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Influence of Church Attendance and Spirituality in a Randomized Controlled Trial to Increase Mammography Use Among a Low-Income, Tri-Racial, Rural Community

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Abstract

Background—The influence of church attendance and spirituality on mammography use was studied among Native American, White, and African American women living in a rural county.

Methods—A randomized trial was conducted to increase mammography use. Women ($n = 851$) were randomly assigned to receive either an educational program delivered by a lay health advisor or a physician letter and brochure about cervical cancer screening (control group). Church attendance and spirituality were measured at baseline and mammography use was evaluated 12 months after enrollment using medical record review.

Results—Almost two-thirds of the women reported that they attended church at least once a week, and less than 4% were classified as having low spirituality. Church attendance ($P = 0.299$) or spirituality ($P = 0.401$) did not have a significant impact on mammography use.

Conclusions—Church attendance and spirituality did not impact mammography use.

Keywords

Cancer screening; Religion; Spirituality; Mammography; Rural population

Introduction

It is estimated that in 2007, 178,480 women in the United States will be diagnosed with breast cancer and 40,460 will die of the disease (American Cancer Society 2007). Mammography and clinical breast examinations have been shown to reduce breast cancer mortality and increase treatment options (Freedman et al. 2003; Hendrick et al. 1997; Smart et al. 1995; Smith et al. 2004; United States Preventive Services Task Force 2002). In the past decade, national mammography rates have steadily increased (Breen et al. 2001; Swan et al. 2003), however, there is recent evidence that this trend may be changing, especially among women between 50 and 64 years of age and among women with higher incomes (Breen et al. 2007). In the past, lower breast cancer screening rates have been documented among minority and older women, women of low socioeconomic status, and those living in rural regions of the United States (Hiatt et al. 2002; Meissner et al. 2007; MMWR 1990).

Reasons for lower rates of mammography screening among minority and underserved women are multifaceted and may include: low levels of education, low socioeconomic status, lack of knowledge, decreased access to healthcare, lack of health insurance or being underinsured, and negative personal and cultural beliefs about cancer and cancer screening (Hiatt et al. 2002; Hsia et al. 2000; Kiefe et al. 1994; Kirkman-Liff and Kronenfeld 1992; Meissner et al. 2007). These issues are especially pervasive in many rural areas, and significant effort has been used to understand how these factors interact to influence cancer screening completion within guidelines (Coughlin et al. 2002; Husaini et al. 2005; Zhang et al. 2000).

Studies that include an important personal and cultural belief, religiosity and/or spirituality, have documented their inconsistent role in promoting several preventive health behaviors, including cancer screening (Benjamins 2006; Ellison and Levin 1998; Fox et al. 1998; Holt et al. 2003a, b; Husaini et al. 2005; Kinney et al. 2002; Mitchell et al. 2002; Paskett et al. 1999; Powell et al. 2003; Underwood and Powell 2006; Weaver and Koenig 2006; Yuen 2007). Although religiosity is a broad concept, it is composed of many interrelated dimensions. One dimension, church participation is often measured by church attendance. Church attendance provides a venue for educational programs, increasing awareness or access to preventive health care programs, and also provides a large social network with a potentially strong social support system (Fox et al. 1998; Paskett et al. 1999; Powell et al. 2003). Spirituality, or one's relationship with a form of higher power, may also influence preventive health service use and other health-related behaviors in a positive manner by providing hope and psychological well-being through prayer or in a negative way by suggesting an external locus of control or fatalism that takes away the need to seek cancer screening (Ellison and Levin 1998; Holt et al. 2003a, b; Kinney et al. 2002; Mitchell et al. 2002; Paskett et al. 1999; Russell et al. 2007; Underwood and Powell 2006; Weaver and Koenig 2006; Yuen 2007).

Previous studies examining the effects of church attendance and spirituality on mammography usage have focused primarily on African American or White women (Holt et al. 2003a, b; Kinney et al. 2002; Lukwago et al. 2003; Mitchell et al. 2002; Paskett et al. 1999; Russell et al. 2007; Underwood and Powell 2006). There have been a limited number of studies that have included diverse populations, including Latinas and Native Americans (Becker and Foxall 2006; Benjamins 2006; Canales et al. 2007; Darnell et al. 2006; Farmer et al. 2005; Fox et al. 1998; Giuliano et al. 1998; Risendal et al. 1999; Welsh et al. 2005). In this study, we build upon earlier research by prospectively examining the influence of church attendance and spirituality on mammography use among a rural population of Native American, White, and African American women in need of a mammogram who participated in a randomized controlled trial to improve mammography utilization.

