

The Effect of Breast Cancer Screening Messages on Knowledge, Attitudes, Perceived Risk, and Mammography Screening of African American Women in the Rural South

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Purpose/Objectives: To determine the effect of three types of breast cancer screening messages (positive/upbeat, neutral/cognitive, and negative/fear) on knowledge, attitudes, perceived risk for breast cancer, and mammography screening of African American women.

Design: Repeated measures intervention.

Setting: Three rural counties in the South.

Sample: 450 African American women aged 45–65 who had not received a mammogram in the past 12 months.

Methods: Following completion of pretest knowledge and attitude surveys, the women participated in a 60-minute breast health intervention session that included watching one of three videos with varied affective tones (positive/upbeat, neutral/cognitive, negative/fear). Data on knowledge, attitudes, perceived risk for breast cancer, and mammography screening were collected before, after, and 12 months following the intervention.

Main Research Variables: Knowledge, attitudes, perceived risk for breast cancer, and mammography screening.

Findings: No significant difference was found among video groups on mammography screening and knowledge of and attitudes about breast cancer over the three measurement periods.

Conclusions: The affective tone of the educational videos did not make a difference in mammogram screening, attitudes, and knowledge of breast cancer screening. More women received a mammogram 12 months postintervention than prior to the intervention; however, the influence of the intervention on this outcome is uncertain.

Implications for Nursing: Nurses and health communication experts should design interventions that foster positive attitudes, increase knowledge about breast cancer screening, and stimulate women to participate in breast cancer screening as outlined by the American Cancer Society. These interventions need to be done in the context of the cultural norms and the education levels of the target population.

Although the attributes and delivery of preventive health messages can make a difference in recipients' use of that information, relatively little research has focused on exploring these variables in terms of promoting breast cancer screening rates among African American women, particularly those living in rural locales. The importance of cultural appropriateness of health promotion messages is well documented, but most of the health promotion research conducted to date has targeted knowledge, attitudes, and practices as the defining variables of cultural competence (Barker, 1992; Kreps, 1994). Few investigators have sought to explore the influence

Key Points . . .

- ▶ Women who never had had a mammogram did receive the screening examination within the 12-month follow-up period.
- ▶ The affective tone of the videos did not have an effect on knowledge, attitudes, and behaviors of participants in this study.
- ▶ Women who did not follow the American Cancer Society's guidelines for breast cancer mammography screening were more likely to have less than a high school education, live in households with an annual income of less than \$15,000, be single, and lack regular health care.

of affect in health recommendations. Therefore, the Breast Health Intervention Evaluation (BRIE) Study sought to determine the effect of three affectively different breast cancer screening messages (positive/upbeat, neutral/cognitive, and negative/fear) on knowledge of breast cancer screening recommendations, attitudes about breast cancer, perceived risk for breast cancer, and mammography screening behaviors of African American women living in three communities in rural Georgia. The lack of research regarding effective breast health screening messages for African American women living in medically underserved areas in the rural South prompted this study.

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Background

Breast cancer mortality rates are higher and five-year survival rates are lower in African American women (Ghafoor et al., 2002). African American women are less likely than Caucasian women to be diagnosed with breast cancer at a localized stage and are more likely to be diagnosed with breast cancer at the regional or distant stage of disease (Jacobellis & Cutter, 2002; Jemal, Thomas, Murray, & Thun, 2002). Mammography use among African American women has increased greatly from 29% in 1987 to 67% in the 1990s (Ghafoor et al.), yet this population's five-year survival rates are lower and mortality rates remain higher. Blackman, Bennet, and Miller (1999) explored trends in self-reported mammography from 1989–1997 among women of different racial groups who participated in Behavioral Risk Factor Surveillance System (BRFSS) surveys conducted in 38 states. Reported differences between Caucasian and African American women were small for all years, and the proportions of Caucasian and African American women who reported having had a mammogram were about the same in 1996 and 1997. Further analysis of these data revealed that the median percentage of women aged 50 years and older who had a mammogram in the past two years was higher for African American women (76%) than for Caucasian (74%) or Hispanic (64%) women (Bolen, Rhodes, Powell-Griner, Bland, & Holtzman, 2000). In another study, substantial increases were found in the percentage of Caucasian and African American women in the United States who have had a recent mammogram, with racial differences in recent mammography use decreasing over time (Breen, Wagener, Brown, Davis, & Ballard-Barbash, 2001). Hegarty, Burchett, Gold, and Cohen (2000) examined whether racial differences exist in the use of cancer prevention services among older African Americans and Caucasians. Compared with older Caucasians, older African American women were less likely to receive mammography (30% African American versus 41% Caucasian, $p < 0.001$). However, the effect of race was not significant when levels of education, income, and insurance coverage were considered.

