Knowledge and perceived risk of major diseases in middle-aged and older women. Health Psychol 1999;18:346–53.

6. Helzlsouer K, Ford D, Hayward R, Midzenski M, Perry H. Perceived risk of cancer and practice of cancer prevention behaviors among employees in an oncology center. Prev Med 1994;23:302–8.

7. Evans D, Burnell L, Hopwood P, Howell A. Perception of risk in women with a family history of breast cancer. Br J Cancer 1993;67:612–14.

8. Marino C, Gerlach K. An analysis of breast cancer coverage in selected women's magazines, 1987–1995. Am J Health Promot 1999;13:163–70.

9. Gerlach K, Marino C, Hoffman-Goetz, L. Cancer coverage in women's magazines: what information are women receiving? J Cancer Educ 1997;12:240–44.

10. Lloyd-Jones D, Larson M, Beiser A, Levy D. Lifetime risk of developing coronary heart disease. Lancet 1999;353:89–92.

11. Silberberg J, Fryer J, Wlodarczyk J, Robertson R, Dear K. Comparison of family history measures used to identify high risk of coronary heart disease. Genet Epidemiol 1999;16:344–55.

12. National Heart Lung and Blood Institute. NHLBI morbidity and mortality chartbook, 1998. Bethesda: NHLBI, 1998.

13. Legato M, Padus E, Slaughter E. Women's perceptions of their general health, with special reference to their risk of coronary artery disease: results of a national telephone survey. J Womens Health 1997;6:189–98.

14. Pilote L., Hlatky M. Attitudes of women toward hormone therapy and prevention of heart disease. Am Heart J 1995;129:1237–38.

15. Mosca L, Jones WK, King KB, Ouyang P, Redberg RF, Hill MN. Awareness, perception, and knowledge of heart disease risk among women in the United States. American Heart Association's Women's Heart Disease and Stroke Campaign Task Force. Arch Fam Med 2000;9:506–15.

16. McCaul KD, Branstetter AD, Schroeder DM, Glasgow RE. What is the relationship between breast cancer risk and mammography screening? A meta-analytic review. Health Psychol 1996;15:423–29.

17. Lerman C, Kash K, Stefanek M. Younger women at increased risk for breast cancer: Perceived risk, psychological well-being, and surveillance behavior. J Natl Cancer Inst Monogr 1994;16:171–76.

18. Price J. Perceptions of colorectal cancer in a socioeconomically disadvantaged population. J Comm Health 1993;18:347–62.

19. Lewis S, Jensen N. Screening sigmoidoscopy: factors associated with utilization. J Gen Intern Med 1996;11:542–44.

20. Avis N, Smith K, McKinlay J. Accuracy of perceptions of heart attack risk: what influences perceptions and can they be changed? Am J Public Health 1989;17:1608–12.

21. Dreyer L, Olsen J. Cancer risk of patients discharged with acute myocardial infarct. Epidemiology 1998;9:178–83.

22. Neugut A, Rosenberg D, Ahsan H, Jacobson J, Wahid N, Hagan M. Association between coronary heart disease and cancers of the breast, prostate, and colon. Cancer Epidemiol Biomarkers Prev 1998;7:869–73.

23. Weinstein N. Effects of personal experience on self-protective behavior. Psychol Bull 1989;105:31–50.

24. Weinstein N. Why it wont happen to me: perceptions of risk factors and susceptibility. Health Psychol 1984;3:431–57.

25. Hoyert D, Kochanek K, Murphy S. Deaths: Final data for 1997. National Vital Statistics Report, Vol. 47, No. 19; 1999: National Center for Health Statistics, Hyattsville, MD.

26. Valdimarsdottir H, Bovbjerg D, Kash K, Holland, J, Osborne, M, Miller, D. Psychological distress in women with a familial risk of breast cancer. Psycho-Oncol 1995;4:133–41.

27. Durfy S, Bowen D, McTiernan A, Sporleder J, Burke W. Attitudes and interest in genetic testing for breast and ovarian cancer susceptibility in diverse groups of women in western Washington. Cancer Epidemiol Biomarkers Prev 1999;8:369–75.

28. Weinstein N. Unrealistic optimism about susceptibility to health problems: conclusions from a community-wide sample. J Behav Med 1987;10:481–500.

29. Lipkus I, Iden D, Terrenoire J, Feaganes J. Relationships among breast cancer concern, risk perceptions, and interest in genetic testing for breast cancer susceptibility among African-American

women with and without a family history of breast cancer. Cancer Epidemiol Biomarkers Prev 1999;8:533–39.

30. Baron RM, Kenny DA. The moderator–mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. J Personality Social Psychol 1986;51: 1173–82.