Methods

Setting and Participants

This study used data obtained from 851 women who participated in the Robeson County Outreach, Screening, and Education (ROSE) Project, a randomized controlled trial aimed at increasing mammography screening rates among medically underserved women age 40 and over in Robeson County, North Carolina using lay health advisors (Paskett et al. 2004). Robeson County is largely a rural county located on the southeastern coastal plain of North Carolina. The population of this county comprises three main racial groups: Native Americans (38%), non-Hispanic Whites (33%), and African Americans (25%). Women were randomly selected from a list of female patients older than 40 years served by the major health care provider for the county, stratifying on clinic and race to ensure a balanced sample. To be eligible to participate in the ROSE Project, a woman had to be in need of a mammogram by virtue of the fact she had not received one in the past 12 months by medical record review. Half the eligible women were randomized to the intervention condition and half to receive the control condition.

Briefly, the intervention consisted of an individualized health education program delivered by a lay health advisor. Two Native American and one African American women who lived in the community were trained by the research staff to be lay health advisors. The intervention was tailored to the needs of each woman by addressing reported barriers (lack of insurance, time, encouragement, etc.) to obtaining a mammogram, and was delivered during three home visits (intensive, face-to-face interactive education), phone calls, and tailored mailings over a 9 to 12-month period.

Women randomized to the control group received a mailing including a letter from their physician and a National Cancer Institute (NCI) brochure focusing on the importance of regular cervical cancer screening. All women completed a baseline survey prior to randomization and a second survey 12–14 months following randomization. Three months after completing the follow-up survey, women in the comparison group received a letter inviting them to obtain a mammogram along with a NCI brochure about the importance of mammography. Further details of the study design, sample selection, the theoretically based intervention, and the results of the randomized controlled trial are described elsewhere (Paskett et al. 2004, 2006).

The baseline survey included items focusing on participant demographics, general health, knowledge, beliefs, and attitudes about breast cancer and breast cancer screening, and cancer screening behaviors. Religiosity was also included in the baseline survey and assessed using items from the Religious Life Scale (Kauffman 1979). Mammography use during the study period was determined by medical record review. The ROSE Project was approved by Institutional Review Boards at Wake Forest University School of Medicine and The Ohio State University.

Measures of Church Attendance and Spirituality

Items focusing on religious affiliation, church attendance, and spirituality were included in the baseline survey (Kauffman 1979). Religious affiliation was categorized as Baptist, Holiness, Methodist, other, or none. Self-reported frequency of church attendance was categorized as high (attending church at least weekly), moderate (attending church less than weekly), or low (does not attend church). Three questions, probing the frequency which women asked God for help, the proximity of their relationship to God, and the extent to which their life had a religious purpose, were used to assess spirituality. To maximize the variability between groups, women were classified as having a high, moderate, or low level of spirituality based on their responses. Women who reported that very often they asked God

for help in making decisions, had a very close relationship with God, and to a very large extent had a religious purpose for their life were labelled as highly spiritual. Women reporting never, seldom, or sometimes asking God for help making decisions, less than a close relationship with God, and to no or a small extent having a religious purpose for their life were labelled as having low spirituality. All other women were classified as having a moderate level of spirituality.

Data Analysis

Logistic regression models were used to examine the relationship between variables at baseline and mammography use 1 year later, verified from medical record review. Since our interest was in the independent effect of church attendance and spirituality, a variable coding for the woman's intervention status was included in the model to control for treatment arm. A second set of models was constructed to examine the effect of church attendance and spirituality controlling for potential confounders. The covariates examined were race (Native American/White/African American); age (40–49/50–59/60–69/70–79/80+ years); marital status (married or living together/divorced or separated/widowed/never married); reproductive history (nulliparous/children), age over 30 years at birth of first child (no/yes); social support (a lot/some/a little/none); education (less than high school/ high school graduate/some college or college graduate); socioeconomic status (high [private insurance, high school graduate, and annual household income of \$20,000]/low [no private health insurance, not high school graduate, or annual income less than \$20,000]); employment (full time or part time/retired/homemaker/disabled/other); health insurance status (any/none); last clinical breast examination (within last year/more than 1 year ago/ never); and smoking status (never/former/current). Statistical analyses were carried out using SAS v9.1 (SAS Institute, Inc., Cary, NC).

