

## Promoting Breast and Cervical Cancer Screening among Hispanic and African American Women

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### Abstract

*The purpose of this research was to investigate factors that influence cancer screening among Hispanic and African American women. The Screening Older Minority Women (SOMW) project was designed to build on the social connections between women by teaching younger women (ages <50) to encourage and support women 50+ years to get breast and cervical cancer screening exams. The program was evaluated through the use of a two-armed randomized trial. The intervention was theoretically grounded using the Health Belief and the Theory of Planned Behavior models. Results of the study focus on: 1) the effectiveness of a trans-generational intervention to encourage older (50 years and over) African-American and Hispanic women to obtain a screening exam; 2) the effectiveness of community outreach workers in recruiting and educating younger women about breast and cervical cancer screening; and 3) the impact of a social networking intervention on key theoretical constructs used to explain screening behavior.*

**Keywords:** African American Women, Hispanic Women, Cancer, Community Outreach, Mammography, Screening Promotion

### 1. Background

Breast cancer is the most common type of cancer among women and the second leading cause of cancer mortality (Adderley-Kelly & Green, 1997; Ashing-Giwa, 1999; Belin, Washington, & Green 2006). Estimates by the American Cancer Society were that 230,480 women would be newly diagnosed with breast cancer in 2011 (Siegel, Ward, Brawley, & Jemal, 2011). Although African American women are less likely to have breast cancer than their white counterparts, they have higher mortality rates and lower five year survival rates with this disease (American Cancer Society, 2011; Chu, Lamar, & Freeman, 2003; Saraiya, Ahmed, Krishnan, Richard, Unger, & Lawson, 2007; Surveillance, Epidemiology and End Results (SEER) program, 2010; American Cancer Society, 2011). These discrepancies are partially due to the fact that African American women have a more advanced stage of cancer when diagnosed (American Cancer Society, 2011; Andersen, Yasui, Meischke, et al., 2000; Belin, Washington, & Green, 2006; Centers for Disease Control, 2005; Chu, Lamar, & Freeman, 2003; Kosiak et al, 2006; Moormeier, 1996). Similar discrepancies exist related to cervical cancer for both African American and Hispanic women compared to White, non-Hispanic women (American Cancer Society, 2011; Byrd, et al., 2012; Chevarley & White, 1997; Fox & Roetzheim, 1994; Saraiya, et al., 2007; Kim, et al., 2012; McCarthy, Burns, Coughlin, et al, 1998; Mamon, et al., 1990; Markides, Rudkins, Angel, & Espino, 1997; Moormeier, 1996; Ortiz, et al., 2010; Saint-Germain & Longman, 1993; Skinner, Arfken, & Waterman, 2000; SEER program, 2010; American Cancer Society, 2011).

The mortality rates related to breast and cervical cancer can be lowered substantially with early detection through regular use of mammograms and Pap tests (Poss, 2001). Both breast and cervical cancer increase with age (Cannistra & Niloff, 1996; Saraiya, et al., 2007; Moormeier, 1996; Valdez, Benerjee, Ackerson, & Fernandez, 2002), yet the rates of screening for these diseases drop off with age (American Cancer Society 2005a; Craig, Quinn, & Vadaparampil, 2009; Rimer et al, 1992; Valdez, Banerjee, Ackerson, & Fernandez, 2002).

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Older women of color are less likely to obtain these exams on a regular basis (American Cancer Society, 2005a; Andersen, Yasui, Meischke, et al., 2000; Baker, 1982; Siegel, Ward, Brawley, & Jemal, 2011; Dietrich, et al., 1992; Kosiak et al., 2006; Marcus & Crane, 1998; Moormeier, 1996). Given the discrepancies in screening rates for older women of color, it is important to develop strategies to encourage these women to obtain screening exams on a more regular basis.

There have been a number of studies to evaluate the effectiveness of interventions to increase rates of screening for breast and cervical cancers (Champion, et al., 2008; Fernandez, et al., 2009; Fernandez, Gonzales, Tortolero-Luna, Partida, & Bartholomew, 2005; Freeman & Chu, 2005; Marcus and Crane, 1998; Rimer, 1994; Russell, et al., 2010; Shields, et al., 2010; Valdez, Banerjee, Ackerson, & Fernandez, 2002). The interventions include individually directed behavior using physician or patient reminders or prompts with clinic-based populations (Freeman & Chu, 2005). Others employed telephone counseling (Fulton, Rakowski, & Jones, 1995). Although many of these studies have demonstrated success, the benefits of these interventions for older minority women are less clear because many lack sufficient numbers of older women or women of color in the sample to assess their impact on these groups. One limitation of the physician or clinic-based intervention is that they can only address women who regularly use health care services (Stockdale, Keeler, Duan, Derose, & Fox 2000).

