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Psychosocial Determinants of Mammography Follow-up after Receipt of Abnormal Mammography Results in Medically Underserved Women

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Abstract

This article targets the relationship between psychosocial determinants and abnormal screening mammography follow-up in a medically underserved population. Health belief scales were modified to refer to diagnostic follow-up versus annual screening. A retrospective cohort study design was used. Statistical analyses were performed examining relationships among sociodemographic factors, psychosocial determinants, and abnormal mammography follow-up. Women with lower mean internal health locus of control scores (3.14) were two times more likely than women with higher mean internal health locus of control scores (3.98) to have inadequate follow-up (OR = 2.53, 95% CI = 1.12–5.36). Women with less than a high school education had lower cancer fatalism scores than women who had completed high school (47.5 vs. 55.2, p-value = .02) and lower mean external health locus of control scores (3.0 vs. 5.3) (p-value < .01). These constructs have implications for understanding mammography follow-up among minority and medically underserved women. Further comprehensive study of these concepts is warranted.

Keywords

Medically underinsured; health beliefs; mammography; follow-up studies

Breast cancer is the most frequently diagnosed non-cutaneous malignancy and the second most lethal form of cancer among women in the United States.¹ African American women with low educational attainment and income experience higher breast cancer mortality rates than their White peers (36.1 of 100,000 vs. 25.2 of 100,000, respectively).²⁻³ Overall, African American women have substantially lower five-year survival rates (78%) than White women (91%).³⁻⁴ Multiple studies show that minority women are diagnosed with breast cancer at later stages than White women.^{1,5-7} Later stage and a higher grade of breast cancer diagnosis in minority women has been attributed in part to under-utilization of mammography services and delays in diagnostic testing relative to their White counterparts.⁸ To decrease mortality, current research efforts are focused on prevention and early detection of breast cancer. Screening mammography has been shown to identify breast cancer at an early stage and is associated with a 44% reduction in risk of late-stage disease.⁹ However, survival rates may be compromised if additional diagnostic testing does not follow initial abnormal or inconclusive mammograms in a timely manner.⁹⁻¹⁰ A range of possible factors, such as access and attitudes about health-care-seeking, may delay definitive screening for breast cancer in minority women.¹¹

Previous studies have focused on psychosocial determinants as explanations for mammography screening behaviors in low-income minority women.¹¹⁻²² However, few studies have focused on psychosocial predictors of inadequate follow-up of diagnostic testing for abnormal mammography follow-up in this population.²³⁻³¹ The factors that predict initial mammography screening may not be the same as those that predict which women will come back for a second mammogram if the results of the first exam are positive or ambiguous. Therefore, it is important to investigate differences in abnormal mammography follow-up perceptions in these high-risk women.³² For the purposes of this study, we define an *abnormal mammography screening result* as a Breast Imaging Reporting and Data System[®] (BIRADS[®])-0 (incomplete, needs additional imaging).³³ Any reference to an abnormal mammography hereafter refers to a BIRADS-0 result. *Medically underserved women* were defined as those women who have inadequate access to, or reduced utilization of, high-quality cancer prevention, screening and early detection, treatment, and/or rehabilitation services.³⁴ Medically underserved women include members of any racial or ethnic group who live in rural areas, or who have low income or literacy level. *Racial or ethnic minorities* were defined as those who self-reported their background as one or more of the categories listed immediately below.³⁵

Race: American Indian or Alaska Native,

Asian,

Black or African American,

Native Hawaiian or Other Pacific Islander

Ethnicity: Hispanic or Latino

The overall goal of this study was to examine psychosocial, etiologic breast cancer risk factors, and environmental barriers that affect follow-up of abnormal mammography in minority and medically underserved women in the public hospital setting. The research results presented in this article concern the relationship of psychosocial determinants to inadequate follow-up after abnormal screening mammography results. The investigators modified 10 psychosocial constructs found in the breast cancer literature to explain abnormal mammography follow-up: 1) perceived barriers, 2) perceived benefits, 3)

perceived susceptibility, 4) breast cancer knowledge, 5) breast cancer risk knowledge,³⁶ 6) self-efficacy,¹⁷ 7) cancer fatalism,^{18,37} 8) internal health locus of control, 9) external health locus of control,^{30–31} and 10) spiritual health locus of control.^{39–40} In a companion paper, we assess the relationship of etiologic factors such as obesity and reproductive history to delay in mammography follow-up.²⁴

Theoretical framework

The pathways between psychosocial health beliefs and return for mammography follow-up have not been well explored. There is a dearth of research on this association in minority and medically underserved women. Exploring the role of psychosocial health beliefs in diagnostic mammography follow-up may provide another avenue to promote breast cancer risk reduction and early detection of breast cancer in minority and medically underserved women. Due to the exploratory nature of this research, the theoretical framework was conceived using a combination of theories and models to examine why some minority and medically underserved women return for abnormal mammography follow-up whereas others do not. A number of constructs from the Health Belief Model (HBM) were employed. Our conceptual framework used the constructs of perceived susceptibility, perceived benefits, perceived barriers, breast cancer knowledge, breast cancer risk knowledge, and self-efficacy from the HBM,^{41–44} cancer fatalism¹⁹ and modified constructs from the health locus of control theory^{20–37} and the spiritual health locus of control theory.²⁰

Most studies have found significant correlations between perceived susceptibility, barriers, and benefits and increased screening mammography use by medically underserved minority women.^{17,46–52} The HBM implies that an individual's psychological readiness to take action relative to a particular health condition is determined by both the individual's perceived susceptibility to a disease, the perceived severity of the consequences of being diagnosed with the disease, and estimating the benefits minus the barriers of taking action.⁵³ If a woman is psychologically ready to take preventive action and receive mammography follow-up, it is presumed her beliefs compel her to weigh the expected benefits of reducing her susceptibility to the disease against psychological barriers discouraging the proposed action.⁵⁴ A stimulus, either internal (such as breast cancer knowledge) or external (such as family history of breast cancer in one's own family) triggers the appropriate action.