One research study examined the breast cancer screening practices of 108,326 women aged 40 and older who were living in rural and nonrural areas of the United States from 1998–1999 (Coughlin, Thompson, Hall, Logan, & Uhler, 2002). The study also used data from the BRFSS. Coughlin et al. found that 67% of women who resided in rural areas had received a mammogram in the past two years, compared with 75% of women living in larger metropolitan areas. The researchers investigated whether rurality modified associations with race or ethnicity and concluded that women in metropolitan areas were more likely than women in rural areas to have had a recent mammogram and that the association with rural and nonrural residence was stronger among African American and Hispanic women than among Caucasian women. Differences between rural and urban women aged 50–69 in their use of mammograms were examined using a nationally representative sample from the 1994 U.S. National Health Interview Survey (Zhang, Tao, & Irwin, 2001). Significantly more urban (68%) than rural (61%) women had mammograms. Among women aged 50–69 with a high school education or an annual household income from \$15,000–\$34,999, significantly fewer rural than urban women had mammograms. However, the proportion was not significantly different after adjusting for edu-

cation, household income, and health insurance status, which all were associated positively with using mammograms. These results suggest that differences in the use of mammography between rural and urban women vary by services and that improvement in socioeconomic status and health insurance coverage of rural women may reduce this disparity.

Legler et al. (2002) conducted a meta-analysis of 38 controlled, experimental, or quasi-experimental intervention studies to determine which types of mammography-enhancing interventions were most effective for groups of diverse women (i.e., groups with historically lower use of mammography). Access-enhancing interventions had the greatest impact on mammography use, accounting for 18.9% of the variance. The most effective intervention combination appeared to be access-enhancing approaches combined with individually directed interventions (e.g., individual and telephone counseling, letters, reminders). Other researchers have noted that the most effective interventions were those that increased access and addressed intra- and interpersonal factors as well as structural, economic, and geographic barriers to obtaining mammography screening (Kiefe, McKay, Halevy, & Brody, 1994; Rimer, 1994; Rimer et al., 1992; Skinner, Arfken, & Waterman, 2000).

The results of these meta-analyses of mammography interventions for diverse populations show that efforts to improve outcomes since the 1990s have generated effective interventions for minority groups. What clearly emerges is the importance of access-enhancing dimensions that address barriers commonly encountered by minority women. Another finding is that social networks and media interventions that have been a mainstay in minority health promotion may not be sufficiently powerful to justify their use without additional interventions. Using a friend-to-friend (interpersonal) support scenario, this study examined the effect of three types of breast cancer screening messages (positive/upbeat, neutral/cognitive, and negative/fear) on knowledge, attitudes, perceived risk for breast cancer, and mammography screening of African American women living in three rural communities in the South.

Methods

Design

A repeated measures experimental design was used. The research was conducted in three rural counties in the South. Each site implemented all three intervention approaches. African American women ($N = 450$) aged 45–65 who had not received a mammogram within the past 12 months were randomly assigned to one of three treatment groups. These women were selected because they were less likely to adhere to the American Cancer Society (ACS) guidelines for breast cancer screening as opposed to women who had regular breast cancer screening. Following completion of pretest surveys, the women participated in a 60-minute breast health intervention session that included watching one of three videos. The three videos varied only in tone of presentation of breast cancer screening information (positive/upbeat, neutral/cognitive, or negative/fear). Survey data on knowledge, attitudes, perceived risk for breast cancer, and mammography screening were collected before, after, and 12 months following the intervention. Because of concerns regarding threats to internal validity, a control group was not included in this design. The probability of control group participants interacting with members of the treatment groups in these rural community

settings was high, increasing concerns about diffusion of imitation of treatment among groups or resentful demoralization wherein the control group would become upset about not receiving the treatment (Burns & Grove, 2001; Trochim, 2001).

Intervention

The video scenario developed for this study reflected the responses from three focus groups with African American women in a rural southern county. The goal of these focus groups was to gather information about knowledge and attitudes toward breast cancer and breast health of African American women as well as specific information pertaining to their preferences about the breast health message design. Each of the three 12-minute videos delivered the same cancer screening information using the same scenario, characters, and dialogue, but the affective tone of each video varied. The video messages were presented in a positive/upbeat mode, a negative manner playing on fear of cancer, and a neutral/cognitive approach. To convey the appropriate tone for each condition, the lighting, set design, set composition, mise-en-scène, camera movement, camera angle, and performance by the actors all were carefully varied and controlled. For example, in the negative/fear condition, the lighting of the sets was darker, the furniture was covered in cooler color tones, shots typically were taken from a lower camera angle, and the music was slow and somber. In the neutral/cognitive video condition, the lighting was essentially flat and music was omitted altogether. In this way, emotional valence (i.e., the attraction or aversion an individual feels toward an object or event) of the videos could be manipulated while the content remained constant.

Witte's (1995) Persuasive Health Message Framework served as the structural model for constructing the breast health messages. This framework is composed of elements from the theory of reasoned action (Fishbein & Ajzen, 1975), elaboration likelihood model (Petty & Cacioppo, 1986), and protection motivation theory (Rogers, 1983) and offers an integrated approach to generating effective messages. These theoretical positions combine the cognitive dimensions of the subjective expected utility decision models with motivated depth of processing, another cognitive process that is influenced greatly by affective appeals. Because the present study sought to explore the role of affect in breast health recommendations, the theoretical integration provided by Witte's Persuasive Health Message Framework seemed ideal.