Results

Baseline demographic characteristics of the 851 women participating in the ROSE study by receipt of mammography at follow-up are listed in Table 1. There were no significant differences in demographic characteristics between the two groups. The results indicated that 42.5% of the women in the lay health advisor intervention group ($n = 433$) and 27.3% of those in the comparison group ($n = 418$) received a mammogram in the 12 months before the follow-up survey ($RR = 1.56$, 95% $CI = 1.29–1.87$, $P < 0.001$) (Paskett et al. 2006). In addition, women in the lay health advisor group compared to the women in the comparison group, displayed better belief scores ($P = 0.004$) and reduced barriers ($P < 0.001$) to mammography at follow-up (Paskett et al. 2006).

Baseline religious characteristics (affiliation, church attendance, and spirituality) are listed in Table 2. Almost two-thirds of the women in this study reported that they attended church at least once a week, and less than four percent were classified as having low spirituality. There were no significant differences in these reported religious dimensions (religious affiliation, church attendance, spirituality) between women who received a mammogram and women who did not receive a mammogram at follow-up.

Adjusting for the effect of the intervention, neither church attendance ($P = 0.299$) nor spirituality ($P = 0.401$) had a significant impact on the likelihood of a woman obtaining a mammogram during the study period (Table 3). Additional models were built, adjusting further for the potential confounders of age, race, socioeconomic status, receipt of clinical breast exam, marital status, and smoking status (Table 3). Neither the variables coding for church attendance ($P = 0.449$) nor the variables coding for spirituality ($P = 0.405$) significantly improved the model. No significant interactions between the religion variables and potential confounders were found.

Discussion

In our study, church attendance and spirituality were not found to be significantly related to mammography use among this rural, tri-racial population of women. This finding is inconsistent with studies that have found an association between church attendance or spirituality and mammography rates (Benjamins 2006; Paskett et al. 1999), but are consistent with several previous studies which have documented no association between church attendance or spirituality and mammography use among White and African American women (Fox et al. 1998; Holt et al. 2003a, b; Husaini et al. 2005; Kinney et al. 2002; Lukwago et al. 2003; Mitchell et al. 2002; Russell et al. 2007; Underwood and Powell 2006).

Although lower cancer screening rates have been documented among Native American women (American Cancer Society 2006), information about religion or traditional identification and cancer screening practices is limited and inconsistent (Canales et al. 2007; Giuliano et al. 1998; Risendal et al. 1999). For example, in one study of predominantly (83%) rural American Indians living in Vermont, women who described themselves as most traditional were less likely to have had a mammogram in the past 2 years (Canales et al. 2007). In another study of urban American Indian women, attendance at tribal-specific religious ceremonies was reported to be associated with receiving a clinical breast examination during the past year but not associated with completing mammography in the past 2 years (Risendal et al. 1999). This current study confirms the finding of the lack of association between church attendance or spirituality and mammography use among Native American women.

Evidence of a religion–health connection suggesting that more religious involvement is associated with better health outcomes has been previously reported (Ellison and Levin 1998; Powell et al. 2003; Weaver and Koenig 2006; Yuen 2007). Studies have documented this positive religion–health connection among men and women, across religious affiliations, race and ethnicities, and socioeconomic levels for several health-related outcomes, including cancer screening (Ellison and Levin 1998; Paskett et al. 1999; Benjamins 2006; Powell et al. 2003; Weaver and Koenig 2006; Yuen 2007). Mechanisms proposed for this association include regulation of lifestyle behaviors, larger social networks and stronger social support, improved self-efficacy, and venues for exposure to health-related information.

Several related issues may explain the variability in the current study findings from previous studies exploring the relationship between religion and mammography. Many of the previous studies were cross-sectional, used convenience samples or participants from urban settings, used a single measure of religion, and/or used different measures (Benjamins 2006; Canales et al. 2007; Fox et al. 1998; Holt et al. 2003a, b; Giuliano et al. 1998; Husaini et al. 2005; Kinney et al. 2002; Mitchell et al. 2002; Paskett et al. 1999; Risendal et al. 1999; Russell et al. 2007; Underwood and Powell 2006). The current study included randomly selected women from a rural setting and measured religious affiliation, church attendance, and spirituality. The high levels of church attendance and spirituality in the population included in this study, however, are noteworthy. Less than 14% of individuals in the study population never attended church, and fewer than 4% of individuals were classified as having low spirituality. These findings indicate the importance of religion, regardless of race, to Native American, non-Hispanic White, and African American women living in this rural region of the United States.