Self-efficacy (perceived confidence in personal ability to carry out an action)^{44,55–56} is incorporated in the HBM in 1988 and is strongly related to intent to have a mammogram⁵⁷ and breast cancer detection practices.⁵⁸

The concepts in the HBM do not wholly address the concept of fear of being diagnosed with breast cancer. Therefore, the construct of fear was identified in the terms of the framework of *cancer fatalism*, which concerns a sense of inevitability regarding breast cancer, fearing the discovery of cancer, and holding fatalistic views about breast cancer death regardless of the stage of diagnosis.^{19,54–62}

Finally, health locus of control (including external, internal, and spiritual dimensions) is significantly associated with a variety of breast health behaviors and adjustment to a breast cancer diagnosis.^{20,39,63–71} Health locus of control beliefs are significantly associated with reporting more benefits of mammography, fewer barriers to mammography, and increased screening in minority women.²⁰

For this study, internal health locus of control is defined as individuals believing that their own actions determine their health outcomes. In contrast, individuals with externally-oriented health locus of control believe that their health outcomes are generally outside of their direct control and may be the result of actions of other people, destiny, luck, chance, or

any other external factor.⁴⁵ A person can simultaneously hold both internal and external beliefs about control of their health status.^{45,56}

Spiritual health locus of control was used to assess the relationships between cultural beliefs and mammography follow-up behavior.²⁰ Spirituality is important to many African Americans and has been associated with adaptive breast cancer beliefs and mammography utilization among urban African American women.²⁰

As described, an increase in perceived benefits of mammography follow-up and self efficacy should result in a higher internal health locus of control and decreased fear of mammography follow-up, whereas a higher external locus of control should increase fear. The covariates of knowledge, susceptibility, and spirituality are included for their previously demonstrated relationships with perceived benefits and barriers to mammography.^{20:36:46-52} It is hypothesized that minority and medically underserved women who have an abnormal mammogram result and fail to return for definitive follow-up within six months of the index mammogram have greater fear, which is related to a lower internal health locus of control, and that barriers will have an additive effect on mammography follow-up. Our research questions were the following: 1) Are there differences in perceptions of susceptibility, benefits, barriers, fatalism, self-efficacy, breast cancer knowledge, breast cancer risk knowledge, and health/spiritual locus of control between women with inadequate and adequate follow-up after an index abnormal mammography finding? 2) Do scores on psychosocial determinants among women with inadequate and adequate mammography follow-up differ by sociodemographic variables such as income, education, and age? 3) Do higher or lower scores on psychosocial determinants predict compliance with mammography follow-up recommendations?

Methods

Setting and design

The Return after Mammography Study (RAMS)⁷² was a hospital-based retrospective cohort study conducted from 2003 to 2006. The study was designed to examine factors that affect minority and medically underserved women's follow-up of incomplete mammography testing. Patients were medically underserved women from both majority and minority racial and ethnic groups having screening mammography performed at the Nashville General Hospital Breast Health Center (NGH-BHC) at Meharry, a public hospital in Nashville, Tennessee. Nashville General Hospital is the primary source for health care for the medically underserved of Metropolitan Nashville and Davidson County. More than 67% of the patient base is from minority groups, including African Americans (52%), Hispanics/Latinos (11%), and other minority groups (4%). Most NGH patients are either uninsured (43%) or on Medicaid (28%), (known as *TennCare* in Tennessee). Up to 75% of NGH patients either cannot pay or make only partial payment for medical services (M. Overlock, personal communication). Eligible subjects were identified from retrospective medical record review. The Mammography Reporting System (MRS) database was abstracted for the date of the abnormal mammography finding, demographic data, and the date at which the patient returned for diagnostic follow-up.

Mammography results were abstracted from the radiologist clinic notes in the medical records reports. Abnormal mammography was defined based on Breast Imaging Reporting and Data System[®] (BIRADS[®]) criteria developed by the American College of Radiology.³³ The eligibility criteria for the study were: 1) An abnormal mammography result of BIRADS-0 requiring diagnostic follow-up prior to the next routine screening;³³ 2) aged 40–75 years; 3) resident of the eight-county metropolitan area surrounding Davidson County; and 4) able to provide informed consent in English. Women whose first language was not

English but who were able to speak and understand English were included. Translation resources for the survey instrument and multi-lingual interviewers were beyond the finances of the current project.

Diagnostic follow-up is required to resolve a BIRADS-0 result.³³ Timely diagnostic resolution to a BIRADS-0 result was defined as procedures such as additional mammography views (compression or magnification), biopsy (core or excisional) or ultrasonography. Although there is no agreed-upon standard for timely follow-up^{73–74} for purposes of this study, we based our analysis on literature that suggests that diagnostic and treatment delays of three–six months may negatively affect breast cancer survival. Study participants who received inadequate follow-up were defined as BIRADS-0 patients without diagnostic resolution within six months after their index abnormal finding. Study participants who received adequate follow-up were defined as BIRADS-0 patients with diagnostic resolution within six months of their index abnormal finding. The disposition of the follow-up of the BIRADS-0 was determined prior to the survey interview. Women with a prior history of cancer or who were deceased at the time of the scheduled interview were removed from the eligible sample.