The story in the videos centers on Ruby, an overweight woman in her late 40s who lives with her husband in a rural community. Ruby's friend, Mary, encourages her to schedule a mammogram and doctor's appointment for breast cancer screening. The scenario includes a visit to her physician, Dr. Lee. The video ends with Ruby receiving a phone call regarding the results of the mammogram; however, the results are not divulged to determine involvement and avoid leading influence. The videos were created for this study, reviewed by healthcare providers and consumers, revised, and tested with African American women in a rural southern county.

The videos underwent three levels of pretesting. First, a working draft of the video script was circulated among a variety of health educators, nurses, physicians, gerontologic researchers, and other faculty members at Morehouse School of Medicine and Georgia State University, both in Atlanta, GA. Written subjective evaluations indicated that some revisions were required. Most of the comments were superficial in na-

ture. However, the reviewers all commented on some important structural elements (e.g., difficulty following the story, difficulty understanding why a particular character did or said something, a scene or statement that was not believable). An additional level of process evaluation was undertaken among organizations associated with breast health promotion and education among African American populations. These organizations included the National Black Leadership on Cancer, BreasTest and More, and Bosom Buddies, Inc. Findings from these assessments confirmed those of the authors in the process evaluation. Second, an informal pretest of the rough cuts of the videos was conducted among the same audiences. Based on feedback from the pretest groups, further modifications were made. Specifically, the volume of the music soundtrack was decreased and the spoken components were sharpened and increased slightly in volume to improve clarity. Further, ambient sound was decreased and sound effects were added where appropriate. In terms of the mise-en-scène, lighting levels were increased throughout the video, especially in the negatively valenced version.

Although data from this pretest were very helpful and encouraging, the researchers felt that a pilot test among groups demographically matched to the target population should be carried out to ensure that members of the target population would be able to understand the message. Subsequently, a formal pilot test was conducted among 10 participants in each of the three target sites, with 30 participants in all. These participants were recruited by the on-site lay health workers who had received extensive training regarding subject recruitment and selection. A total of 25 individuals completed usable surveys for the pilot study. Each site showed only one of the videos randomly assigned. The pilot test of the workshop was implemented with 25 women, aged 45–65, with 10, 6, and 9 individuals viewing the videos in the three selected communities. Most participants in the pilot test were aware of the major symptoms of breast cancer (40%–60% for each symptom), based on pretest survey responses. Participants were asked to view all three videos (designated A, B, and C) and avoid the tendency to make comparisons between and among the videos as much as possible. All pretest participants were able to correctly identify the affective position of each of the videos. One of the most important findings was that the respondents expressed mild consternation that the dramatic stress of the story was unresolved (i.e., the results of the main character's mammogram). This suggests that engagement did occur and that readers were able to identify with the characters. From the theoretical perspective of the elaboration likelihood model, this finding suggests central processing of information, which is more desirable than peripheral issue processing involving little cognitive effort.

Instruments

Items for the pre- and postintervention surveys were taken from the 24-item **Breast Cancer Awareness Survey** developed by the National Black Leadership on Cancer Initiative. Items selected for the **BRIE questionnaire** included those about breast cancer screening history, family history of breast cancer, sociodemographic data, breast health knowledge, awareness of breast cancer warning signals, and attitudes toward breast cancer. Additional items that were gleaned from focus group data were added. Knowledge of breast cancer risks and prevention was measured by a nine-item true or false questionnaire. One point was assigned to each correct answer;

therefore, scores ranged from 0–9. Attitudes about breast cancer were assessed with an 11-item questionnaire that used a Likert-type scale (1 = strongly agree to 5 = strongly disagree), with scores ranging from 11–55. A visual analog scale (VAS) measured perceived risk for breast cancer. Participants were asked to mark their perceived risk for breast cancer on a line with markings ranging from 1 (high risk) to 8 (low risk). Cronbach's alpha for the attitudes scale for this sample was 0.55. All parts of the BRIE questionnaire were pretested with African American women living in the rural South. Mammogram screening was determined by participant self-report at the onset of the study and one year later.