31. Greenhouse SW, Geisser S. On methods in the analysis of profile data. Psychometrika 1959;32:95–112.

32. Rom DM. A sequentially rejective test procedure based on a modified Bonferroni inequality. Biometrika 1990;77:663–65.

33. Tversky A, Kahneman D. Availability: a heuristic for judging frequency and probability. Cognit Psychol 1973;5:207–32.

34. Satariano W. Aging, comorbidity, and breast cancer survival: an epidemiologic view. Adv Exp Med Biol 1993;330:1–11.

35. Rimer B, Bluman L. The psychosocial consequences of mammography. J Natl Cancer Inst Monogr 1997;22:131–38.

Read All About It: The Over-Representation of Breast Cancer in Popular Magazines[1]

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Background. While women are far more likely to develop and die from cardiovascular disease (CVD) than breast cancer, research has shown that they markedly overestimate their personal risks of breast cancer and underestimate their CVD risks. The source of this disparity is not yet known, although increased media attention to breast cancer relative to CVD has been suggested to play a role. The purpose of the present study was to provide a first critical test of this possibility. Two hypotheses were tested: (a) the number of breast cancer articles would be greater than the number of CVD articles; and (b) this disparity in coverage would increase over the years.

Methods. A web-based search engine was used to quantify all breast cancer and cardiovascular disease articles (keyword search) in 73 popular magazines on a annual basis for a 10-year interval (1990–1999).

Results. Consistent with study hypotheses, breast cancer articles outnumbered CVD articles, and this disparity widened over the years ($P < 0.0001$). This disparity was not limited to specific magazine categories (e.g., women's interest).

Conclusions. Over-representation of breast cancer vis-a-vis CVD is pervasive in popular magazines. Future research should investigate how such disparities in the media may influence risk perceptions, adoption of preventive health behaviors, and compliance with screening guidelines. © 2002 American Health Foundation and Elsevier Science (USA)

Key Words: breast cancer; cardiovascular disease; perceived risk; media; magazine.

INTRODUCTION

Breast cancer is the most common form of cancer diagnosed in American women, contributing to more deaths than any other form of cancer among women under the age of 55 [1]. It is estimated that one in eight women in the United States will develop breast cancer in their lifetimes. Women are keenly aware of this threat. Indeed, studies have indicated that most women substantially overestimate their risks of breast cancer [2–4]. A study by Herbert-Croteau *et al.* [4] found that only 37% of women aged 40–69 correctly identified the population lifetime risk of breast cancer, while 46% overestimated their risks. Another study [5] found similar results among a younger cohort of women, with 75% overestimating their own lifetime risks. Even among employees at an oncology clinic, presumed to be more knowledgeable about cancer risks, perceived risk was elevated, averaging 40% [6]. Among women with family histories of breast cancer, who also would be expected to be more knowledgeable about their own increased risks, numerous studies have demonstrated that perceptions of risk far exceed objective estimates (e.g., [7,8]).

In addition to being a potential source of stress (e.g., [7,9]), this overestimation of their breast cancer risks may lead women to underestimate their risks of developing other diseases. Most notable in this regard is cardiovascular disease (CVD), which typically poses a greater lifetime risk for women than does breast cancer [10]. Contrary to many women's beliefs [11], CVD is the leading cause of death and disability for women in the United States. Data from the Framingham Heart Study indicate that the lifetime risk of a woman developing heart disease is approximately one in three, and even greater for women with family histories of CVD [10]. CVD accounts for more than 505,000 deaths among women in the United States annually [12], in contrast to 43,000 deaths from breast cancer each year [1]. Although the risk of CVD is approximately three times greater than the risk of developing breast cancer, studies indicate that women are far more concerned

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about developing breast cancer than developing CVD [13,14]. A recent survey found that, among women between the ages of 45–64, only 9% were concerned about CVD, while 61% were concerned about breast cancer [15]. In a national telephone survey, Legato et al. [14] found that almost half of the women believed that it was unlikely that they would die from a heart attack, and nearly 60% believed that they were more likely to die from breast cancer than from CVD. Another recent study of a heterogeneous sample of urban women [9] demonstrated that they grossly overestimated their lifetime risks of breast cancer and underestimated their risks of heart disease, a disparity that was particularly pronounced among women with family histories of breast cancer.