Study procedures

Study procedures were approved by the Institutional Review Boards at Meharry Medical College and Nashville General Hospital prior to study implementation. BIRADS-0 patients identified as eligible for the study from the medical record review were recruited for the survey interview portion of the study. Eligible women were sent a letter from the medical director of the breast health center inviting them to participate in the study interview, explaining the study and saying that the respondent would be reimbursed \$15 for her time and effort in participating in the study. A toll-free number was also provided should patients wish to opt out. The postal service's ancillary service endorsement (*Forwarding Service Requested*) was written on outgoing envelopes in the event that the patient was no longer at the address recorded in the medical record. In many such instances, the introductory letter was returned as undeliverable. If another address was obtained by the research staff, a second introductory letter was sent to the new address. Alternate addresses were also attempted when necessary, including the emergency contact identified from the patient's medical record and the billing system.

All patient contacts and interviews were completed by one full-time research assistant, who completed training on psychosocial and epidemiologic data collection methods, including obtaining informed consent and HIPAA (Health Information Portability and Accountability Act) waivers over the telephone. The research assistant piloted these techniques using an epidemiologic survey instrument with 20 subjects.

A call center unrelated to study staff and location was established to answer the refusal line to avoid coercion of study participants. If the woman was reached, an appointment for completion of the survey was scheduled and a study packet consisting of the informed consent form, a HIPAA waiver, a reimbursement form, and the study instrument scales was mailed in advance of the scheduled interview. During the scheduled telephone appointment, participants provided consent orally and the survey instrument was read to them.

Sample

A total of 227 women were identified with an abnormal BIRADS-0 result in a screening mammogram completed between January 2003 and December 2004. Of these women, 11% (n = 18) were not eligible to participate due to age, residency restrictions, a cancer history, inability to provide consent, or being deceased or too ill to participate, leaving 209 eligible

women. In addition, 68 women could not be reached due to disconnected telephone numbers, changed phone numbers, changed addresses, or no answer to the telephone calls. An additional 18% of women refused and 10% completed only part of the study interview. Complete data were available from 76 women. An average of 4.6 telephone calls (range 1–19) and 2.7 months (range 1–490 days) were required to reach participants. Findings on the 209 eligible women who did not participate in this study after three months effort and/or 12 contact attempts have been reported elsewhere.⁷² The following is a report of the questionnaire data on sociodemographic factors, psychosocial determinants, and return for abnormal mammography follow-up.

Measures

Variables in the HBM related to knowledge about breast cancer and risk factors, perceived benefits and barriers, perceived susceptibility, and self-efficacy for mammography follow-up were adapted for the present study from a previously validated instrument.¹⁷ We modified the HBM scales in this study by rephrasing relevant items to refer to mammography follow-up for an abnormal mammography finding (BIRADS-0), rather than to screening mammography. Perceived susceptibility, perceived benefits and barriers, and self-efficacy were measured using a five-point Likert scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*.

The perceived susceptibility scale measured perceived likelihood of getting breast cancer and consisted of three items addressing the likelihood of developing the disease (*There is a good chance I will get breast cancer in five years*, *There is a good chance I will get breast cancer in the next 10 years*, and *There is a good chance I will get breast cancer during my lifetime*). Cronbach's alpha for this scale was 0.88, indicating excellent internal consistency of test items within this scale in the current study.

The perceived benefits scale assessed the perceived effectiveness of behavior to decrease the risk of death from breast cancer and consisted of four items (including, *Keeping a mammogram follow-up appointment would help you find breast cancer when it is just getting started* and *Keeping a mammogram follow-up appointment will decrease your chances of dying from breast cancer*). Cronbach's alpha for this scale was 0.73.

Perceived barriers were defined as personal costs associated with getting a mammogram follow-up. Twenty-one items (including, *Other health problems would keep you from having a mammogram follow-up* and *Having a mammogram follow-up is too expensive*) were used to assess potential barriers. Cronbach's alpha was 0.87 for this scale.

The self-efficacy scale included six items to measure confidence to return for mammography follow-up after an abnormal index mammography result despite perceived barriers to diagnostic testing, (including, *You can get mammogram follow-up even if you are worried* and *You can get mammogram follow-up even if you don't know what to expect*). The coding of negatively worded statements was reversed, with higher scores indicating higher self-efficacy. The Cronbach's alpha for this scale was 0.45.

Breast cancer knowledge and breast cancer risk knowledge were measured from items adapted from the same validated study instrument cited above.¹⁷ Breast cancer risk knowledge was measured with five *yes/no/don't know* response format multiple choice items (including, *Can bumping or bruising the breasts lead to breast cancer?* and *Are women who have close relatives with breast cancer more likely to get it themselves?*) and two additional items (1. *When breast lumps are discovered, how many of them turn out to be cancer? Most breast lumps turn out to be cancer, About half turn out to be cancer, or Most do not turn out to be cancer;* 2. *Who is more likely to get breast cancer? Women younger than 50, Women*

older than 50, or There is no difference). The answer choices for the breast cancer knowledge scale were scored as correct or incorrect (the latter for giving the wrong answer or replying *don't know*).