Procedure

Three rural counties in Georgia were chosen. In each area, a community lay health worker (CLHW) was recruited and hired and intense recruitment efforts were initiated to reach volunteers. In terms of recruitment, each of the three CLHWs was given a goal of 150 participants in her respective site, for a total of 450 participants. The use of indigenous leadership has received strong support in the literature because this approach typically builds on the strengths of natural helpers in a community who, in addition, may share a common frame of reference (Eng, 1993; Eng & Young, 1992; Minkler & Pies, 2002; Tessaro, Eng, & Smith, 1994). Numerous marketing strategies, including posters, church newsletter announcements, participant referral, and women's social club announcements, were employed to recruit participants. Several difficulties were encountered; for example, the amount of time between the initial contact and consent and the intervention session was a strong indicator of actual participation. Sessions scheduled more than two weeks after contact had greater levels of no-shows, but sessions scheduled less than two weeks after contact had greater levels of time conflicts. Ultimately, recruitment was a slow process that took far longer than anticipated and necessitated two 12-month no-cost extensions in the study. When one site faltered in the recruitment process, the location was moved to another demographically similar community. One site was particularly successful in its recruitment efforts because the CLHW was an experienced community interventionist and the executive director of a large, minority senior citizens center.

Once contact was made, participants were scheduled to attend a 60-minute breast health intervention session. Prior to the intervention session, an informed consent form was mailed to each participant with instructions to read it carefully and bring it to the intervention session. At the beginning of the session, questions about the study were answered and signed consent was obtained. Anywhere from 5–30 women attended each intervention session, and each woman was paid \$30 for her participation.

In each county, each CLHW was trained to conduct the breast health intervention session using a specified protocol for implementation. During the intervention session, participants completed the demographic and breast screening history and knowledge, attitudes, and perceived risk questions; watched one of the three videos; and filled out the post-test knowledge and attitude questions and items about their perceptions of the video. They then were given breast self-examination information and breast screening referral information. Participants in group A saw the positive/upbeat version of the video, group B watched the negative/fear version, and group C viewed the neutral/cognitive version. Twelve months fol-

lowing the intervention, trained research assistants contacted participants via telephone. During this call, the participants answered the knowledge and attitude questions, reported on mammography screening during the past year, and answered questions about their recall of the video.

Data Analysis

Descriptive analyses including means, standard deviations, percentages, analysis of variance (ANOVA), and chi-square were used to describe the sample. Repeated measures ANOVA was used to determine the differences among groups over time on knowledge, attitudes, perceived risk for breast cancer, and mammogram screening patterns.

Results

Sample and Preintervention Profile

Pre- and post-test data were complete for 450 participants from the three rural counties. Twelve-month follow-up data were collected from 319 women, resulting in a response rate of 71%. As many as 10 attempts were made to contact participants at follow-up; however, most were unreachable because of incorrect or disconnected phone numbers.

The mean age for the sample was 52.55 years ($SD = 11.23$ years). Although the women were randomly assigned to watch one of the three videos, a significant difference was found among groups on age ($F[2, 443] = 16.03, p < 0.001$). Women in group C ($\bar{X} = 56.68$ years, $SD = 12.67$) were significantly older than women in the other two groups (group A: $\bar{X} = 50.36$ years, $SD = 10.30$; group B: $\bar{X} = 50.64$ years, $SD = 9.38$). A significant difference among groups on annual household income was noted ($\chi^2 = 30.88, df = 12, p = 0.002$) (see Table 1). More women in group C came from households with an annual income of less than \$10,000. A significant difference among groups on education was reported ($\chi^2 = 29.26, df = 10, p = 0.001$), and more women in groups A and B reached higher levels of education than women in group C. No significant difference among groups was noted on marital status or having a regular source of health care. The groups also differed on sources of healthcare insurance. Women in group C were less likely to have private insurance ($\chi^2 = 22.96, df = 2, p < 0.000$) and were more likely to have healthcare coverage from Medicaid ($\chi^2 = 13.74, df = 2, p = 0.001$) or Medicare ($\chi^2 = 12.38, df = 2, p = 0.002$) than women in the other two groups.

Breast health and history were assessed. The groups did not differ in regard to incidence of breast cancer diagnosis of a family member or close friend, a breast cancer diagnosis of the participant herself, or use of tobacco. For the most part, women in all groups had heard of a mammogram; however, women in groups A and B were more likely to have had a mammogram ($\chi^2 = 26.09, df = 8, p = 0.001$) (see Table 2). Each participant was asked to identify the reasons for not having a regular mammogram (see Table 3). Although the numbers were small, more women in group C indicated that they did not know where to get a mammogram ($\chi^2 = 6.13, df = 2, p = 0.047$). Fewer women in group C reported that they were afraid to get a mammogram than those in groups A and B ($\chi^2 = 7.12, df = 2, p = 0.028$).

Participants were asked to identify symptoms that they thought were warning signs of breast cancer (see Table 4). More women in groups A and B thought that pain, soreness, and burning in the breast were symptomatic of breast cancer than women in group C ($\chi^2 = 12.24, df = 2, p = 0.002$).