Evidence suggests that women are receptive to health information from family and friends (Altpeter, Earp, Bishop, & Eng, 1999; Ashing-Giwa, 1999; Belin, Washington, & Green, 2006; Matthews, Berrios, Darnell, & Calhoun, 2006; Eng, Parker, & Harlan, 1997; Larkey, 2006; Matthews, Berrios, Darnell, & Calhoun, 2006; Suarez, et al., 1993). The Screening Older Minority Women project (SOMW) was designed to use social network connections to reach older minority women to help them obtain more regular cancer screening exams.

## **2. Methods**

### **2.1 Development of the Intervention**

The development of the format and content of the intervention was informed through a review of the literature on existing interventions to encourage use of screening tests. The Theory of Planned Behavior (TPB) and, to a lesser extent, the Health Belief Model (HBM) was the theoretical underpinning of the intervention (Poss, 2001). In addition, a local community advisory board, focus groups, and intensive interaction with local community organizations also informed the development of the intervention as described below.

#### **2.1.1 Focus Groups**

To identify the critical messages of the intervention, we conducted a series of focus groups with older and younger women. According to the Theory of Planned Behavior (Ajzen, 1991), specific information and wording to define attitudes, subjective norms and perceived behavioral control should be elicited directly from the program recipients or study participants. Four focus groups were convened. Two focus groups were held with Hispanic women, one with women aged 30-45 years and another with women 50 years and older. Two groups with the same age divisions were held with African American women. A total of 28 women were in the focus groups. The 90-minute sessions, conducted by trained Hispanic and African American moderators, covered discussions on breast and cervical cancer, mammography and Pap tests, barriers to these screening tests, and the general outline for the intervention. The sessions were tape-recorded and the tapes were transcribed.

Barriers to screening exams identified by the focus group participants included attitudes (fear, embarrassment, discomfort), financial concerns, fear of “finding” cancer, lack of information about where and when to get an exam, cultural norms about the appropriateness of having a screening exam, reluctance to be examined by a male clinician, and a general lack of discomfort with clinicians were some of a main findings of the focus group study.

#### **2.1.2 Outreach Workers**

The younger women recruited into the study were contacted and trained by a small cadre of outreach workers. These outreach workers were women drawn from the local African American and Hispanic communities. They were women who were familiar with the community social structure and local organizations. They knew how and where to find younger women and were familiar with the local cultural issues related to breast and cervical cancer and screening exams. The three Hispanic and one African American outreach workers were bilingual.

### **2.1.3 Intervention Content and Format**

The goals of the intervention program were to encourage and support older African American and Hispanic women (ages 50 years and older) to obtain clinical breast exams, mammograms and Pap tests. The intervention was designed to take advantage of trans-generational social connections and supports by moving the younger women to influence the older women. Since younger women are more likely to have regular contact with preventative services than their older counterparts they may feel more comfortable using these services. The younger women might be able to talk with the older women about the exams and even serve as role models and supports.

Each younger woman was asked to identify or nominate an older woman with whom she has a close relationship and one that might be willing to engage in discussions about breast and cervical cancer. The younger woman was trained to initiate a discussion with her older younger woman about screening exams and help the older woman to identify any barriers she might face in obtaining these exams. In particular, the younger woman was trained to identify and address any attitudes, beliefs, or norms held by the older woman that might be barriers to seeking an exam. She was given printed materials (about the screening exams and how to obtain an exam) to pass on to the older woman. Finally, she was encouraged to help the older woman make appointments or arrange transportation to the exam.

Intervention materials included brochures published by the National Cancer Institute. These brochures were packaged in a plastic bag printed with the project logo (The Women to Women Project), along with a refrigerator magnetic (with the project logo and contact information), and a project pen. All program materials were available in both English and Spanish. One week following the in-person recruitment and training, the outreach workers contacted the younger women who agreed to participate in the study by telephone. The purpose of this call was to identify the older woman she recruited to the project and make sure she was able to talk with the older woman about breast and cervical cancer screening, and pass on the intervention materials. A final booster call was made to the younger woman six weeks later to check on the progress of the younger woman in helping her older counterpart with getting screening exams and to answer questions for the younger women.

### **2.2 Study Design and Recruitment**

The study took place in Hispanic and African American neighborhoods of two northeastern cities, Waterbury, CT and Boston, MA. These areas were selected because they had a high proportion of women in the study target populations and were similar in demographic and socio-economic makeup. Also, both sites contained a health service that offered free or low-cost mammograms, breast exams and Pap tests funded through each state by the CDC Breast and Cervical Cancer Early Detection Program.

The study was designed as a two-armed clinical trial with recruitment sessions as the unit of randomization. Younger women were recruited to participate in the study through sessions held at local sites in both cities. For recruitment sessions randomized to the treatment condition, the outreach workers were trained to explain the study, talk about the importance of regular breast and cervical screening and explain the role of the younger woman. Women who were interested in participating in the study by recruiting, educating, and supporting an older woman were then enrolled in the study at the session. They were asked to complete a study consent form and a short intake form to record contact information and basic demographic information of the younger woman. The woman was also asked to identify a potential younger woman noting her age and relationship.