The breast cancer knowledge scale was assessed with 11 items (including, *Does having your first child after age 30 increase, decrease, or have no influence on your risk of getting breast cancer?* and *Does being African American increase, decrease, or have no influence on your risk of getting breast cancer?*), with three response choices (*increase risk, decrease risk, and no influence*).

Cancer fatalism, understood here as a sense of fear, predetermination, pessimism, or inevitability of death due to breast cancer, was measured by the Powe Fatalism Inventory (PFI)^{18–19} consisting of 15 items with a possible range of scores from 0–15.22 The PFI inventory used in the current study was revised to change the response categories to a five-point Likert response scale of 1 = *strongly disagree* to 5 = *strongly agree*. This PFI revised scale was developed and tested in an African American population with Cronbach's alphas ranging from 0.84–0.87.¹⁷ The attributes identified on the scale (PFI items in parentheses) are fear (*I believe some people don't want to know they have cancer because they don't want to know they are dying*), pessimism (*I believe if someone gets cancer, her time to die is near*), predetermination (*I believe if someone gets cancer, it was meant to be*), and a sense of the inevitability of death due to cancer (*I believe if someone gets cancer, that's the way she was meant to die*). Cronbach's alpha for our sample was 0.81.

Variables assessing the health locus of control construct—internal health locus of control, external health locus of control, and (active and passive) spiritual health locus of control—were adapted from a previously validated questionnaire on mammography screening in a sample of low-income, African American participants from public health centers.²⁰ These measures used a four-point Likert response format ranging from 1 = *I strongly disagree* to 4 = *I strongly agree*.

Internal health locus of control (IHLC), understood here as the belief that an individual's own health outcomes are determined by his or her own behavior, was assessed using three items adapted from Holt et al.,²⁰ including, *My health depends on what I do*; *Staying healthy is up to me*; and *It is my responsibility to keep myself healthy*. Cronbach's alpha was 0.71.

External health locus of control (EHLC), understood here as a belief that forces other than the individual's own behavior control her health outcomes, was assessed with two items taken from Form A of the Multidimensional Health Locus of Control (MHLC) scales⁴⁵—*If it's meant to be, I will stay healthy* and *No matter what I do, if I'm going to get sick, I will get sick*. Both of those items assess the chance dimension of external health locus of control. For this sample, Cronbach's alpha was 0.61 for this two-item scale.

In this study, we included two domains of spiritual health locus of control, active and passive.³⁹ *Active spiritual health locus of control* was defined as the belief that a higher power (e.g., God) empowers the individual to take care of herself, and *passive spiritual health locus of control* as the belief that a higher power is in control of one's health.²⁰ The two active spiritual locus of control items (*If I lead a good spiritual life, I will stay healthy* and *If I stay healthy, it's because I am right with God*) were combined with the two passive spiritual locus of control items (*I rely on God to keep me in good health* and *Through my faith in God, I can stay healthy*) to yield a Cronbach's alpha of 0.82 for the four-item spiritual health locus of control (SHLC) scale for this sample.

Associated factors

Sociodemographic and clinical variables such as race, ethnicity, age, marital status, health insurance, income, social history, mammography interpretation, and radiologist recommendation were obtained from medical record chart review by a certified data abstractionist. Telephone interviews assessed 10 psychosocial constructs for their association with timely mammography follow-up to abnormal mammography results. Epidemiologic and clinical risk factors including family history of cancer, smoking status, alcohol intake, gynecologic factors, hormonal history, and menopausal status were also assessed. Self-reported weight status and height were used to calculate body mass index (BMI) expressed in kg/m². Physical activity exposure was defined as regularly engaging in exercise activities in MET values over the past 10 years (metabolic equivalents duration in hours/week), the years of participation, and the average energy expenditure in MET-hours/day/year.⁷⁵ Additional study procedures are reported elsewhere.⁷²

Statistical analysis

Univariate logistic regression was performed to examine the bivariate association between sociodemographic factors and psychosocial health beliefs with follow-up status (i.e., whether there was resolution within six months). General linear modeling, including backwards stepwise logistic regression, was performed to look at the bivariate and multivariate associations between sociodemographic and psychosocial characteristics. An F test was used to test for statistical significance between characteristics (SAS GLM procedure). Logistic regression was performed to evaluate predictors associated with timely resolution of an abnormal mammogram with psychosocial predictor variables dichotomized according to the overall mean values in the data. Finally, multiple logistic regression was performed in examining the likelihood of inadequate mammogram follow-up for the IHLC factor with the adjustment of self-efficacy and perceived susceptibility. SAS software (SAS Institute Inc., Cary, NC, USA) was used to perform the statistical analyses for this study. All tests of significance were two-tailed with the alpha level set at .05.

Results

A total of 76 interviews were conducted with 35 inadequate follow-up patients (longer than six months since mammogram result) and 41 adequate follow-up patients (six months or less since mammogram result), for an overall response rate of 54% among inadequate follow-up patients and 46% among adequate follow-up patients. Of these 76 women, 48% (n = 37) categorized themselves as African American, 38% (n = 29) as White, and 12% (n = 9) self-categorized their race/ethnicity as Other, Hispanic/Latino, or Middle Eastern ethnicity.

Table 1 shows sociodemographic characteristics of the participants according to follow-up status. We observed no statistically significant differences with respect to age, income, health insurance, race/ethnicity, or education.