The relationship between religion and health has received attention from health researchers interested in understanding how religious beliefs and practices may influence an individual's

health or their health-related quality of life. Recently, a large multi-center randomized trial examining the effect of prayer among patients undergoing cardiac surgery received wide media coverage (Benson et al. 2006). This study showed that intercessory prayer had no effect on reducing complications related to coronary artery bypass graft surgery, and certainty of receiving intercessory prayer was associated with a higher incidence of complications. Despite the negative findings of this recent study, many healthcare providers are aware of the importance that religion plays in the lives of patients (Weaver and Koenig 2006). In fact, the recognition of the spiritual needs and desires of patients has led to the incorporation of religiosity, spirituality, and spiritual care into medical school curriculum and physician training (Anandarajah and Mitchell 2007; Fortin and Barnett 2004; Graves et al. 2002; Puchalski 2006).

Since religion plays an important role in the lives of individuals, particularly minority populations and those living in rural communities, the use of the church as a potential venue for future cancer screening programs may be central to improving mammography screening among women living in rural areas. For success, church-based cancer prevention programs should be developed using a collaborative partnership and incorporate health promotion messages that are spiritually based for recruitment, participation, and sustain-ability (Campbell et al. 2007; Powell et al. 2005).

Several limitations of the study should be considered when interpreting these results. First, cultural differences in religious beliefs and practices make the findings of this study hard to generalize. Secondly, the importance of religion in Robeson County led to little variation among the women in regards to church attendance and spirituality. This lack of variability makes a true effect hard to detect. Finally, due to the complexity of the constructs, church attendance or spirituality may not have been completely captured by the items used in the survey. The definitions and concepts of church attendance and spirituality are subjective and difficult to measure because they are multidimensional constructs and individuals may not be comfortable with sharing their personal beliefs and practices.

In conclusion, our data do not suggest a link between church attendance or spirituality and mammography use in the tri-racial, rural population studied, however, the high degree of church attendance in this study population indicates that religious settings may be important when delivering interventions to improve the health behaviors of residents in rural, Southern communities. Future research should focus on capturing the multidimensional aspects of church attendance and spirituality to guide the development of community-based interventions.

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References

- Anandarajah G, Mitchell M. A spirituality and medicine elective for senior medical students: 4 years' experience, evaluation, and expansion to the family medicine residency. *Family Medicine*. 2007; 39(5):313–315. [PubMed: 17476601]
- American Cancer Society. Cancer facts and figures 2006. Atlanta: American Cancer Society; 2006.
- American Cancer Society. Cancer facts and figures 2007. Atlanta: American Cancer Society; 2007.
- Becker SA, Foxall M. An analysis of health behavior theories applied to breast-screening behavior for relevance with American Indian women. *Journal of Transcultural Nursing*. 2006; 17(3):272–279. [PubMed: 16757667]