One likely source of women's overemphasis on breast cancer risk relative to other health risks may be the disproportionate number of breast cancer-related articles published in popular magazines [16,17]. Indeed, the number of breast cancer-related articles appearing in magazines has increased over the past 50 years. From the years of 1929–1949, there were only a total of 15 articles about cancer in popular women's magazines [18]. A study of women's magazines in a more recent time period (1987–1995), however, found over 200 articles about breast cancer alone [16]. Two other reports by Gerlach, Marino, and colleagues [17,19] confirmed that cancer coverage (especially breast cancer) in selected women's magazines from 1987–1995 far exceeded that of other diseases. Consistent with the possibility that over-representation of breast cancer in magazines contributes to overestimation of risk among women, studies indicate that the American public relies on the media to obtain its health information [20,21]. Women in particular have been shown to utilize the media to obtain health information [22,23]. Meissner et al. [22] found that, aside from information from physicians, printed media was the most common source of health information utilized by women. In fact, studies have generally supported the view that the media has a substantial impact on a person's health perceptions [24–26].

Taken together, these studies suggest that disparities in media coverage may contribute to women's overestimation of their breast cancer risks. To date, however, studies of printed media coverage have relied on intensive manual analyses of relatively few, primarily women's, magazines. The extent to which disparities in magazine coverage extend beyond this selected set of publications into the broader range of popular magazines not specifically targeted at women is not yet known. Also not known is the extent to which these publication trends are consistent across categories of magazines targeting specific readerships (e.g., African Americans).

Our strategy in the present study was to use a computerized database to examine a broad group of popular magazines (i.e., top 100 by paid circulation), and to conduct head-to-head comparisons of the number of articles over the previous decade in which breast cancer or CVD were mentioned. We hypothesized: (a) that the number of breast cancer articles would be greater than the number of CVD articles across this wide range of publications; (b) that this disparity between breast cancer and CVD coverage increased over the study interval. In addition, we conducted exploratory analyses to examine the possibility that coverage disparities may vary across established magazine categories (i.e., women's, news, and African American magazines).

METHODS

Database

To examine the study hypotheses, a web-based search engine, ProQuest Direct (University Microfilms, Ann Arbor, MI), was employed. We chose ProQuest because, to our knowledge, this search engine has the largest number and widest variety of searchable magazines available online for our search period (1990–1999). Using information provided by Advertising Age 2000 WWW, the top 100 magazines by paid circulation at the midpoint of the time interval (i.e., 1995) were compiled. To include publications with emerging popularity, we added any magazine that achieved top 100 status after 1995. This strategy yielded a total of 118 magazines (complete list available upon request). Of these, 73 (see Appendix) had searchable data available for the 10-year study interval through ProQuest Direct.

Search Strategy

Our first search was for any article mentioning breast cancer within each magazine from the year 1990 through the year 1999. We used "Breast Cancer" as our global search term (keyword), which in this database also included the related terms: "Mammography," "Breast-self examination," "Mastectomy," and "Lumpectomy." We then performed a search for articles mentioning CVD during the same time interval. We used the search term (keyword) "Cardiovascular Disease" which also included the following related terms: "Angina Pectoris," "Heart Attack," "Heart Failure," "Stroke," "Angioplasty," "Cardiac Arrhythmia," "Blood Pressure," "Cardiology," and "Hypertension."

Data Analyses

To address the study hypotheses, we first tabulated the combined data for all 73 magazines for each year of the study interval, and subsequently ran separate analyses by magazine subcategories to explore the possibility that women's, news, or African American magazines may vary in their coverage levels. Magazines

were assigned to categories based on established classifications found in the National Directory of Magazines [27]. Equal proportion χ^2 analyses (a null hypothesis of equal breast cancer and CVD coverage) were performed to identify statistically significant discrepancies in coverage of breast cancer and CVD.

RESULTS

All Magazines

Consistent with the first study hypothesis, across all 73 magazines, we found a total of 697 "breast cancer articles" compared with only 546 "CVD articles," based on our keyword search. This difference was statistically significant: $\chi^2 (1) = 18.1, P < 0.0001$. In addition, consistent with the second study hypothesis, we found that the discrepancy between the number of breast cancer articles and CVD articles widened as the years progressed (see Fig. 1); $\chi^2 (9) = 47.0, P < 0.001$. Examination of Fig. 1 suggests that the divergence was particularly notable beginning in 1997.