Table 2 shows the means, standard deviations, ranges of scores, and reference values for each psychosocial construct scale. Reference values of the psychosocial construct scales were provided from findings of the original versions and existing literature on age, race, SES and gender concordant composition reference populations comparable to the patients studied.^{14–15,17,20,36,38,40,47–48}

The barriers and benefits scales were reported as summary scores. The women in the study perceived low benefits (mean, standard deviation (SD) 5.6 ± 1.9, range (4–12)) and high barriers (mean, SD 84.1 ± 12.8, range (54–101)) compared with the means of previously published reference values for mammography screening follow-up. Breast cancer knowledge and breast cancer risk knowledge were scored as incorrect or correct. The

women in the study were above the scale median in breast cancer risk knowledge (mean, SD 4.9 ± 1.6 , range (1–7)) and lower than the median in breast cancer knowledge (mean, SD 4.7 ± 1.3 , range (1–9)) compared with the reference values. Cancer fatalism, self efficacy, and perceived susceptibility were also summary scores. The women in the study had higher cancer fatalism scores (mean, SD 52.1 ± 10.8 , range (26–75)), lower self efficacy scores (mean, SD 11.7 ± 2.0 , range (7–17)) and higher susceptibility scores (mean, SD 11.5 ± 3.3 , range 3–15) in comparison with the means of the respective reference values.

Table 3 shows the bivariate associations of psychosocial health belief constructs with mammography follow-up status. We observed a significant association for internal health locus of control with inadequate follow-up patients. A decrease in internal health locus of control was associated with two-fold increased risk for inadequate mammography follow-up (odds ratio [OR] = 2.53, 95% confidence interval [CI] = 1.20–5.36). There was no significant difference in the women with inadequate and adequate follow up in perceived benefits, barriers, susceptibility, self-efficacy, cancer fatalism, spiritual health locus of control, breast cancer knowledge, or breast cancer risk knowledge.

General linear modeling was used to examine the association between sociodemographic characteristics and psychosocial construct scores (Table 4). Of the sociodemographic factors evaluated, women with an educational attainment less than high school had a significantly lower mean breast cancer risk knowledge scores than women with educational attainment above high school (4.0 vs. 5.0, p-value = .02, significantly lower cancer fatalism scores (47.5 vs. 55.2, p-value = .02) and significantly lower mean external health locus of control scores (3.0 vs. 5.3) (p-value < .01). Commercial insurance was also a significant predictor. Women with commercial insurance had a significantly lower mean perceived susceptibility than self-paying, uninsured, or Medicare patients (8.9, 12.5, 11.9, 11.1, respectively) (p-value = .03) and had a lower breast cancer risk knowledge score than uninsured or self-paying patients. (3.8, 5.1, 5.1, respectively) (p-value = .02). Women with a higher income (> \$60,000) versus a lower income (< \$20,000) had lower mean self-efficacy scores (7.1 vs. 9.4) (p-value = .03). An inverse association was observed with breast cancer risk knowledge and age. As women became older, their breast cancer risk knowledge significantly decreased (p-value = .03). None of the sociodemographic variables were related to internal health locus of control, spiritual health locus of control, breast cancer knowledge, or perceived benefits.

For the bivariate associations between the psychosocial factors and inadequate follow-up, internal health locus of control was the only significant psychosocial factor. After adjusting for self-efficacy and perceived susceptibility, internal health locus of control remained statistically significant.

Discussion

Previous studies have considered the relationship of age, race, education, income, and health insurance to inadequate follow-up after abnormal mammography. The results of correlating age and inadequate follow-up are conflicting, while African American race, lower education, lower income, and lack of insurance have been associated with more inadequate follow-up.^{76–80} No significant differences were found in this study in potentially confounding variables, such as age, education, health insurance, or race. Seventy percent of the women in the study were under-insured or uninsured, and 60% were members of minority groups. Since there were no significant differences in the two groups, findings suggest mammography follow-up in this sample was not related to the socioeconomic factors often identified in other studies.

The women in this study had higher than average knowledge of breast cancer risk, but had lower than average breast cancer knowledge. They also perceived mammography follow-up to have little benefit. This may indicate exposure to breast cancer education that has not been focused on the risk for African American women. The women had scores indicating high perceived barriers to completion of follow-up tests, high fatalism, high susceptibility, and lower self-efficacy.

Since this was an exploratory study, we considered relationships of variables to the outcome of inadequate follow-up as well as relationships among the psychosocial and sociodemographic variables. Our findings demonstrating low educational attainment and breast cancer risk knowledge scores among medically underserved and minority women are consistent with the literature.^{11,32,48,80–82} Few studies^{11,14,46} have examined whether there are racial differences in breast cancer risk knowledge. Lower knowledge about breast cancer risk and breast cancer screening has been identified as an issue among low-income and African American women.¹³ This lack of knowledge may contribute to pessimism that early breast cancer detection can make a difference.⁷

Some African American women may believe myths about cancer and dismiss cancer as a disease that primarily affects European Americans. African American women are more concerned with being diagnosed with diseases likely to affect people of their race (e.g., hypertension, sickle cell anemia).^{83–84} A study by Sadler et al. showed only 51% (541/1055) of women in a cohort of 1,055 African American women believed that breast cancer was among the top four diseases in the African American community, in comparison with 59% (625/1055) and 53% (556/1055) of the women believing that diabetes and hypertension, respectively, are among the top four diseases to which African Americans are susceptible.⁸⁴ White women have been found to have higher levels of perceived susceptibility to breast cancer than African American women.* The African American community has been reported to view breast cancer as a White woman's disease.^{85–86} O'Malley found that African American women and those with lower mammography use were less educated, underinsured, and less likely to believe that they were at risk for breast cancer without having symptoms in comparison with others.⁸⁷ Older African American women have also been shown to be less likely than White women to know their lifetime risk of breast cancer or to understand that older women were more likely to get breast cancer.^{11,14,48}

The findings that women with commercial insurance had lower breast cancer risk knowledge scores and perceived susceptibility than uninsured or self-paying patients were unexpected.^{1,88} There was a small sample size for the commercial insurance group, and these results should be interpreted with caution.