- Benjamins MR. Religious influences on preventive health care use in a nationally representative sample of middle-age women. *Journal of Behavioral Medicine*. 2006; 29(1):1–16. [PubMed: 16397821]
- Benson H, Dusek JA, Sherwood JB, Lam P, Bethea CF, Carpenter W, Levitsky S, Hill PC, Clem DW Jr, Jain MK, Drumel D, Kopecky SL, Mueller PS, Marek D, Rollins S, Hibberd PL. Study of the Therapeutic Effects of Intercessory Prayer (STEP) in cardiac bypass patients: A multicenter randomized trial of uncertainty and certainty of receiving intercessory prayer. *American Heart Journal*. 2006; 151(4):934–942. [PubMed: 16569567]
- Breen N, Cronin KA, Meissner HI, Taplin SH, Tangka FK, Tiro JA, McNeel TS. Reported drop in mammography: Is this cause for concern? *Cancer*. 2007; 109(12):2405–2409. [PubMed: 17503429]
- Breen N, Wagener DK, Brown ML, Davis WW, Ballard-Barbash R. Progress in cancer screening over a decade: Results of cancer screening from the 1987, 1992, and 1998 National Health Interview Surveys. *Journal of the National Cancer Institute*. 2001; 93(22):1704–1713. [PubMed: 11717331]
- Campbell MK, Hudson MA, Resnicow K, Blakeney N, Paxton A, Baskin M. Church-based health promotion interventions: Evidence and lessons learned. *Annual Review of Public Health*. 2007; 28:213–234.
- Canales MK, Rakowski W, Howard A. Traditionality and cancer screening practices among American Indian women in Vermont. *Health Care for Women International*. 2007; 28:155–181. [PubMed: 17364978]
- Coughlin SS, Thompson TD, Hall HI, Logan P, Uhler RJ. Breast and cervical carcinoma screening practices among women in rural and nonrural areas of the United States, 1998–1999. *Cancer*. 2002; 94(11):2801–2812. [PubMed: 12115366]
- Darnell JS, Chang CH, Calhoun EA. Knowledge about breast cancer and participation in a faith-based breast cancer program and other predictors of mammography screening among African American women and Latinas. *Health Promotion Practice*. 2006; 7(3 Suppl):201S–212S. [PubMed: 16760248]
- Ellison CG, Levin JS. The religion–health connection: Evidence, theory, and future directions. *Health Education & behavior*. 1998; 25(6):700–720. [PubMed: 9813743]
- Farmer DF, Bell RA, Stark N. Cancer screening among Native Americans in eastern North Carolina. *Journal of Health Care for the Poor and Underserved*. 2005; 16(4):634–642. [PubMed: 16311489]
- Fortin AHT, Barnett KG. STUDENTJAMA. Medical school curricula in spirituality and medicine. *JAMA*. 2004; 291(23):2883. [PubMed: 15199044]
- Fox SA, Pitkin K, Paul C, Carson S, Duan N. Breast cancer screening adherence: Does church attendance matter? *Health Education & Behavior*. 1998; 25(6):742–758. [PubMed: 9813745]
- Freedman GM, Anderson PR, Goldstein LJ, Hanlon AL, Cianfrocca ME, Millenson MM, von Mehren M, Torosian MH, Boraas MC, Nicolaou N, Patchefsky AS, Evers K. Routine mammography is associated with earlier stage disease and greater eligibility for breast conservation in breast carcinoma patients age 40 years and older. *Cancer*. 2003; 98(5):918–925. [PubMed: 12942557]
- Giuliano A, Papenfuss M, DeZapian JD, Tilousi S, Nuvayestewa L. Breast cancer screening among Southwest American Indian women living on reservation. *Preventive Medicine*. 1998; 27:135–143. [PubMed: 9465364]
- Graves DL, Shue CK, Arnold L. The role of spirituality in patient care: Incorporating spirituality training into medical school curriculum. *Academic Medicine*. 2002; 77(11):1167. [PubMed: 12431947]
- Hendrick RE, Smith RA, Rutledge JH III, Smart CR. Benefit of screening mammography in women aged 40–49: A new meta-analysis of randomized controlled trials. *Journal of the National Cancer Institute Monographs*. 1997; (22):87–92. [PubMed: 9709282]
- Hiatt RA, Klabunde C, Breen N, Swan J, Ballard-Barbash R. Cancer screening practices from National Health Interview Surveys: Past, present, and future. *Journal of the National Cancer Institute*. 2002; 94(24):1837–1846. [PubMed: 12488477]
- Holt CL, Clark EM, Kreuter MW, Rubio DM. Spiritual health locus of control and breast cancer beliefs among urban African American women. *Health Psychology*. 2003a; 22(3):294–299. [PubMed: 12790257]