At recruitment sessions randomized to the control condition, the outreach workers explained the study and asked the younger woman to identify an older younger woman for the study. Like the treatment session recruitment, women willing to participate signed an informed consent and completed the intake form. Unlike treatment session, these women did not receive the intervention training. Instead, they received only a telephone call, one week after enrolling in the study, to determine the participation status, name and contact information of the older woman identified by the younger woman as her counterpart in the study. Women in both the treatment and control conditions were contacted by telephone one year following recruitment to the study.

All participants were read an informed consent statement by telephone. They were interviewed about their use of screening exams as well related constructs drawn from the TPB and HBM models. These interviews were completed in English and Spanish by trained, bilingual interviewers.

Since the outcomes measures are based on self-report, a small validation sub-study was conducted on a subset of the participants. All women who reported obtaining a screening exam during the study period were asked at the end of the interview to give permission to verify her report with the Family Health Center. Women who agreed to this verification step were mailed an additional consent form and asked to return the form by mail. Medical records were checked for each woman in the sub-study to determine if the recorded date and nature of the exam were consistent with the woman's self-report.

### **2.3 Measures**

There were four primary outcomes of interest for this study to assess the impact of the intervention. They included intentions to seek in the future and every year following a: 1) mammogram; and 2) Pap test. The other two measures were having, during the period between recruitment into the study and the follow-up interview: 1) a mammogram; and 2) a Pap test. Study measures and including the constructs related to HBM and TPB models used as secondary outcomes and the psychometric properties of the measures are shown on table 10.

### **2.4 Statistical Analysis**

Intervention effects were estimated by multivariate regression models controlling for background and study characteristics. Linear regression models were estimated for the continuous outcome (intentions to get an exam) and logistic regression models were used for the dichotomous outcomes (successful recruitment to the study, speaking to a nominator about breast cancer and mammograms, and obtaining a screening exam since recruitment to the study). Obtaining a screening exam was modeled using both the indicator of treatment group and a measure of exposure to the intervention. Differences in the unadjusted rates for secondary outcomes were compared using t-tests. In addition, a path model to predict intention to obtain a mammogram was estimated with TPB and HBM constructs.

## **3. Results**

### **3.1 Recruitment**

Over a 22-month period, a total of 151 recruitment sessions were held at public events (e.g. community health fairs), group meetings (e.g. a social club meeting), door-to-door contacts, and health care facilities. Through these sessions, a total of 549 younger women were signed up for the study at the recruitment sessions. Two thirds of these women (432) fit the age eligibility criteria (30-45 years) and just over half of those women were able to identify an older woman to pair with her on the study. Some younger women identified more than one older woman yielding 238 younger women who successfully recruited 281 older women to participate in the study. Response rates for the 12-month interviews were high for the younger women (82.8%), while 66.9% of the older women complete the 12-month follow-up interview (as shown in Table 1).

Analyses to determine factors that predict successful recruitment of an older woman into the study revealed that younger women of the same ethnic background were more likely to successfully recruit a participant. For example, African American younger women were almost five times more likely to recruit another African American compared to younger women from other ethnic backgrounds (White, Hispanic). The nature of the relationship between the younger and older woman was also a significant predictor. Younger women who recruited their mothers to the study were 2.26 times more likely to be successful compared to women with other relationships. Finally, the location of recruitment was an important predictor. Women who were recruited through one-on-one contacts were more likely to be successful at finding an older woman as compared to women recruited through larger group events.

### **3.2 Characteristics of Study Sample**

The average age of the older women was 60 and for the younger women, age 39 (as shown in Table 2). Close to half of the sample self-identified as African American. Levels of educational attainment were higher for the nominators, with over half reporting some college education or more. In comparison, over half (59.7%) of the older women reported less than a full high school education. Nearly half of the younger women lived with a partner or spouse compared to just over one-third of the older women. Most of the women reported having health insurance. The majority of the younger women had at least some private insurance while less than half of the older women had any private insurance.

The 188 older women who completed the 12-month follow-up interview are compared by study group (as shown in Table 3). More women were successfully recruited to the control group than intervention group. The ages of the women in the two study groups were similar. Educational levels of the women in the two study arms were similar, with over 50% reporting less than a full high school education. Roughly one-third of the women in both study arms lived with a spouse or partner. Rates of previous mammograms were surprisingly high with over 90% of women in both study arms reporting having a mammogram at some time and 85% having one in the previous two years. Similarly high rates were reported for Pap tests.

### **3.3 Validation of Self-Reported Screening Behavior**

A total of 34 women who reported a screening exam at St. Mary's Hospital consented to verification of her report through her medical records. Of these, 17 women were older women who gave a date for a mammogram at the hospital within two years prior to the follow-up interview. According to hospital records, four of these 18 older women were never seen or never had a mammogram at the hospital. For the remaining 13 cases, self-reported dates of the mammogram for 12 (70.5%) cases fell within a twelve-month around the record date; for 10 cases (58.8%) the reported date fell within a six-month period of the recorded date.