In our study, cancer fatalism was lower in women with less education. This finding is inconsistent with several other studies that showed greater fatalism in less educated women.^{1,7–18,21} People with strong fatalistic beliefs may perceive they have no control over their health, and may be less likely to participate in cancer screening. Previous studies on cancer fatalism^{15,17–18,62,82} have been conducted in a mammography screening population. Our sample comprises women who received an abnormal result on screening mammography and were advised to return for follow-up. Such women have already overcome barriers to mammography screening, despite their medically underserved status. This finding prompts speculation that the development of fatalism regarding cancer and beliefs that health

*Fuller ME. A comparison study between African-American and Caucasian women in their health beliefs and locus of control concerning breast cancer in North Florida. Florida State University, 2008. Unpublished manuscript.

outcomes are beyond individual control are not related to the individual's demographic characteristics as it may be to their previous experience in receiving cancer screening.

We observed lower external health locus of control in less educated women; our attempts to explain this finding are informed by the screening mammography literature, as the research in the area of abnormal follow-up behavior and health locus of control is scarce. This framework needs further investigation concerning its ability to predict follow-up mammography behavior. Previous research on health locus of control as a predictor of screening mammography behavior in minority populations have shown both null^{65–66} and positive associations.^{58–68} A study on health locus of control in African American and White women on mammography behavior showed no significant differences in those with internal versus external locus of control; nor did it show any significant differences in those who participated in mammograms and who exhibited either internal or external control.⁶⁵ Conversely, a central Florida study of 197 White and 152 African American women between the ages of 19 and 93 comparing health beliefs and health locus of control found significantly greater numbers of African American women than of White women had high external locus of control.⁶⁸ African American women were significantly more likely to believe in chance or to depend on powerful others. Perceived susceptibility to cancer and beliefs about the seriousness of breast cancer all were significantly associated with powerful other scores among African American women, but there was no relationship between health locus of control and years of education for African American women.

We observed that women with higher income levels had lower levels of self-efficacy related to mammography follow-up. Consistent with our results, in a study of African American women, Skinner et al.²¹ found that self-efficacy decreased with increasing education, which is positively correlated with income. These findings are somewhat unexpected and may be due to chance.

The finding that women with lower health internal locus of control were twice as likely to have inadequate follow-up is important and will inform future interventional studies aimed at improving timeliness of follow-up after abnormal mammography. Health locus of control has been studied previously as it is related to breast cancer screening behaviors,^{39–40,70,89–91} individuals' knowledge of breast cancer, adjustment,^{92–94} and mood.^{71,93} There have also been studies of delay to breast cancer treatment.⁶⁴ However, as far as we know, there are no published studies that examined the contribution of internal health locus of control to adherence to recommendations for diagnostic follow-up of abnormal mammography in a minority and medically underserved population. The present results suggest that women with lower internal health locus of control are substantially less likely to complete timely follow-up after a BIRADS-0 mammographic test result.

Strengths and limitations

Several methodological limitations should be noted. First, this study is not population-based, but rather has patients from a single health center. Our study results are limited to the medically underserved women served by our public hospital who could be reached for interview. The homogeneity of the study population should be kept in mind when interpreting results. Results may not be generalizable to populations outside of our public hospital.

This study is based on self-reported behaviors and beliefs. The retrospective data generated from this study do not allow us to observe how the process of mammography follow-up affects responses to the survey questions. The only way to test effectively how mammography follow-up affects responses to the questionnaire's health belief items is to collect data prospectively, before and after the process of dealing with mammography

follow-up to see if there is a confounding effect. Therefore, we cannot rule out the possibility that the questionnaire may have generated a recall bias and some context effects. Social desirability could have affected the responses to our questions. In addition, the psychosocial health belief scales were modified from original instruments that have validity and reliability parameters. Our reliability analysis was based on a small sample size.

The current study is limited by its relatively small number of subjects but adds important information to the literature. Collaboration across breast health centers would be helpful to increase the sample size and generalizability of the results in order to advance our knowledge of how to encourage compliance in women with a BIRADS-0 with follow-up recommendations.