Table 1. Demographic Characteristics by Video Group

Characteristic	Group A (n = 149) ^a		Group B (n = 149) ^a		Group C (n = 148) ^a		c ²	p
	n	%	n	%	n	%		
Household income (\$)							30.88	0.002
< 10,000	47	32	36	25	58	40		
10,000–14,999	19	13	23	16	18	12		
15,000–24,999	26	18	28	19	14	10		
25,000–34,999	14	10	21	14	9	6		
35,000–49,999	13	9	16	11	10	7		
≥ 50,000	17	12	15	10	10	7		
Unknown	12	8	8	5	26	18		
Education							29.26	0.001
Less than high school	39	26	36	25	70	48		
High school graduate	50	34	48	33	29	20		
Some college or technical school	29	20	29	20	30	21		
College graduate	16	11	21	14	8	6		
Advanced college degree	12	8	11	8	6	4		
Other	3	2	2	1	2	2		
Marital status							NS	NS
Married	69	46	68	46	58	40		
Single	34	23	32	22	33	23		
Divorced, widowed, or separated	46	31	49	33	55	38		
Regular source of health care							NS	NS
Yes	119	82	124	86	119	82		
No	26	18	20	14	26	18		
Healthcare insurer^b								
Private insurance	77	53	75	51	41	28	22.96	0.000
Medicaid	26	18	31	21	52	35	13.74	0.001
Medicare	25	17	20	14	43	29	12.38	0.002
Cash, check, money order, or credit card	37	25	46	31	42	29		
Other	14	10	11	8	11	8		

^a In some cases, data were missing. Numbers and percentages are based on cases reported.

^b Some respondents reported multiple providers.

NS—not significant

Note. Because of rounding, not all percentages total 100.

Women in group C were less likely to identify discharge from the nipple ($c^2 = 10.52$, $df = 2$, $p = 0.005$), swelling or enlargement of the breast ($c^2 = 8.95$, $df = 2$, $p = 0.011$), changes in shape of the breast or nipple ($c^2 = 14.22$, $df = 2$, $p = 0.001$), and discoloration ($c^2 = 15.73$, $df = 2$, $p < 0.001$) as signs and symptoms of breast cancer than participants in groups A and B.

Knowledge

An examination of means showed no significant difference among groups on pre- and post-test scores ($F[2, 444] = 0.121$, $p = 0.886$). However, the test for within-subjects effects indicated that the individuals in the groups increased their knowledge from pre- to post-test ($F[2, 444] = 64.64$, $p < 0.001$). Further exploration of the data revealed that a significant difference existed between pre- and post-test scores for the total sample ($t = -8.155$, $df = 449$, $p < 0.001$) as shown in Table 5. Scores for the sample were slightly higher on post-test ($\bar{X} = 6.81$, $SD = 1.76$) than they were on pretest ($\bar{X} = 6.17$, $SD = 1.60$).

Knowledge of breast cancer was measured one year following the intervention. No significant differences were found among video groups on knowledge of breast cancer over the three measurement periods ($F[2, 323] = 0.955$, $p = 0.386$). Although the video group members as a group did not differ in their knowledge, the individual participants' knowledge of breast cancer differed significantly over time. Post-test scores

were higher than pretest scores; however, knowledge scores at the one-year measurement dropped significantly for all groups.

Perceived Risk for Breast Cancer

VAS scores for perceived risk for breast cancer from pretest ($\bar{X} = 5.08$, $SD = 1.92$) to post-test ($\bar{X} = 5.07$, $SD = 1.97$) were essentially identical. No significant difference was evident between pre- and post-test perceived risk for breast cancer in the whole sample ($t = 0.20$, $df = 394$, $p = 0.840$), yet a significant difference existed in scores among groups ($F[2, 389] = 7.631$, $p = 0.007$). Women in group A rated their perceived risk lower at pretest and post-test than did women in the other groups.

Attitudes

Differences in attitude scores were not significant between pretest and post-test for the total sample ($t = -1.247$, $df = 449$, $p = 0.213$) nor between groups ($F[2, 444] = 2.342$, $p = 0.097$). Comparison of attitude scores by groups across all three measurement periods demonstrated that no significant difference was present among groups ($F[2, 318] = 1.103$, $p = 0.333$). As described in Table 6, the mean attitude scores decreased for all groups at the final measurement period, indicating that participants reported more negative attitudes about breast cancer 12 months postintervention. This effect was significant ($F[2, 318] = 540.778$, $p < 0.001$).

Table 2. Incidence of Mammograms Prior to and 12 Months Following the Intervention

		Video Group A				Video Group B				Video Group C			
		Preintervention (n = 150)		Follow-Up (n = 109)		Preintervention (n = 149)		Follow-Up (n = 109)		Preintervention (n = 148)		Follow-Up (n = 101)	
History of Mammogram	Response	n	%	n	%	n	%	n	%	n	%	n	%
Had mammogram in the past 12 months	Yes	—	—	—	—	4	3	2	67	—	—	—	—
	No	—	—	—	—	—	—	1	33	—	—	—	—
Had mammogram 1–2 years ago	Yes	88	59	49	78	69	46	41	79	54	37	30	75
	No	—	—	14	22	—	—	10	19	—	—	10	25
Had mammogram 2–3 years ago	Yes	9	6	4	57	9	6	4	57	17	12	4	36
	No	—	—	3	43	—	—	3	43	—	—	7	64
Had mammogram more than 3 years ago	Yes	14	9	7	64	20	13	8	62	16	11	4	33
	No	—	—	4	36	—	—	5	39	—	—	7	58
Never had mammogram	Yes	39	26	12	43	47	32	15	43	61	41	13	33
	No	—	—	16	57	—	—	20	57	—	—	26	67
Had a mammogram since the video intervention (12 months)	Yes	—	—	72	66	—	—	70	64	—	—	51	50
	No	—	—	37	34	—	—	39	36	—	—	50	49

Note. Because of rounding, not all percentages total 100.