### **3.4 Exposure to the Intervention**

To assess exposure to the intervention each younger woman was asked if she talked to the older woman about breast/cervical cancer and about getting a mammogram/Pap test since she was enrolled in the study. Just over half of the older women in both the study arms reported that the younger woman spoke to her about mammography; 55% in the intervention group and 54% in the control group (54%). The only factor which predicted if older women reported that she spoke to the younger woman was the level of educational attainment (as shown in Table 4).

### **3.5 Mammography**

#### **3.5.1 Intention to Get a Mammogram in the Next 12 Months**

Measures of intention to get a mammogram in the next twelve months, as measured on an 18-point scale were similar for women in the both the intervention and control groups. Reported intentions were 9.4 among women in the control group and 9.0 among women in the intervention group. Two models are shown to predict intentions to get a mammogram: one is a measure of exposure to the intervention and the second is the study treatment arm as a predictor (as shown in Table 5). Neither measure of the intervention is a significant predictor of intention. The significant predictors of a higher intention to get a mammogram include being Hispanic (compared to African-American women), having private insurance versus no insurance and having had a mammogram in the preceding two years.

#### **3.5.2 Had a Mammogram Since Recruitment**

At the 12-month follow-up, 71% of women in both the treatment and control groups reported having had a mammogram in the interval between recruitment into the study and the follow-up interview. There was no statistically significant effect of the intervention in either model (using reported exposure to the intervention or study treatment arm) as an indicator of the intervention (as shown in Table 6). The only significant predictors of the having a mammogram since recruitment in both statistical models estimated was level of educational attainment of the younger woman. In addition, older women were more likely to get a mammogram after recruitment to the study if they were nominated by their daughters.

### **3.6 Pap Test**

#### **3.6.1 Intention to Get a Pap test the Next 12 Months**

At the 12-month follow-up, intention to get a Pap test in the next 12 months for women in the treatment group was 8.5 (on a 10 point scale) and 8.2 for older women in the control group (as shown in Table 7). There was no statistically significant intervention effect on intentions to get a Pap test in the next 12 months in the models using either one of the two intervention indicators. The strongest predictor of intention to get a Pap test was history of having a Pap test in the previous two years. In addition, age of the younger woman was negatively related to intention (older women had lower intentions to get a Pap test). Hispanic older women had higher levels of intentions to get a Pap test than did their African American counterpart.

Finally, older women who reported having private health insurance had higher intentions compared to those who did not have private health insurance.

### **3.6.2 Had a Pap test Since Recruitment**

At the 12-month follow-up, 69% of the older women in the intervention and 56% of the older women in the control group reported getting a Pap test since they were recruited into the study (as shown in Table 8). There was a small, yet statistically significant, intervention effect in the model using reported discussions with nominator as an indicator of intervention exposure. The older women who reported that she spoke to the younger about cervical cancer and Pap tests were more likely to report having a Pap test since enrollment in the study. This finding did not hold up for the models testing randomization to the treatment arm as the indicator of exposure to the intervention. Other predictors of having a Pap test since recruitment were age; older age was negatively associated with having a Pap test since recruitment, private insurance (in the model using randomization assignment).

## **4. Discussion**

On three of the four study outcomes, intentions to get a mammogram or Pap test and having a mammogram in since recruitment into the study, there were no statistically significant intervention effects observed. A statistically significant intervention effect was found for one of the four outcomes: having a Pap test since recruitment to the study.

This intervention model was less effective at reaching the older women than other community-participatory studies have been (Carrion & Bullock, 2012, Bullock, 2006). First, the message communicated from the research team, to the outreach worker, to the younger women may have become progressively weaker or otherwise altered as it moved down the chain of communication. Since the project staff or the outreach workers never contacted the older women directly the message had less chance of being accurately communicated to the primary target. The younger women may have loss enthusiasm to carry out their commitments to talk to the older women over the duration of the research study. In fact, only half of older women stated that the younger woman spoke to her about the exam. Without this contact, the older women would not receive the intervention. Second, a younger woman may have spoken with an older woman, but the older women failed to recall the discussion. Third, it is possible that in instances where the younger women did speak with the older women, the discussions were not sufficiently motivating to move the older women to seek an exam or increase their intentions to seek an exam.

A second explanation for lack of observable intervention effect may be that the control women were as likely to recall speaking to the older woman as a participant in the intervention group. Women in both treatment groups were recruited to the study by their nominators and the intervention discussions may have not been perceptibly different from the control recruitment discussions.

A third possible explanation for lack of intervention effect is the notably high rates of intentions reported screening behavior and positive attitudes towards the exams. These rates are much higher than the national rates generally reported for Hispanic and African American women. It is important to note that insurance coverage was a significant predictor of getting an exam. It is surprising that this reported barrier still existed in the study context where these exams were available at low or no cost for women in the study neighborhoods. Furthermore, this factor was significant for intentions as well as the reported behavior. Women who had private insurance had higher intentions, even after controlling for their screening history and educational attainment.