Locating respondents for interview was more difficult than anticipated, contributing to our lower than expected completion and consent rates. A concerted effort was made to contact, consent, and interview women. On average, it took 82 days and 4.5 (range 1–19) attempts to reach a woman in our sample. The majority of African American participants (58%) did not complete the study or refused to participate once located (52%), contributing to our lower-than-planned completion and consent rates.⁷² The concern with poor participation in this study is selection bias resulting in differential exposure between refusing and participating inadequate and adequate follow-up patients, respectively.^{95–96} Medical record data that were collected from the non-respondents provided the opportunity to examine possible selection bias. Non-respondents were more likely to be African American or in the “other” ethnic/racial category and to be between the ages of 40–50 years of age.⁷²

Conclusions

These findings yield important psychosocial implications for identifying women who may not return for timely diagnostic follow-up. Although previous studies have individually addressed psychosocial influences on abnormal mammography follow-up,^{23–31} and the influence of health locus of control on screening mammography behaviors,^{39–40,70,89–91} we are not aware of any studies that examine the contribution of both the internal health locus of control beliefs and medically underserved mammography patient’s abnormal mammography follow-up behavior. Provider interactions with the patient should be modified to include messages directly addressing these psychosocial determinants of diagnostic breast cancer screening. The data suggest that these constructs may be important cognitive factors to consider in understanding mammography follow-up in minority and medically underserved women, but further validation of these exploratory findings is necessary. Previous research on cancer screening shows that tailoring messages^{15,97–98} is an effective strategy for increasing the likelihood of uptake of annual screening. At this study progresses, we will test the effects of health messages that are tailored for minority and medically underserved women specifically on the significant sociodemographic and psychosocial variables from this research. The recommendations for clinical practice emerging from this research include (a) recognize predictors of follow-up mammography among low-income medically underserved minority women; (b) address culturally specific barriers, e.g., cancer fatalism, in order to increase compliance with diagnostic follow-up; and (c) increase internal health locus of control and breast cancer risk knowledge through education. We are optimistic that further study of these constructs will enhance interventions promoting return for abnormal mammography follow-up among minority and medically underserved women to eliminate breast cancer disparities.

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Table 1

Bivariate Association Between Demographic Factors and Mammography Follow-Up, RAMS Study, 2003–2006

Characteristics	Inadequate Follow-up ^a (n = 35)	Adequate Follow-up ^b (n = 41)	OR (95% CI)
Age (years)			
30–49	16 (47.06%) ^c	21 (51.22%)	0.85 (0.34, 2.10)
>50	18 (52.94%)	20 (48.78%)	1
Income			
≤\$20,000	12 (35.29%)	17 (42.50%)	0.91 (0.28, 2.94)
\$20,000–\$40,000	10 (29.41%)	11 (27.50%)	0.71 (0.24, 2.10)
>\$40,000	12 (35.29%)	12 (30.00%)	1
Health insurance			
TennCare/Medicare	8 (22.85%)	16 (39.02%)	0.32 (0.09, 1.14)
Commercial (BCBS, Cigna)	11 (31.43%)	13 (31.71%)	0.64 (0.13, 3.03)
Other	5 (14.29%)	5 (12.20%)	0.54 (0.16, 1.87)
None	11 (31.43%)	7 (17.07%)	1
Race/ethnicity			
White	11 (31.43%)	20 (48.78%)	1
African American	22 (62.86%)	20 (48.78%)	2.00 (0.77, 5.19)
Other ^d	2 (5.71%)	1 (2.44%)	3.64 (0.30, 44.77)
Education			
< High School or GED	17 (48.57%)	20 (50.00%)	0.94 (0.38, 2.34)
> High School	18 (51.43%)	20 (50.00%)	1

^aBreast Imaging Reporting and Data System (BIRADS) BIRADS-0 patients without diagnostic resolution within 6 months after their index abnormal finding.

^bBIRADS-0 patients with diagnostic resolution within 6 months after their index abnormal finding.

^cColumn percentage.

^dHispanic/Latina and Middle Eastern.

OR = odds ratio

CI = confidence interval

Table 2

Descriptive Statistics of Psychosocial Health Belief Constructs, RAMS Study, 2003–2006

Scale	# items	Mean	Standard Deviation	Range	Reference Values ^d
Perceived Benefits (likert scale 1–5) ^a	4	5.6	1.9	4–12	6.1
Perceived Barriers (likert scale 1–5) ^a	21	84.1	12.8	54–101	64.4
Self-Efficacy (likert scale 1–5) ^a	6	11.7	2.0	7–17	16.7
Perceived Susceptibility (likert scale 1–5) ^d	3	11.5	3.3	3–15	3.1
Cancer Fatalism (likert scale 1–5) ^a	15	52.1	10.8	26–75	41.1
Spiritual Health Locus of Control (likert scale 1–4) ^b	4	9.4	3.7	4–16	10.3
Internal Health Locus of Control (likert scale 1–4)	3	3.6	1.3	3–11	9.0
External Health Locus of Control (likert scale 1–4)	2	4.4	2.0	2–8	6.5
Breast Cancer Risk Knowledge (yes/no) ^c	7	4.9	1.6	1–7	3.4
Breast Cancer Knowledge (increase, decrease, no effect) ^c	11	4.7	1.3	1–9	6.1

^aPerceived barriers, benefits, self-efficacy, susceptibility and cancer fatalism scales were reported as summary scores.^bSpiritual health locus of control was reported as a summary score (Active and passive spiritual health locus of control are combined in this analysis).^cBreast cancer risk knowledge and breast cancer knowledge were scored as incorrect or correct (Yes = 1, No = 0, D/K = 0)

Reference values drawn from findings of the original item versions and existing literature.