Women's Magazines

Fourteen women's magazines were identified among the 73 in the study (Cosmopolitan, Family Circle, Glamour, Good Housekeeping, Mademoiselle, McCalls, New Woman, Redbook, Self, Shape, Vanity Fair, Vogue, and Woman's Day). The total number of breast cancer articles in these magazines from 1990 to 1999 was 286, compared with only 109 CVD articles; $\chi^2 (1) = 79.3, P < 0.0001$. In addition, similar to the findings with the overall sample of magazines, there was an incremental increase in breast cancer coverage relative to CVD coverage in women's magazines over the 10-year study interval (see Fig. 2); $\chi^2 (9) = 19.5, P < 0.025$.
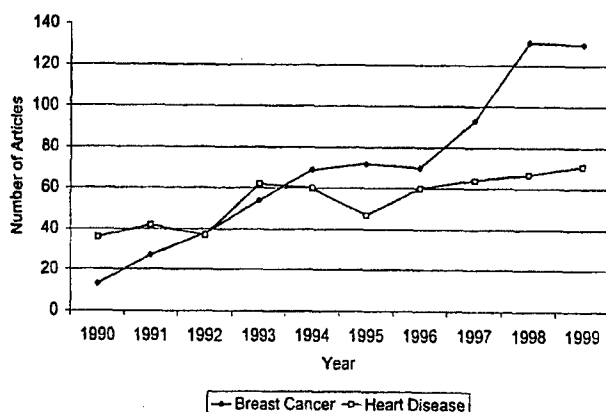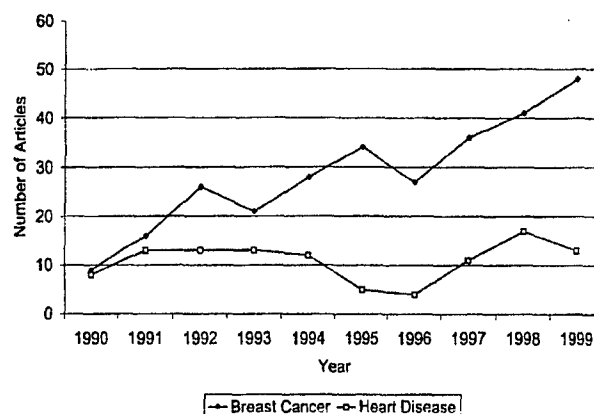

FIG. 2. Number of articles related to breast cancer and heart disease in top women's magazines, 1990–1999.

News Magazines

Three news magazines were identified among the 73 in the study (Newsweek, Time, U.S. News & World Report). Similar to the previous results, there were more breast cancer articles ($n = 100$) than CVD articles ($n = 79$), but this difference did not reach statistical significance; $\chi^2 (1) = 2.5, P < 0.14$. Although more variable, as expected for a grouping with a modest number of breast cancer and CVD articles, examination of Fig. 3 suggests a pattern of increasing breast cancer coverage over the years relative to CVD, especially since 1997; $\chi^2 (9) = 18.9, P = 0.05$.

African-American Interest Magazines

Three African-American interest magazines were identified among the 73 magazines in the study (Ebony, Essence, Jet). Similar to the findings for news magazines, we found that the number of breast cancer articles ($n = 45$) exceeded the number of CVD articles ($n = 34$), though this difference did not reach statis-
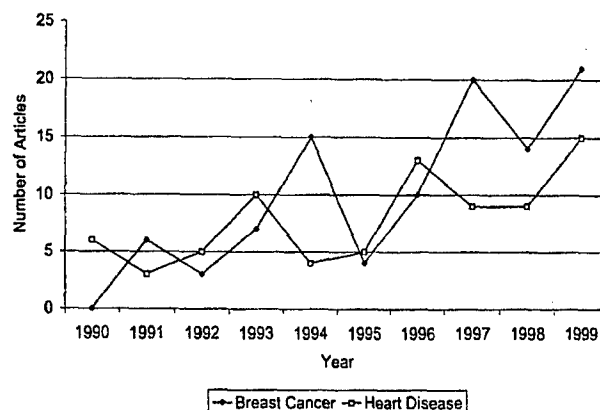

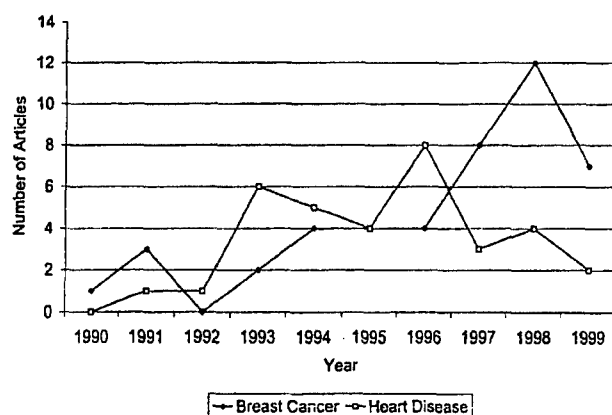FIG. 1. Number of articles related to breast cancer and heart disease in top magazines, 1990–1999.

FIG. 3. Number of articles related to breast cancer and heart disease in top news magazines, 1990–1999.