Mammogram Screening

At pretest, women in group C were less likely to have had a mammogram than women in groups A and B ($\chi^2 = 26.09$, $df = 8$, $p = 0.001$). To compare groups at pretest and 12 months, the responses to the pretest mammography history question were collapsed to two groups (i.e., compliant and noncompliant) according to ACS's breast cancer screening recommendations. As a result, the number of women getting mammograms increased among all groups; however, women in group C were less likely to get a mammogram than women in groups A and B ($F[2, 316] = 4.84$, $p = 0.008$). Of the total number of women contacted at 12 months ($n = 319$), the overall percentage of women receiving a mammogram since the intervention ($n = 193$; 61%) was greater than the percentage of the total sample ($N = 450$) who had a mammogram in the two years ($n = 215$; 48%) prior to the intervention. Women in group C were less likely to get a mammogram before and after the intervention. Definite gains in mammography screening are evident in the number of women who never had a mammogram or who had a mammogram more than two years prior to the intervention. The increase in percentage gains ranged from 21% of the women in group C who never had a mammogram to 50% of the women in group A who had a mammogram more than three years prior to the intervention.

Ad Hoc Analysis

In light of recent reports suggesting that rural women are less likely to have mammograms than women living in metropolitan areas and that education, household income, and health insurance status all were positively associated with getting a mammogram (Coughlin et al., 2002; Zhang et al., 2001), additional analyses were done. Using pretest demographic data, the sample was divided into two groups (compliant or noncompliant with ACS breast cancer screening recommendations). Women who had undergone a mammogram in the past two years were considered to be adherent to the ACS guidelines, whereas those who had not were assigned to the noncompliant group. Analyses of demographic variables indicated that the groups differed on education ($\chi^2 = 26.45$, $df = 5$, $p < 0.001$), income ($\chi^2 = 33.62$, $df = 6$, $p < 0.001$), marital status ($\chi^2 = 8.77$, $df = 2$, $p = 0.012$), and healthcare coverage ($\chi^2 = 12.75$, $df = 1$, $p < 0.001$). Women who were in compliance with ACS breast cancer screening recommendations had achieved higher levels of education, lived in households with more income, and were more likely to be married and have regular health care. Differences between compliant and noncompliant groups on knowledge, attitudes, and screening at the 12-month follow-up were examined. Income was the only demographic factor that was associated with having a mammogram. Using income as a covariate, differences between compliant and noncompliant groups on knowledge and

Table 3. Reasons for Not Having a Regular Mammogram by Video Group

Reason Given for Not Having a Regular Mammogram	Group A		Group B		Group C	
	n	%	n	%	n	%
I cannot afford it.	25	42	16	24	29	33
I am afraid.	24	41	21	31	18	21
I have never been told to get a mammogram.	14	24	19	28	20	23
I do not believe that I am at risk for breast cancer.	11	19	12	18	11	13
I do not know how or where to get one.	4	7	5	8	16	18
I do not believe that it increases my chances of survival.	2	3	3	5	7	8

Table 4. Identification of Signs and Symptoms of Breast Cancer by Video Group

Sign or Symptom	Group A		Group B		Group C	
	n	%	n	%	n	%
Lumps in the breast	141	95	138	95	131	90
Discharge from the nipple	99	66	103	71	78	53
Pain, soreness, or burning in the breast	93	62	107	74	79	54
Changes in the shape of breast or nipple	89	60	101	70	70	48
Swelling or enlargement of the breast	76	51	92	63	68	47
Discoloration	63	42	78	54	45	31
Shortness of breath	24	16	36	25	30	21
Nausea	19	13	19	13	18	12

attitudes at pre-, post- and 12 months postintervention were analyzed. Women in compliance with ACS screening guidelines were more knowledgeable ($F[1, 319] = 5.002, p = 0.026$) and had more positive attitudes ($F[1, 314] = 8.152, p = 0.005$) about breast cancer than women who did not follow the guidelines. As may be expected, these women also were more likely to have had a mammogram within the 12-month follow-up period ($t = -6.49, df = 320, p < 0.001$).