- Holt CL, Lukwago SN, Kreuter MW. Spirituality, breast cancer beliefs and mammography utilization among urban African American women. *Journal of Health Psychology*. 2003b; 8(3):383–396. [PubMed: 14670216]
- Hsia J, Kemper E, Kiefe C, Zapka J, Sofaer S, Pettinger M, Bowen D, Limacher M, Lillington L, Mason E. The importance of health insurance as a determinant of cancer screening: Evidence from the Women's Health Initiative. *Preventive Medicine*. 2000; 31(3):261–270. [PubMed: 10964640]
- Husaini BA, Emerson JS, Hull PC, Sherkat DE, Levine RS, Cain VA. Rural-urban differences in breast cancer screening among African American women. *Journal of Health Care for the Poor and Underserved*. 2005; 16(4 Suppl A):1–10. [PubMed: 16327092]
- Kauffman JH. Social correlates of spiritual maturity among North American Mennonites. *Sociological Analysis*. 1979; 40:27–42.
- Kiefe CI, McKay SV, Halevy A, Brody BA. Is cost a barrier to screening mammography for low-income women receiving Medicare benefits? A randomized trial. *Archives of Internal Medicine*. 1994; 154(11):1217–1224. [PubMed: 8203989]
- Kinney AY, Emery G, Dudley WN, Croyle RT. Screening behaviors among African American women at high risk for breast cancer: Do beliefs about god matter? *Oncology Nursing Forum*. 2002; 29(5):835–843. [PubMed: 12058158]
- Kirkman-Liff B, Kronenfeld JJ. Access to cancer screening services for women. *American Journal of Public Health*. 1992; 82(5):733–735. [PubMed: 1566955]
- Lukwago SN, Kreuter MW, Holt CL, Steger-May K, Bucholtz DC, Skinner CS. Sociocultural correlates of breast cancer knowledge and screening in urban African American women. *American Journal of Public Health*. 2003; 93(8):1271–1274. [PubMed: 12893610]
- Meissner HI, Breen N, Taubman ML, Vernon SW, Graubard BI. Which women aren't getting mammograms and why? (United States). *Cancer Causes Control*. 2007; 18(1):61–70. [PubMed: 17186422]
- Mitchell J, Lannin DR, Mathews HF, Swanson MS. Religious beliefs and breast cancer screening. *Journal of Womens Health (Larchmt)*. 2002; 11(10):907–915.
- MMWR. Use of mammography—United States, 1990. *Morbidity and Mortality Weekly Report*. 1990; 39(36):621. 627–630. [PubMed: 2118588]
- Paskett ED, Case LD, Tatum C, Velez R, Wilson A. Religiosity and cancer screening. *Journal of Religion & Health*. 1999; 38:39–51.
- Paskett ED, Tatum C, Rushing J, Michielutte R, Bell R, Foley KL, Bittoni M, Dickinson S. Racial differences in knowledge, attitudes, and cancer screening practices among a triracial rural population. *Cancer*. 2004; 101(11):2650–2659. [PubMed: 15505784]
- Paskett E, Tatum C, Rushing J, Michielutte R, Bell R, Long Foley K, Bittoni M, Dickinson SL, McAlearney AS, Reeves K. Randomized trial of an intervention to improve mammography utilization among a triracial rural population of women. *Journal of the National Cancer Institute*. 2006; 98(17):1226–1237. [PubMed: 16954475]
- Powell ME, Carter V, Bonsi E, Johnson G, Williams L, Taylor-Smith L, Hayes Q, Hull PC, Cain VA, Husaini BA. Increasing mammography screening among African American women in rural areas. *Journal of Health Care for the Poor and Underserved*. 2005; 16(4 Suppl A):11–21. [PubMed: 16327093]
- Powell LH, Shahabi L, Thoresen CE. Religion and spirituality. Linkages to physical health. *American Psychologist*. 2003; 58(1):36–52. [PubMed: 12674817]
- Puchalski CM. Spirituality and medicine: Curricula in medical education. *Journal of Cancer Education*. 2006; 21(1):14–18. [PubMed: 16918282]
- Risendal B, Roe D, DeZapen J, Papenfuss M, Giuliano A. Influence of health care, cost, and culture on breast cancer screening: Issues facing urban American Indian women. *Preventive Medicine*. 1999; 29:501–509. [PubMed: 10600431]
- Russell KM, Monahan P, Wagle A, Champion V. Differences in health and cultural beliefs by stage of mammography screening adoption in African American women. *Cancer*. 2007; 109(2 Suppl):386–395. [PubMed: 17133417]