FIG. 4. Number of articles related to breast cancer and heart disease in top African-American magazines, 1990–1999.

tical significance; χ^2 (1) = 1.5, P < 0.26. Examination of Fig. 4, again suggests a pattern of increasing breast cancer coverage over the years, relative to CVD, especially since 1997, though not statistically significant; χ^2 (9) = 14.2, P < 0.20, in this small sample of articles.

Because of the great disparity between breast cancer and CVD articles observed among women's magazines, we explored the possibility that the disparity in the overall sample was primarily carried by this small sub-sample of magazines. To test this, we re-ran the analysis of the overall sample, excluding women's magazines (n = 59). Results indicated that, although the absolute number of breast cancer and CVD articles overall did not differ; χ^2 (1) = 0.8, P < 0.37, the pattern of increasing breast cancer coverage over the years, relative to CVD, remained significant; χ^2 (9) = 50.6, P < 0.001.

DISCUSSION

Consistent with the primary study hypothesis, breast cancer articles significantly outnumbered cardiovascular disease articles in this large sample of popular magazines in the United States. As hypothesized, results also revealed a pattern of increasing disparity between breast cancer and CVD coverage over the 10-year study interval. Indeed, during this interval, the number of breast cancer articles per year increased by more than 600 percent, while the number of CVD articles increased by less than 50 percent. Consistent with previous reports, the results of the present study also revealed that breast cancer articles far exceeded CVD articles in popular women's magazines, again showing a dramatic increase in this disparity over the 10-year study interval. Although less dramatic, similar patterns of results were seen in the samples of popular news magazines and African American magazines. Together, these results provide com-

pelling evidence of an increasing relative over-representation of breast cancer in popular magazines compared with CVD, despite the fact that, even for women, CVD is a far more common disease.

The results of this survey of 73 of the most popular magazines in the United States offer the most comprehensive support in the literature, to date, that the topic of breast cancer is over-represented in the media compared to CVD. Gerlach and colleagues [17,19] have previously reported that breast cancer articles were over-represented in a sample of four women's magazines (Good Housekeeping, Ladies Home Journal, McCalls, Redbook) and in a sample of three African American magazines (Ebony, Essence, Jet), which they subjected to detailed content analysis over the years 1987–1995. Replicating and extending these findings, the present study of breast cancer articles over the years 1990–1999 revealed a similar pattern of over-representation in samples of 14 women's magazines (including 3 of those in the Gerlach survey), and three African American magazines (also surveyed by Gerlach). The results of the present study indicate that the over-representation of breast cancer, compared with CVD, is not limited to magazines targeted at female readers or African American readers. Rather, the disparity between breast cancer and CVD coverage can be seen across a wide spectrum of popular magazines, as indicated both by the results of the statistical analyses across all 73 magazines, as well as inspection of the data for the three magazine categories. Finally, the present data provide the most compelling evidence to date of the increasing disparity between breast cancer and CVD coverage in popular magazines.

It should be noted that the present study has several limitations. First, due to system limitations (i.e., not available in ProQuest), we were unable to survey all of the magazines identified as among the 100 most popular. We therefore cannot rule out the possibility that this limited selection introduced a systematic bias in our sample of magazines that could have affected results. We have no reason to suspect, however, that ProQuest inclusion criteria would be related to breast cancer or CVD coverage. Moreover, the widespread nature of the coverage disparity, evidenced across a broad spectrum of magazines, provides no support for such a systematic bias.

Second, we did not perform detailed content analyses on the articles, which leaves open the possibility that breast cancer or CVD may not have been the major topic of all of the articles. We have no reason, however, to believe that the proportion of articles devoted to CVD would be any greater than that devoted to breast cancer. Furthermore, even passing reference to a disease may have an impact on an individual's perceptions of disease risks. At present, little is known about

the relative impact of different types of content (e.g., news story vs human interest story vs passing reference) on perceptions of disease risks. Indeed, several previous studies [28–30] raise the possibility that qualitative aspects of magazine articles (e.g., overemphasis of diagnoses in younger women, more dramatic references to breast cancer as "traitorous" and "evil") may be important contributors to women's perceptions of disease risk. It should be noted that neither we nor previous investigators have provided evidence of a direct link between media exposure and perception of disease risk, although a strong circumstantial case for this connection can be made [17–19].

Finally, breast cancer and CVD coverage in other media utilized by women seeking health care information (e.g., newspaper, TV, radio; [21]) and their relative contributions to disparities in perceived risk have yet to be examined. We have no reason, however, to believe that the disproportionate attention given to breast cancer will be any less evident in other media. It is nevertheless important to confirm the presence of such biases in other media, especially in light of previous studies suggesting that younger and less-educated individuals rely more on television for their health information [21].