Discussion

The affective tone of the videos did not have an effect on knowledge, attitudes, and behaviors of participants in this study. Nonetheless, more women who never had a mammogram did receive a mammogram within the 12-month follow-up period. The breast cancer screening video and social interaction that occurred during the intervention may have influenced participants to have a mammogram. However, this increase in mammography screening cannot necessarily be attributed to this intervention because a strong secular trend was found toward increased mammography during the study period, which arose, in part, from a variety of environmental breast health messages from several sources. Nevertheless, the entire sample was exposed to potentially confounding messages, but the extent and depth of such exposure were not determined. Any impact that the intervention had on the participants' behavior may be attributed to the content, rather than the affect, of the video. The content rather than the tone of the video may have stimulated these women to have a mammogram. Conclusions about the cause of these behavioral changes should be made with caution because 86% ($n = 279$) of the participants indicated that they remembered hearing or seeing information about breast cancer screening during their 12-month participation in this study. Of these, 92% reported receiving breast health messages or information

on television, and 81% reported receiving breast health messages or information in a doctor's office or from a regular healthcare provider. This finding challenges the persuasive impact of the intervention messages and calls into question the effect that the study intervention had in the context of other confounding influences. Nevertheless, these data show higher levels of recommendation acceptance among those groups who viewed the affectively positive and negative videos compared with those participants who viewed the neutral message. Although the likelihood of confounding messages must be acknowledged, the researchers assumed that such spurious message exposure was spread equally among all study participants.

The focus group data suggested that an affective tone in the video would impact knowledge, attitudes, and behaviors, but this was not found in this study. The variance in the affective tones of the videos may have been insufficient for women to respond differently. For example, women in group B watched the negative/fear version of the video, yet they remembered the film as being "happy." Perhaps the participants reported the video in a positive fashion to please the researcher (Hawthorne effect); however, these reports did not influence the outcome variables.

Another interesting observation in the results of this study is related to the difference in mean scores for knowledge and attitudes before, after, and 12 months after the intervention. At the 12-month follow-up, the mean scores for knowledge and attitudes for all video groups were much lower. These results call into question the effectiveness of the telephone interview or the timing of the telephone calls in collecting these data. These women most likely did not become less knowledgeable or their attitudes less positive during the 12-month interval. The participants may have been unable to give their full attention to the interviewer's questions because they were distracted by stimuli in their home environment. In addition, the social interactions that participants may have had with family and friends over the 12-month period may have contributed to this finding. Discussions about the increased mortality from breast cancer among African American women may have altered their responses as would the incidence of a friend or family member being diagnosed with breast cancer.

The failure of randomization to produce comparable video groups is noteworthy. Women from all three sites were randomly assigned to groups at that location, yet the women in group C were significantly different from participants in groups A and B with regard to age, income, education, and types of insurance. In this case, however, these differences did not affect the outcomes of the study.

Table 5. Knowledge of Breast Cancer^a

Group	Pretest		Post-Test*		12 Months	
	\bar{X}	SD	\bar{X}	SD	\bar{X}	SD
A	6.266	1.66	6.700	1.70	4.504	1.59
B	6.214	1.61	6.832	1.86	4.800	1.35
C	6.027	1.52	6.851	1.72	4.640	2.00

* $p < 0.001$

^a Range of scores for knowledge of breast cancer was 0–9.

Table 6. Attitudes Toward Breast Cancer^a

Group	Pretest		Post-Test*		12 Months	
	\bar{X}	SD	\bar{X}	SD	\bar{X}	SD
A	42.273	7.27	43.793	6.71	30.981	4.81
B	43.053	6.97	42.402	7.44	30.836	4.86
C	41.297	7.44	42.567	6.96	31.176	5.71

* Pretest/post-test: $F(2, 444) = 64.64, p < 0.001$

^a Range of attitudes scores was 11–55.

Zhang et al. (2001) reported that education, household income, and health insurance status all were positively associated with having a mammogram. They suggested that improving the socioeconomic status and health insurance coverage of rural women may reduce the disparity in mammogram use. In this study, only household income was associated with having a mammogram. Using income as a covariate, women who were in compliance with ACS breast cancer screening guidelines were more knowledgeable and had more positive attitudes over the three measurement periods. These results suggest that research is needed to explore why women with lower household incomes tend to be more nonadherent to ACS guidelines. Interventions to address this population then can be tested.

Implications for Nursing

The challenge for nursing and health communication research is to design interventions that foster positive attitudes and increased knowledge about breast cancer screening. These interventions need to be developed in the context of cultural norms and educational levels of the target population. In this study, women who did not follow the ACS guidelines were more likely to have less than a high school education, live in households with an annual income of less than \$15,000, be single, and lack regular health care. These findings and recommendations are similar to those made by Zhang et al. (2001).

Breast cancer screening messages must reach women who do not adhere to ACS guidelines. These women are at greater risk for a diagnosis of breast cancer at more advanced disease stages when prognosis is much poorer. The challenge for healthcare providers is to identify subsets of these women and develop intervention strategies that encourage them to get mammograms in accordance with ACS guidelines.