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## References

- Adderley-Kelly, B. B., & Green, P. M. (1997). Breast cancer education, self-efficacy, and screening in older African American women. *Journal of National Black Nurses Association*, 9(1), 45-57.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211.
- Altpeter, M., Earp, J., Bishop, C., & Eng, E. (1999). Lay health advisor activity levels: Definitions from the field. *Health Education & Behavior: the Official Publication of the Society for Public Health Education*, 26(4), 495-512.
- American Cancer Society. Cancer facts & figures 2011. Atlanta, GA: American Cancer Society, 2011.
- Ashing-Giwa, K. K. (1999). Health behavior change models and their socio-cultural relevance for breast cancer screening in African American women. *Women & Health*, 28(4), 53-71.
- Belin, P. I., Washington, T. A., & Greene, Y. Y. (2006). Saving Grace: a breast cancer prevention program in the African American community. *Health & Social Work*, 31(1), 73-76.
- Bullock, K. (2006). Promoting advance directives among African Americans: A faith-based model. *Journal of Palliative Medicine*, 9(1), 183-195.
- Byrd, T. L., Wilson, K. M., Smith, J.L., Heckert, A., Orians, C.E., Vernon, S.W., Fernandez-Esquer, M.E., & Fernandez, M.E. (2012). Using intervention mapping as a participatory strategy: Development of a cervical cancer screening intervention for Hispanic women. *Health Education & Behavior*. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/22388451>
- Carrion, I. V., & Bullock, K. (2012). A case study of Hispanics and hospice care. *International Journal of Humanities & Social Sciences*, 2 (4), 9-19.
- Cannistra, S., & Niloff, J. (1996). Cancer of the uterine cervix. *New England Journal of Medicine*, 334(16), 1030-1038.
- Champion, V. L., Monahan, P. O., Springston, J.K., Russell, K., Zollinger, T.W., Saywell, R.M. Jr, & Maraj, M. (2008). Measuring mammography and breast cancer beliefs in africanamerican women. *Journal of Health Psychology*. 18(6), 827-837.
- Chevarley, F., & White, E. (1997). Recent Trends in Breast Cancer Mortality among White and Black US Women. *American Journal of Public Health*, 87(5), 775-781.
- Chu, K. C., Lamar, C. A., & Freeman, H. P. (2003). Racial disparities in breast carcinoma survival rates: Separating factors that affect diagnosis from factors that affect treatment. *Cancer*, 97(11), 2853-2860.
- Eng, E., Parker, E., & Harlan, C. (1997). Lay health advisor intervention strategies: A continuum from natural helping to paraprofessional helping. *Health Education & Behavior*, 24(4), 413-417.
- Fernandez, M. E., Gonzales, A., Tortolero-Luna, G., Williams, J., Saavedra-Embese, M., Chan, W., & Vernon, S.W. (2009). Effectiveness of cultivando la salud: A breast and cervical cancer screening promotion program for low-income Hispanic women. *American Journal of Public Health*, 99(5), 936-943.
- Fernandez, M. E., Gonzales, A., Tortolero-Luna, G., Partida, S., & Bartholomew, L.K. (2005). Using intervention mapping to develop a breast and cervical cancer screening program for hispanic farmworkers: Cultivando la salud. *Health Promotion Practice*, 6(4), 394-404.
- Fox, S., & Roetzheim, R. (1994). Screening mammography and older Hispanic women: Current status and issues. *Cancer (Supplement)*, 74(7), 2028-2033.
- Freeman, H. P., & Chu, K. C. (2005). Determinants of cancer disparities: Barriers to cancer screening, diagnosis, and treatment. *Surgical Oncology Clinics of North America*. 14(4), 655-669.
- Fulton, J. P., Rakowski, W., & Jones, A. C. (1995). Determinants of breast cancer screening among inner-city hispanic women in comparison with other inner-city women. *Public Health Reports*, 110(4), 476-482.
- Kim, S. E., Perez-Stable, E. J., Wong, S., Gregorich, S., Sawaya, G. F., Walsh, J. M., & Kaplan, C. P. (2012). Association between cancer risk perception and screening behavior among diverse women. *Archives of Internal Medicine*, 168(7), 728-734.
- Larkey, L. L. (2006). Las Mujeressaludables: reaching Hispanics for breast, cervical and colorectal cancer prevention and screening. *Journal of Community Health*, 31(1), 69-77.