The results of the present study are consistent with the possibility that disparities in media coverage may be one source of the increasingly well-documented disparities in perceived risks of breast cancer and CVD [9,13,14]. Although CVD is the number one killer of women in the U.S., far more women in general population are concerned about breast cancer than CVD. Indeed, Mosca et al. [11] found that, compared with CVD, women were seven times more likely to identify cancer as their greatest health concern; most were also unaware of common risk factors and preventive measures relevant to CVD. Given the link between risk perceptions and adoption of preventive measures (e.g., smoking cessation) and appropriate screening (e.g., cholesterol testing) [31], it is important that women have appropriate perceptions of their risks. To the extent that media coverage has an impact on risk perceptions, the disparities observed in the present study may have important public health consequences. A better understanding of how the media influences risk perceptions, adoption of preventive health behaviors, and compliance with screening guidelines, may markedly enhance the efforts of health advocates to work with the members of the media to maximize their beneficial influence on public health. In addition, further research should examine the potential beneficial impact of having health care providers (e.g., genetic counselors) discuss media biases as sources of misinformation when informing clients of their actual levels of risk for disease.

REFERENCES

1. American Cancer Society. Cancer, Facts, and Figures. Atlanta: ACS, 2001.

2. Smith BL, Gadd MA, Lawler C, MacDonald DJ, Grudberg SC, Chi FS, et al. Perception of breast cancer risk among women in breast center and primary care settings: correlation with age and family history of breast cancer. Surgery 1996;120:297–303.

3. Dolan NC, Lee AM, McDermott MM. Age-related differences in breast carcinoma knowledge, beliefs, and perceived risk among women visiting an academic general medicine practice. Cancer 1997;80:413–20.

4. Herbert-Croteau N, Goggin P, Kishchuk N. Estimation of breast cancer risk by women aged 40 and over: a population based study. Canadian J Public Health 1997;88:392–6.

5. Lerman C, Kash K, Stefanek M. Younger women at increased risk for breast cancer: perceived risk, psychological well-being, and surveillance behavior. J Natl Cancer Inst Monogr 1994;16: 171–5.

6. Helzlsouer KJ, Ford DE, Robert SA, Hayward, Midzenski M, Perry H. Perceived risk of cancer and practice of cancer prevention behaviors among employees in an oncology center. Prev Med 1994;23:302–8.

7. Zakowski SG, Valdimarsdottir HB, Bovbjerg D, Borgen P, Holand J, Kash K. Predictors of intrusive thoughts and avoidance in women with family histories of breast cancer. Ann Behav Med 1997;19:362–9.

8. Evans D, Burnell L, Hopwood P, Howell A. Perception of risk in women with a family history of breast cancer. Br J Cancer 1993;67:612–4.

9. Erblich J, Bovbjerg DH, Norman C, Valdimarsdottir HB, Montgomery G. It won't happen to me: lower perception of heart disease risk among women with family histories of breast cancer. Prev Med 2000;31:714–21.

10. Lloyd-Jones DM, Larson MG, Beiser A, Levy D. Lifetime risk of developing coronary heart disease. The Lancet 1999;353:89–92.

11. Mosca L, Jones WK, King KB, Ouyang P, Redberg RF, Hill MN. Awareness, perception, and knowledge of heart disease risk among women in the United States. American Heart Association's Women's Heart Disease and Stroke Campaign Task Force. Arch Fam Med 2000;9:506–15.

12. National Heart Lung and Blood Institute. NHLBI Morbidity and Mortality Chartbook—1998. Bethesda: NHLBI, 1998.

13. Pilote L, Hlatky M. Attitudes of women toward hormone therapy and prevention of heart disease. Am Heart J 1995;129:1237–8.

14. Legato MJ, Padus E, Slaughter E. Women's perceptions of their general health with special reference to coronary artery disease: results of a national telephone survey. J Women's Health 1997; 6:189–98.

15. Phillips KA, Glendon G, Knight JA. Putting the risk of breast cancer in perspective. New Engl J Med 1999;340:141–4.

16. Marino C, Gerlach K. An analysis of breast cancer coverage in selected women's magazines, 1987–1995. Am J Health Promot 1999;13:163–70.

17. Gerlach K, Marino C, Hoffman-Goetz L. Cancer coverage in women's magazines: what information are women receiving? J Cancer Educ 1997;12:240–4.

18. Black WC, Nease RF, Tosteson AN. Perception of breast cancer risk and screening effectiveness in women younger than 50 years of age. J Natl Cancer Inst 1995;87:720–31.

19. Gerlach K, Marino C, Weed D, Hoffman-Goetz L. Lack of colon cancer coverage in seven women's magazines. Women Health 1997;26:57–68.

20. Gellert GA, Higgins KV, Lowery RM, Maxwell RM. A national

survey of public health officers interaction with the media. J Am Med Assoc 1994;271:1285–9.