- Smart CR, Hendrick RE, Rutledge JH III, Smith RA. Benefit of mammography screening in women ages 40–49 years. Current evidence from randomized controlled trials. *Cancer*. 1995; 75(7):1619–1626. [PubMed: 8826919]
- Smith RA, Duffy SW, Gabe R, Tabar L, Yen AM, Chen TH. The randomized trials of breast cancer screening: What have we learned? *Radiologic Clinics of North America*. 2004; 42(5):793–806. [PubMed: 15337416]
- Swan J, Breen N, Coates RJ, Rimer BK, Lee NC. Progress in cancer screening practices in the United States: Results from the 2000 National Health Interview Survey. *Cancer*. 2003; 97(6):1528–1540. [PubMed: 12627518]
- Underwood SM, Powell RL. Religion and spirituality: Influence on health/risk behavior and cancer screening behavior of African Americans. *The ABNF Journal*. 2006; 17(1):20–31. [PubMed: 16596897]
- United States Preventive Services Task Force. Screening for breast cancer: Recommendations and rationale. Rockville: Agency for Healthcare Research and Quality; 2002.
- Weaver AJ, Koenig HG. Religion, spirituality, and their relevance to medicine: An update. *American Family Physician*. 2006; 73(8):1336–1337. [PubMed: 16669558]
- Welsh AL, Sauaia A, Jacobellis J, Min SJ, Byers T. The effect of two church-based interventions on breast cancer screening rates among Medicaid-insured Latinas. *Prevention Chronic Diseases*. 2005; 2(4):A07.
- Yuen EJ. Spirituality, religion, and health. *American Journal of Medical Quality*. 2007; 22(2):77–79. [PubMed: 17395961]
- Zhang P, Tao G, Irwin KL. Utilization of preventive medical services in the United States: A comparison between rural and urban populations. *Journal of Rural Health*. 2000; 16(4):349–356. [PubMed: 11218321]

Table 1

Baseline demographic characteristics by mammography status at 12 months among women ($n = 851$) in the Robeson County Outreach, Screening, and Education (ROSE) Project

	No mammogram ($n = 553$)	Received mammogram ($n = 298$)	χ^2
	n (%)	n (%)	P -value
Treatment Group			<0.0001
Treatment	249 (45)	185 (62)	
Control	304 (55)	113 (38)	
Race			0.9766
African American	183 (33)	98 (33)	
Native American	232 (42)	125 (42)	
White	138 (25)	75 (25)	
Age (years)			0.2139
40–49	244 (44)	119 (40)	
50–59	150 (27)	89 (30)	
60–69	84 (15)	54 (18)	
70–79	56 (10)	33 (11)	
80+	19 (4)	3 (1)	
Education			0.3569
<High School	237 (43)	134 (45)	
High School Graduate	166 (30)	98 (33)	
Some college/college graduate	150 (27)	66 (22)	
Socioeconomic status			0.7914
Low	453 (82)	247 (83)	
High	100 (18)	51 (17)	
Health insurance (any)			0.8220
No	155 (28)	86 (29)	
Yes	398 (72)	212 (71)	
Smoking status			0.0592
Never	260 (47)	165 (55)	
Former	111 (20)	56 (19)	
Current	182 (33)	77 (26)	

Table 2

Baseline religious characteristics by mammography status at 12 months among women ($n = 851$) in the Robeson County Outreach, Screening, and Education (ROSE) Project

	No mammogram ($n = 553$)	Received mammogram ($n = 298$)	χ^2
	n (%)	n (%)	P -value
Religious affiliation			0.5659
Baptist	270 (49)	161 (54)	
Holiness	127 (23)	63 (21)	
Methodist	66 (12)	30 (10)	
Other	48 (9)	27 (9)	
None	42 (7)	17 (6)	
Church attendance			0.3494
Low	82 (15)	33 (11)	
Moderate	135 (24)	75 (25)	
High	336 (61)	190 (64)	
Spirituality			0.7062
Low	19 (4)	9 (3)	
Moderate	423 (76)	221 (74)	
High	111 (20)	68 (23)	

Table 3

Mammography use according to levels of church attendance and spirituality among women ($n = 851$) in the Robeson County Outreach, Screening, and Education (ROSE) Project

	Intervention adjusted OR (95%CI) ^a	Fully adjusted OR (95% CI) ^b
Church attendance		
Low	1.00	1.00
Moderate	1.32 (0.80–2.18)	1.40 (0.83–2.35)
High	1.35 (0.86–2.11)	1.26 (0.79–2.03)
Spirituality		
Low	1.00	1.00
Moderate	1.05 (0.48–2.32)	1.09 (0.48–2.50)
High	1.16 (0.51–2.68)	1.28 (0.53–3.07)

OR = Odds Ratio CI = Confidence Interval

^a Adjusted for treatment effect only

^b Adjusted for treatment effect, age, race, socioeconomic status, use of clinical breast exam, marital status, and smoking status