- Mamon, J., Shediak, M., Crosby, C., Sanders, B., Matanoski, G., & Celentano, D. (1990). Inner-city women at risk for cervical cancer: Behavioral and utilization factors related to inadequate screening. *Preventative Medicine*, 19, 363-376.
- Markides, K., Rudkin, L., Angel, R., & Espino, D. (1997). Health Status of Hispanic Elderly in the United States (pp. 285-300). In L. Martin, & B. Soldo (Eds.), *Racial and Ethnic Differences in the Health of Older Americans*. Washington: National Academy Press.
- Matthews, A.K., Berrios, N., Darnell, J.S., & Calhoun, E. (2006). A qualitative evaluation of a faith-based breast and cervical cancer screening intervention for African American women. *Health Education & Behavior*, 33 (5), 643-663.
- McCarthy, E., Burns, R., Coughlin, S., Freund, K., Rice, J., Marwill, S., Ash, A., Shwartz, M., & Moskowitz, M. (1998). Mammography use helps to explain differences in breast cancer stage at diagnosis between older black and white women. *Annals of Internal Medicine*, 128(9), 729-736.
- Moormeier, J. (1996). Breast cancer in black women. *Annals of Internal Medicine*, 124(10), 897-905.
- Ortiz, A. P., Hebl, S. M., Serrano, R., Fernandez, M.E., Suárez, E., & Tortolero-Luna, G. (2010). Factors associated with cervical cancer screening in Puerto Rico. *Preventing Chronic Disease*, 7(3), A58.
- Posser, J.E. (2001). Developing a new model for cross-cultural research: Synthesizing the health belief mode and the theory of reasoned action. *Advances in Nursing Science*, 23 (4), 1-15.
- Rimer, B. (1994). Interventions to increase breast screening: Lifespan and Ethnicity issues. *Cancer*, 74(1 Supplement), 323-328.
- Rimer, B. K., Ross, E., Lerman, C., Boyce, A., & Engstrom, P. F. (1992). Multi-strategy health education program to increase mammography use among women ages 65 and older. *Public Health Reports*, 107(4), 369-380.
- Russell, K. M., Champion, V. L., Monahan, P.O., Millon-Underwood, S., Zhao, Q., Spacey, N., Rush, N.L., & Paskett, E.D. (2010). Randomized trial of a lay health advisor and computer intervention to increase mammography screening in African American women. *Cancer Epidemiology, Biomarkers and Prevention*. 19(1), 201-210.
- Saint-Germain, M., & Longman, A. (1993). Breast cancer screening among older Hispanic women: Knowledge, attitudes, and practices. *Health Education Quarterly*, 20(4), 539-553.
- Saraiya, M., Ahmed, F., Krishnan, S., Richards, T.B., Unger, E.R., Lawson, H.W. (2007). Cervical cancer incidence in a prevaccine era in the United States, 1998-2002. *Obstetrics & Gynecology*, 109 (2), 360-370.
- Siegel, R., Ward, E., Brawley, O., & Jemal, A. (2011). Cancer statistics, 2011: The impact of eliminating socioeconomic and racial disparities on premature cancer deaths. *CA: A Cancer Journal for Clinicians*, 61(4), 212-236.
- Shields, C. G., & Ziner, K. W., Bourff, S.A., Schilling, K., Zhao, Q., Monahan, P., Sledge, G., & Champion, V. (2010). An intervention to improve communication between breast cancer survivors and their physicians. *Journal of Psychosocial Oncology*, 28(6), 610-629.
- Skinner, C., Arfken, C., & Waterman, B. (2000). Outcomes of The Learn, Share & Live breast cancer education program for older urban women. *American Journal of Public Health*, 90(8), 1229-1234.
- Stockdale, S., Keeler, E., Duan, N., Derose, K., & Fox, S. (2000). Costs and cost-effectiveness of a church-based intervention to promote mammography screening. *Health Services Research*, 35(5, part 1), 1037-1057.
- Suarez, L., Nicholas, D., Pulley, L., Brady, C., & McAlister, A. (1993). Local health departments implement a theory-based model to increase breast and cervical cancer screening. *Public Health Reports*, 108(4), 477-482.
- Surveillance, Epidemiology, and End Results (SEER) Program (2010). SEER\*Stat Database: NAACCR Incidence-CiNA Analytic File, 1995-2007, for Expanded Races Custom Files with County, ACS Facts & Figures Projection Project, North American Association of Central Cancer Registries. Bethesda, MD: National Cancer Institute, Division of Cancer Control and Population Sciences, Surveillance Research Program, Cancer Statistics Branch.
- Valdez, A., Banerjee, K., Ackerson, L., & Fernandez, M. (2002). A multimedia breast cancer education intervention for low-income Hispanics. *Journal of Community Health*, 27(1), 33-51.