21. O'Keefe GJ, Boyd HH, Brown MR. Who learns preventive health care information from where: cross-channel and repertoire comparisons. Health Commun 1998;10:25–36.

22. Meissner HI, Potosky AL, Convissor R. How sources of health information relate to knowledge and use of cancer screening exams. J Comm Health 1992;17:153–65.

23. Murray M, McMillan CL. Gender differences in perceptions of cancer. J Cancer Educ 1993;8:53–62.

24. Nattinger AB, Hoffman RG, Howell-Pelz A, Goodwin JS. Effect of Nancy Reagan's mastectomy on choice of surgery for breast cancer by US women. J Am Med Assoc 1998;279:762–6.

25. Smith PM, Schwartz PE. New fears in gynecological cancer. Cancer 1995;76:2133–7.

26. Frost K, Frank E, Maibach E. Relative risk in the news media: a quantification of misrepresentation. Am J Public Health 1997; 87:842–5.

27. National Directory of Magazines—2000. Ox Bridge, Baltimore: 2000.

28. Clarke JN. Cancer, heart disease, and AIDS: what do the media tell us about these diseases? Health Commun 1992;4:105–20.

29. Clarke JN. Breast cancer in mass circulating magazines in the USA and Canada, 1974–1995. Women Health 1999;28:113–30.

30. Burke W, Olsen AH, Pinsky LE, Reynolds SE, Press NA. Misleading presentation of breast cancer in popular magazines. Eff Clin Prac 2001;4:58–64.

31. Avis N, Smith K, McKinlay J. Accuracy of perceptions of heart attack risk: what influences perceptions and can they be changed? Am J Public Health 1989;17:1608–12.

APPENDIX: MAGAZINES INCLUDED IN THE ANALYSES

American Rifleman	Life	Scouting
American Health for Women	Mademoiselle	Self
Better Homes & Gardens	McCalls'	Seventeen
Bon Appetit	Men's Health	Shape
Boy's Life	Modern Maturity	Smithsonian
Business Week	Money	Southern Living
Car & Driver	Motor Trend	Sports Illustrated
Consumer's Digest	National Geographic	Sunset
Cosmopolitan	NEA Today	Teen
Country Living	New Woman	The American Hunter
Discover	Newsweek	The American Legion Magazine
Ebony	Outdoor Life	The Family Handyman
Essence	Parenting	Time
Family Circle	Parents	Today's Homeowner
Field & Stream	PC Magazine	Travel & Leisure
Glamour	PC World	TV Guide
Golf Digest	People	U.S. News
Golf Magazine	Playboy	Us
Good Housekeeping	Popular Science	V.F.W.
Gourmet	Popular Mechanics	Vanity Fair
Health	Prevention	Vogue
Home	Reader's Digest	Weight Watchers Magazine
House Beautiful	Redbook	Woman's Day
Jet	Rolling Stone	YM
Kiplinger's		

53F CAREGIVING AND DEATH OF A MOTHER PREDICT CURRENT DISTRESS IN WOMEN WITH FAMILY HISTORIES OF BREAST CANCER.

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Healthy women with family histories of breast cancer in a first degree relative (FH+) have been reported to exhibit higher levels of breast cancer-related distress than women without family histories of breast cancer (FH-). Recent data suggest that this may be particularly true for women who had a parent die of cancer. We hypothesized that the death of a parent from cancer may be particularly distressing for women who have had the day-to-day responsibility of caring for a parent or other family member with cancer.

105 healthy women (54 FH+, 51 FH-) recruited from large medical centers in the New York City area completed the Impact of Events scale (IES), which measures breast cancer-related distress, and items assessing whether or not they had taken care of a family member with cancer or had a mother who died from cancer. Mean age was 43.4 years (SD=10.3). 76% of the women were African American, 35% were currently married, and 35% completed college.

Consistent with previous studies, results indicated that FH+ women whose mothers had died of cancer scored significantly higher on the IES than either FH+ women whose mothers had not died of cancer or FH- women (p<.05). Further analyses revealed that women who had cared for a family member with cancer scored higher on the IES than women who did not (p<.01), and that FH+ women who experienced both caregiving and the death of a mother from cancer had the highest IES scores (p<.01).

These findings indicate that a history of caregiving, both independently, and in conjunction with the death of a mother from cancer, predicts higher levels of distress in women with a family history of breast cancer. Psychosocial interventions should be appropriately focused on these issues.