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Table 3

Bivariate Association Between Mean Psychosocial Construct Scores and Mammography Follow-Up RAMS Study, 2003–2006

Mean Psychosocial Construct Scores	Inadequate Follow-up (n = 35) Mean (SD)	Adequate Follow-up (n = 41) Mean (SD)	OR ^{*a} (95% CI) Per unit decrement
Perceived Benefits	5.79 (2.77)	6.07(2.30)	1.05 (0.87, 1.26)
Perceived Barriers	83.24 (14.33)	83.56 (14.69)	0.99 (0.97, 1.03)
Perceived Susceptibility	12.06 (3.51)	10.98 (3.16)	0.90 (0.78, 1.04)
Self-Efficacy	8.63 (2.73)	8.61 (2.45)	0.99 (0.84, 1.19)
Cancer Fatalism	52.50 (10.94)	50.88 (10.76)	1.04 (0.97,1.06)
Internal Health Locus of Control	3.14 (0.43)	3.98 (1.67)	2.53 (1.20, 5.36)
External Health Locus of Control	4.63 (2.16)	4.28 (1.92)	0.92 (0.73, 1.15)
Spiritual Health Locus of Control ^b	9.06 (3.89)	9.60 (3.48)	1.04 (0.92, 1.18)
Breast Cancer Knowledge	4.80 (1.66)	4.98 (1.60)	1.07 (0.81, 1.42)
Breast Cancer Risk Knowledge	4.77 (1.26)	4.66 (1.24)	0.93 (0.64, 1.34)

* p<.05

^a Odd ratios for being inadequate follow-up for every unit decrement in psychosocial factor scores.

^b Active and passive spiritual health locus of control are combined in this analysis.

OR = odds ratio

CI = confidence interval

SD = standard deviation

Table 4

General Linear Model (GLM) Coefficient Ts of Sociodemographic Characteristics and Mean Scores of Psychosocial Health Beliefs Predicting Return for Mammography Follow-Up, RAMS Study, 2003–2006^a

Sociodemographic characteristics	Perceived Barriers ^b	Perceived Benefits ^b	Perceived Susceptibility ^b	Self-Efficacy ^c	Breast cancer knowledge ^d	Breast cancer risk knowledge ^d	Cancer Fatalism ^e	Internal Health Locus of Control	External Health Locus of Control	Spiritual Health Locus of Control ^f
<i>Age^g</i>										
F-value	0.03	0.6	0.7	0.3	0.3	4.7**	1.1	0.3	0.9	1.6
	83.7	5.9	11.4	8.6	4.9	4.7	51.5	5.1	4.4	13.8
<i>Income</i>										
F-value	2.2	1.9	0.4	3.2**	1.6	1.6	1.8	1.7	2.4	1.2
<\$20,000	79.1	6.5	11.1	9.4	4.4	4.4	49.1	5.6	4.0	13.4
\$20,000–\$40,000	86.3	5.3	11.3	8.0	5.1	5.0	50.8	5.1	3.9	12.7
\$40,000–\$60,000	87.4	6.0	12.3	9.2	5.4	4.7	53.9	4.6	4.6	15.6
>\$60,000	88.8	5.0	11.9	7.1	5.2	5.1	56.5	4.5	5.6	14.8
<i>Health Insurance</i>										
F-value	2.4	1.5	3.3**	2.1	0.3	4.4*	0.9	2.6	1.7	1.6
TennCare/Medicare	82.0	6.0	11.1	8.8	5.1	4.4	51.1	5.9	4.0	13.6
Commercial (BCBS,Cigna)	74.5	7.3	8.9	10.3	4.6	3.8	47.3	4.9	3.8	11.1
Self-pay	87.4	5.6	12.5	8.0	4.9	5.1	53.8	4.7	5.2	14.3
None	86.8	5.4	11.9	8.2	4.7	5.1	51.6	4.7	4.4	14.9
<i>Race/Ethnicity</i>										
F-value	0.4	1.9	0.1	0.1	1.5	1.2	1.1	0.6	0.2	1.3
Non-African American ^h	85.0	5.5	11.6	8.5	5.1	4.9	53.1	5.3	4.3	14.4
African American	82.9	6.3	11.4	8.7	4.7	4.6	50.4	5.0	4.5	13.3
<i>Education</i>										
F-value	1.5	1.8	1.2	1.9	2.1	4.1**	4.3**	0.4	9.7*	1.4
< High School or GED	80.2	6.7	10.7	9.2	4.3	4.0	47.5	4.8	3.0	12.3
High School	81.1	6.3	10.9	9.2	4.9	4.7	48.8	4.8	4.0	14.3

Sociodemographic characteristics	Perceived Barriers ^b	Perceived Benefits ^b	Perceived Susceptibility ^b	Self-Efficacy ^c	Breast cancer knowledge ^d	Breast cancer risk knowledge ^d	Cancer Fatalism ^e	Internal Health Locus of Control	External Health Locus of Control	Spiritual Health Locus of Control ^f
> High School	86.4	5.4	12.0	8.1	5.2	5.0	55.2	5.1	5.3	14.3

* p≤.01

** p≤.05

^aF-test performed to test for statistical significance

^bPerceived barriers, benefits and susceptibility scales were reported as summary scores.

^cSelf-efficacy was reported as a summary score.

^dBreast cancer knowledge and breast cancer risk knowledge were scored as incorrect or correct (Yes = 1, No = 0, D/K = 0).

^eCancer fatalism was reported as a summary score.

^fSpiritual Health Locus of Control was reported as a summary score. Active and passive spiritual health locus of control are combined in this analysis.

^gAge was reported as a continuous measure.

^hNon-African American = White, Hispanic/Latino or Middle Eastern ethnicity