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References

- Barker, J.C. (1992). Cultural diversity: Changing the context of medical practice. *Western Journal of Medicine*, 157, 248–254.
- Blackman, D.K., Bennet, E.M., & Miller, D.S. (1999). Trends in self-reported use of mammograms (1989–1997) and Papanicolaou tests (1991–1997)—Behavioral Risk Factor Surveillance System. *Morbidity and Mortality Weekly Report*, 48(6), 1–22.
- Bolen, J.C., Rhodes, L., Powell-Griner, E.E., Bland, S.D., & Holtzman, D. (2000). State-specific prevalence of selected health behaviors, by race and ethnicity—Behavioral Risk Factor Surveillance System, 1997. *Morbidity and Mortality Weekly Report*, 49(2), 1–60.
- Breen, N., Wagener, D.K., Brown, M.L., Davis, W.W., & Ballard-Barbash, R. (2001). 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*, 93, 1704–1713.
- Burns, N., & Grove, S.K. (2001). *The practice of nursing research: Conduct, critique, and utilization* (4th ed.). Philadelphia: Saunders.
- Coughlin, S.S., Thompson, T.T., Hall, H.I., Logan, P., & Uhler, R.J. (2002). Breast and cervical carcinoma screening practices among women in rural and nonrural areas of the United States, 1998–1999. *Cancer*, 94, 2801–2812.
- Eng, E. (1993). The Save Our Sisters Project: A social network strategy for reaching rural black women. *Cancer*, 72, 1071–1077.
- Eng, E., & Young, R. (1992). Lay health advisors as community change agents. *Journal of Family and Community Health*, 15(1), 24–40.
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.
- Ghafoor, A., Jemal, A., Cokkinides, V., Cardinez, C., Murray, T., Samuels, A., et al. (2002). Cancer statistics in African Americans. *CA: A Cancer Journal for Clinicians*, 52, 326–341.
- Hegarty, V., Burchett, B.M., Gold, D.T., & Cohen, H.J. (2000). Racial differences in use of cancer prevention services among older Americans. *Journal of the American Geriatric Society*, 48, 735–740.
- Jacobellis, J., & Cutter, G. (2002). Mammography screening and differences in stage of disease by race/ethnicity. *American Journal of Public Health*, 92, 1144–1150.
- Jemal, A., Thomas, A., Murray, T., & Thun, M. (2002). Cancer statistics, 2002. *CA: A Cancer Journal for Clinicians*, 52, 23–47.
- Kiefe, C.I., McKay, S.V., Halevy, A., & Brody, B.A. (1994). Is cost a barrier to screening mammography for low-income women receiving Medicare benefits? A randomized trial. *Archives of Internal Medicine*, 154, 1217–1224.
- Kreps, G.L. (1994). *Effective communication in multicultural health care settings*. Thousand Oaks, CA: Sage.
- Legler, J.M., Meissner, H.I., Coyne, C., Breen, N., Chollette, V., & Rimer, B.K. (2002). The effectiveness of interventions to promote mammography among women with historically lower rates of screening. *Cancer Epidemiology, Biomarkers and Prevention*, 11, 59–71.
- Minkler, M., & Pies, C. (2002). Ethical issues in community organization and community participation. In M. Minkler (Ed.), *Community organizing and community building for health* (pp. 120–138). New Brunswick, NJ: Rutgers University Press.
- Petty, R.E., & Cacioppo, J.T. (1986). *Communication and persuasion: Central and peripheral routes to attitude change*. New York: Springer.
- Rimer, B.K. (1994). Mammography use in the U.S.: Trends and the impact of interventions. *Annals of Behavioral Medicine*, 16, 317–326.
- Rimer, B.K., Resch, N., King, E., Ross, E., Lerman, C., Boyce, A., et al. (1992). Multistrategy health education program to increase mammography use among women ages 65 and older. *Public Health Reports*, 107, 369–380.
- Rogers, R.W. (1983). Cognitive and physiological processes in fear appeals and attitude change: A revised theory of protection motivation. In J. Cacioppo & R. Petty (Eds.), *Social psychophysiology* (pp. 153–176). New York: Guilford.
- Skinner, C.S., Arfken, C.L., & Waterman, B. (2000). Outcomes of the learn, share, and live breast cancer education program for older urban women. *American Journal of Public Health*, 90, 1229–1234.
- Tessaro, I., Eng, E., & Smith, J. (1994). Breast cancer screening in older African-American women: Qualitative research findings. *American Journal of Health Promotion*, 8, 286–293.
- Trochim, W.M. (2001). *The research methods knowledge base* (2nd ed.). Cincinnati, OH: Atomic Dog.
- Witte, K. (1995). Fishing for success: Using the Persuasive Health Message Framework to generate effective campaign messages. In E. Maibach & R.L. Parrott (Eds.), *Designing health messages: Approaches from communication theory and public health practice* (pp. 145–166). Thousand Oaks, CA: Sage.
- Zhang, P., Tao, G., & Irwin, K.L. (2001). Utilization of preventive medical services in the United States: A comparison between rural and urban populations. *American Journal of Preventive Medicine*, 21, 182–188.