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95T DEATH OF A FIRST-DEGREE RELATIVE FROM BREAST CANCER PREDICTS BREAST SELF-EXAMINATION FREQUENCY

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Women with family histories of breast cancer (FH+) are at an increased risk of developing the disease themselves. Research on compliance with recommended guidelines for monthly breast-self examination (BSE) in this group of women has yielded equivocal results. Not yet examined is the possibility that the outcome of the disease in the relative (i.e., death) may play a role in women's compliance with BSE guidelines.

142 healthy women (31 FH+ women whose first-degree relatives died from the disease, 25 FH+ women whose relatives did not die from the disease, and 86 FH- women) reported their BSE frequency. Barriers to BSE performance (e.g., fear) were assessed as a possible mediating variable. Mean age of the sample was 42.6 (SD=10.7), 74% were African American, 31% were currently married, and 37% had completed college.

Results indicated that FH+ women whose relatives died from the disease were more likely than the others to under-perform BSE (<once/2 months), and that FH+ women whose relatives did not die from the disease were more likely than the others to over-perform BSE (>1/month) (p<.005). Post-hoc analyses indicated that FH+ women whose relatives died from the disease reported significantly higher numbers of barriers than the others (p<.05), and that barriers mediated the relationship between having had a relative die from breast cancer and BSE under-performance. Barrier numbers were not related to BSE over-performance in FH+ women whose relatives had not died from the disease.

Findings suggest that clinicians would benefit from assessing the outcome of the breast cancer in the relatives of their patients (i.e., did the relative die?) when making surveillance recommendations. In light of the present findings, an extra effort should be made to educate and encourage FH+ women to perform BSE at the recommended monthly interval.

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Background. Previous studies have consistently reported that women
with family histories of breast cancer have higher levels of perceived risk
and cancer-specific distress (intrusive thoughts). Higher levels of general
distress in these women have been less consistently reported. We
hypothesized that individual differences in perceived risk and intrusive
thoughts about breast cancer may predict variability in levels of general
distress.

Methods. Participants (n=191) were healthy women (mean age=41.4);
45% were African American; 58% had completed college; and, 36% were
married. Forty five percent of the women reported a history of breast cancer
in a first degree relative (none in active treatment). Perceived risk (0- 100%
likelihood), cancer specific distress (intrusive thoughts subscale of the
Impact of Events Scale), and general distress (total score on the Brief
Symptom Inventory) were assessed.

Results & Conclusions. Consistent with the study hypothesis, higher
levels of intrusive thoughts predicted higher general distress among women
with family histories of breast cancer ($F_{[1,81]}=9.42$, $p<.005$). Although
perceived risk did not predict general distress, there was a significant
interaction with intrusive thoughts ($p<.05$), such that the impact of intrusive
thoughts on general distress was stronger among women with higher levels
of perceived risk. Among women without family histories of breast cancer,
intrusive thoughts also predicted general distress ($F_{[1,102]}=43.21$,
$p<.0001$), but perceived risk did not (either as a main effect or in
interaction). These results are consistent with previous studies of other
populations suggesting that intrusive thoughts are a source of general
distress. For women with family histories of breast cancer, the impact of
intrusive thoughts appear to be particularly pronounced if they perceive
themselves to be at high risk for developing !
the disease. Psychosocial interventions may profit from a better
understanding of the impact of intrusive thoughts on distress in these
women.

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Does genetic counseling for breast cancer predisposition increase knowledge?
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An important goal of genetic counseling for cancer predisposition is to improve knowl-
edge about a range of topics, including principles of genetics and oncology, risks for
cancer, and options for screening and primary prevention. However, there are little pub-
lished data on knowledge and comprehension following genetic counseling for breast
cancer. Therefore, the major aims of the present study were: 1) to examine the effec-
tiveness of genetic counseling in improving general knowledge about breast cancer/ge-
netics; and 2) to determine if the effectiveness of counseling is related to demographic
and psychosocial factors. Participants were 107 women attending individual genetic
counseling sessions for breast cancer susceptibility at Memorial Sloan-Kettering Can-
cer Center in New York. Approximately one week prior to their counseling session, the
women completed measures of: 1) breast cancer knowledge (a 27-item questionnaire);
2) cancer specific distress (Impact of Events Scale); and 3) general distress (Profile of
Mood States). Approximately one week following their counseling session, the women
again completed the knowledge questionnaire. There was a significant increase in
knowledge from before to after the genetic counseling session ($p=.0001$). However,
there was a wide variability among the women, with no improvement in knowledge
among some women. The counseling was less effective for minority women ($p=.007$),
less educated women ($p=.05$), and women with high levels of general distress ($p=.003$).
When all of these variables were entered together into the equation, ethnicity and gen-
eral distress remained significant while education was no longer significant. These find-
ings suggest that some women may require different counseling protocols if genetic
counseling is to be effective in educating them about their risks and options.