## Appendix

Table 1: Study Response Rates

	Nominators	Older women
Initial # Recruited	549	N/A
Eligibles Recruited	432 (78.7%)	528
Successful at One Week	238 (55.1%)	281 (53.2%)
Interviewed	197 (82.8%)	188 (66.9%)

Table 2: Characteristics of Older Women and Younger Women

	Older women (n=188)		Younger women (n=197)	
	N	%	N	%
Mean Age at Interview (range)	60.7 (50-82)		38.7 (31-47)	
Recruited in Boston, MA	49	26.1	57	28.9
Race/Ethnicity:				
African American, non-Hispanic	93	50.8	94	48.7
Hispanic	82	44.8	91	47.2
Both African American and Hispanic	8	4.4	4	2.1
Other, non-Hispanic	0	0	4	2.1
Education:				
Eighth Grade or Less	68	36.6	8	4.1
Some High School	43	23.1	28	14.4
High School Graduate	37	19.9	51	26.2
Some College	23	12.4	76	39.0
College Graduate	15	8.1	32	16.4
Living With Spouse or Partner	66	35.5	96	49.2
Health Insurance*				
None	13	7.3	21	10.9
Private	82	44.6	114	59.4
Medicare	66	36.3	12	6.2
Medicaid	73	39.9	59	30.7

\*Respondents may have more than one type of coverage

**Table 3: Characteristics of Control and Intervention Groups**

TABLE 3	Older women (n=188)			
	Control (n=113)		Intervention (n=75)	
Mean Age (range: 50-82)	62.0		58.7	
	N	(%)	N	(%)
Recruited in Boston, MA	38	33.6	11	14.7
Race/Ethnicity				
African American, non-Hispanic	59	54.1	34	45.9
Hispanic	44	40.4	38	51.4
Both African American and Hispanic	6	5.5	2	2.7
Education				
Eighth Grade or Less	40	35.7	28	37.8
Some High School	26	23.2	17	23.0
High School Graduate	21	18.8	16	21.6
Some College	16	14.3	7	9.5
College Graduate	9	8.1	6	8.2
Living With Spouse or Partner	39	34.8	27	36.5
Health Insurance				
None	8	7.5	5	6.9
Private	45	40.9	37	50.0
Medicare	47	43.1	19	26.0
Medicaid	48	43.6	25	34.2
Screening History				
Ever had a mammogram	106	93.8	71	94.7
Had a mammogram in past 2 years	96	85.0	64	85.3
Ever had a pap test	58	85.3	38	92.7
Had pap in past 2 years	48	71.6	33	80.5

\*Respondents may have more than one type of coverage

**Table 4: Factors Predicting Younger Woman’s Report That Older Woman Spoke to Her about Breast Cancer and Mammograms**

	Unstandardized Coefficient (S.E.)	Odds Ratio
Age	-.02 (.03)	.98
Hispanic	-.20 (.43)	.82
Lives with Spouse	-.25 (.37)	.78
Education Attained	-.08 (.09)	.92
Medicare	-.14 (.46)	.87
Medicaid	.43 (.44)	1.53
Private Insurance	.77 (.50)	2.16
Boston	-.26 (.49)	.77
Intervention Group	.06 (.39)	1.06
Mother of younger woman	.51 (.46)	1.66
Other Relative of younger woman	.92 (.54)	2.51
Recruited at Social Group	-.00 (.45)	1.00
Recruited One on One	.60 (.64)	1.83
Recruited at Health Facility	.42 (.66)	1.53
Nominator Had Mammogram - last 2 Years	-.09 (.37)	.91
Nominator’s Last Grade	.19 (.09)	1.20*

\* p < .05; \*\*p < .01 \*\*\*p < .001

**Table 5: Older Women Intentions to Get a Mammogram In the Next Twelve Months?**

	Model with measure of exposure to intervention (Nominator discussed screening exams)		Model with treatment arm	
	Unstandardized Coefficient (S.E.)	Standardized Coefficient	Unstandardized Coefficient (S.E.)	Standardized Coefficient
Age	-.02 (.02)	-.07	-.02 (.02)	-.09
Hispanic	.82 (.31)	.21*	.87 (.31)	.22**
Lives with Spouse	-.26 (.29)	-.06	-.27 (.28)	-.07
Education Attained	-.03 (.06)	-.04	-.04 (.06)	-.05
Medicare	.56 (.35)	.14	.53 (.35)	.13
Medicaid	.36 (.35)	.09	.31 (.34)	.08
Private Insurance	1.13 (.39)	.29**	1.14 (.38)	.29**
Boston	-.03 (.36)	-.01	-.14 (.36)	-.03
Mother of younger woman	.61 (.34)	.16	.55 (.33)	.14
Other Relative of nominator	.44 (.39)	.09	.44 (.38)	.09
Recruited at Social Group	-.00 (.33)	-.00	.10 (.33)	.03
Recruited One on One	.14 (.49)	.02	.07 (.48)	.01
Recruited at Health Facility	-.48 (.52)	-.07	-.40 (.51)	-.06
Had Mammogram in Last Two Years	2.13 (.40)	.38***	2.14 (.40)	.38***
Nominator discussed breast screening exams	-.02 (.28)	-.00	-	-
Intervention condition			-.50 (.30)	-.13

\* p < .05; \*\*p < .01 \*\*\*p < .001

**Table 6: Older Women Reported Use of Mammograms after Recruitment**

	Model with measure of exposure to intervention (Nominator discussed screening exams)		Model with treatment arm	
	Unstandardized Coefficient (S.E.)	Odds Ratio	Unstandardized Coefficient (S.E.)	Odds Ratio
Age	-.02 (.03)	.98	-.01 (.03)	.99
Hispanic	.58 (.45)	1.78	.53 (.45)	1.70
Lives with Spouse	-.13 (.40)	.88	-.11 (.41)	.89
Education Attained	.29 (.10)	1.34**	.31 (.10)	1.36**
Medicare	-.36 (.48)	.70	-.35 (.48)	.71
Medicaid	.26 (.48)	1.30	.32 (.48)	1.38
Private Insurance	-.09 (.54)	.92	-.08 (.54)	.92
Boston	.15 (.53)	1.16	.24 (.54)	1.27
Mother of younger woman	1.43 (.49)	4.17**	1.55 (.49)	4.69**
Other Relative of younger woman	.51 (.52)	1.66	.56 (.51)	1.74
Recruited at Social Group	-.58 (.48)	.56	-.68 (.49)	.51
Recruited One on One	-.74 (.70)	.48	-.72 (.70)	.49
Recruited at Health Facility	-.33 (.76)	.72	-.37 (.76)	.69
Number of days between recruitment and interview	.00 (.00)	1.00	.00 (.00)	1.00
Younger woman discussed screening exams	.29 (.38)	1.33	-	-
Intervention Group	-	-	.40 (.42)	1.48

\*p < .05; \*\*p < .01 \*\*\*p < .001

**Table 7: Intention to Get a Pap Test In The Next 12 Months**

	Nominator discussed cervical cancer, Pap test		Intervention Arm	
	Unstandardized Coefficient (S.E.)	Standardized Coefficient	Unstandardized Coefficient (S.E.)	Standardized Coefficient
Age	-.08 (.04)	-.22*	-.08 (.04)	-.21*
Hispanic	1.44 (.58)	.24*	1.42 (.58)	.23*
Lives with Spouse	-.80 (.52)	-.12	-.77 (.53)	-.12
Last Grade Completed	.09 (.11)	.08	.09 (.11)	.08
Medicare	1.13 (.65)	.18	1.14 (.64)	.18
Medicaid	-.28 (.58)	-.04	-.27 (.58)	-.04
Private Insurance	1.54 (.65)	.25*	1.56 (.65)	.25*
Boston	-.37 (.60)	-.06	-.30 (.61)	-.05
Mother of nominator	.50 (.60)	.08	.54 (.61)	.09
Other Relative of younger woman	-.16 (.69)	-.02	-.17 (.69)	-.02
Recruited at Social Group	-.48 (.59)	-.08	-.51 (.59)	-.08
Recruited One on One	-.70 (.89)	-.08	-.65 (.90)	-.07
Recruited at Health Facility	-.95 (.87)	-.10	-.98 (.87)	-.10
Had Pap Test in Last Two Years	3.75 (.64)	.52***	3.71 (.64)	.51***
Provided with Pamphlets	-.16 (.74)	-.02	.61	-.02
Nominator discussed cervical cancer & pap tests	-.02 (.69)	-.00	N/A	N/A
Intervention Group	N/A	N/A	.21 (.56)	.03

\* p< .05; \*\*p < .01 \*\*\*p < .001

**Table 8: Had a Pap test Since Recruitment**

	Nominator discussed cervical cancer, Pap tests		Treatment Arm	
	Unstandardized Coefficient (S.E.)	Odds Ratio	Unstandardized Coefficient (S.E.)	Odds Ratio
Age	-.19 (.06)	.83**	-.18 (.06)	.84**
Hispanic	.12 (.71)	1.13	-.06 (.69)	.94
Lives with Spouse	.29 (.63)	1.33	.62 (.64)	1.86
Last Grade Completed	-.00 (.12)	1.00	-.02 (.13)	.98
Medicare	.34 (.83)	1.40	.89 (.83)	2.44
Medicaid	-.92 (.74)	.40	-.40 (.72)	.67
Private Insurance	1.64 (.87)	5.18	1.96 (.86)	7.13*
Boston	1.87 (.84)	6.50*	2.11 (.88)	8.28*
Mother of younger woman	.80 (.70)	2.23	1.20 (.69)	3.32
Other Relative of younger woman	.90 (.98)	2.46	.95 (.96)	2.59
Recruited at Social Group	1.17 (.76)	3.22	1.29 (.75)	3.65
Recruited One on One	2.56 (1.33)	12.9	2.48 (1.31)	11.94
Recruited at Health Facility	.24 (1.04)	1.28	-.26 (.97)	.77
Number of days between recruitment and interview	.00 (.01)	1.00	.00 (.01)	1.00
Provided with Pamphlets	-1.04 (1.02)	.36	.88 (.78)	.26
Younger woman discussed cervical cancer & pap tests	2.51 (1.00)	12.29*	N/A	N/A
Intervention Group	N/A	N/A	1.31 (.71)	3.72

\* p &lt; .05; \*\*p &lt; .01 \*\*\*p &lt; .001