

## Increasing mammography screening among women over age 50 with a videotape intervention

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### Abstract

**Background.** A randomized trial was conducted to test the effectiveness of a videotape for increasing mammography screening among a multiethnic sample of older women.

**Methods.** A multiethnic sample of Caucasian, African-American, and Hispanic women between the ages of 50 and 70 was recruited from Resident Lists compiled by the State of Massachusetts. After completing a baseline questionnaire, women were randomized to receive either a videotape or pamphlet about mammography and recontacted at 2 and 12 months after baseline to assess attitudes, beliefs, and mammography screening. A total of 581 women completed questionnaires at all three time points.

**Results.** At baseline, approximately 75% of women reported having a mammogram in the past year and 90% reported having one in the past 2 years. Rates did not differ between groups. At the 12-month follow-up, mammography rates, adjusted for baseline screening, were 80.4% in the video and 74.8% in the pamphlet group. Logistic regression analysis of mammography at 12 months (within past year vs. >1 year ago) controlling for baseline mammogram produced an odds ratio of 1.48 for the video group that was not significantly different from unity (95% CI = 0.95–2.28).

**Conclusions.** The videotape had a small effect on increasing mammography screening. Although the effect was smaller than more intensive interventions, the video is a convenient, low cost, and easily implemented method to increase mammography screening.

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**Keywords:** Mammography; Videotape; Intervention; African-American; Hispanic

### Introduction

Breast cancer is the most common cancer among women in the United States, with an estimated 215,990 new cases of invasive breast cancer expected to occur among women in the United States in 2004 [1]. Women have an estimated 13% lifetime risk of being diagnosed with invasive breast cancer [2]. Research has shown that survival from breast cancer can be substantially increased by early detection and treatment through regular mammography screening [3–6]. A review of seven major randomized clinical trials found that, for women

aged 50 years and older, mammography reduces breast cancer mortality by 25–30% [3–6]. The American Cancer Society currently recommends annual screening starting at age 40 and the National Cancer Institute recommends screening every 1–2 years in women aged 40 and above. While the proportion of women getting mammograms annually has increased over the years, many women still do not obtain regular mammograms. The 2002 Behavioral Risk Factor Surveillance System (BRFSS) reports that 66.0% of women >40 years of age nationwide report having had a mammogram in the past year, while 83% report having one in the past 2 years [7].

Because of the strong link between screening and mortality, strategies that increase mammography rates are an important means of secondary prevention for breast cancer. Rimer [8] classifies interventions for breast screening as individual-directed, health system-directed, access-enhanc-

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ing, or social network approaches. Multi-strategy combinations are also common. While some evidence can be found to support the effectiveness of each of these types, none of these strategies is clearly superior to the others. A recent meta-analysis of patient-based mammography screening interventions found that behavioral (e.g., telephone reminders, letters of invitation), theory-based cognitive interventions (e.g., focused educational materials), and sociological interventions (e.g., peer or lay support) all increased screening compared to usual care [9]. Although multiple behavioral interventions and interactive cognitive interventions were the most effective, these interventions can be costly and time intensive.

One comparatively new medium for conveying information about mammography is with videotapes. Videotapes can offer an advantage over written material in their ability to graphically present information and explain difficult concepts, which may help impart knowledge to those who are less literate [10]. They can also portray real-life situations and are particularly effective at reaching people on an affective or emotional level [11]. Previous studies have shown that videotapes enhance patients' short-term knowledge [12–15]; reduce anxiety, fear, and pain associated with a medical condition [16]; and are preferred over written material [17]. Video presentations have consistently been rated as better vehicles for the dissemination of information than posters, pamphlets, and other written materials [10,18–20]. These characteristics suggest that videotapes have considerable potential to convince women of the benefits of mammography screening.

The purpose of the present study was to develop and test the effectiveness of a videotape for increasing mammography screening. The theoretical basis for our approach was derived from Ajzen's [21] Theory of Planned Behavior (TPB) and the Health Belief Model [22]. According to the TPB, the two primary proximal determinants of any behavior are intentions and perceptions of control over the behavior. Intentions, in turn, are influenced by perceived control, attitudes, and subjective norms. The theory also holds that beliefs play an important role in all three of these intermediate factors. The TPB has been successfully applied to breast and testicular examination [23–26].

The causal chain in the TPB implies that changing domain-specific beliefs about the behavior is one of the key ways to change behavior. Changing these beliefs will lead to more favorable attitudes, more influential subjective norms, and greater perceived control that will increase the likelihood of adopting the desired behavior. Because videotape portrayals are more engaging and vivid than written materials, they are more likely to modify women's beliefs. The Health Belief Model suggests that both perceived barriers and self-efficacy are important factors related to behavior. Several studies have shown that barriers are important predictors of screening behavior [27–29]. Thus, the video was designed to also focus on reducing perceived barriers to screening and increasing perceived self-efficacy

for obtaining a mammogram. As a result, we hypothesized that women viewing the videotape would have higher rates of annual mammography screening than women who are given a pamphlet.

## Methods

### *Study design*

A prospective randomized trial was conducted to test the effectiveness of the videotape for improving rates of mammography screening compared to the usual practice of providing written materials. The primary outcome measure is the 12-month mammography screening rate. After completing a baseline questionnaire, women were randomized to either a videotape intervention or to a comparison group that received a standard pamphlet developed by the National Cancer Institute. Women were recontacted at 2 and 12 months after baseline to assess attitudes, beliefs, and intentions and assess mammography screening. The target sample was women aged 50–70. Our goal was to recruit relatively equal numbers of Caucasian, African-American, and Hispanic women.

### *Sampling design*

The project's sampling design focused on three cities in Massachusetts with the largest proportions of minority residents—Boston, Lawrence, and Springfield. Within each city, three areas with the largest concentrations of Hispanics and African-Americans were identified. The primary sampling units were ZIP codes in Lawrence and Springfield and wards in Boston. Women between the ages of 50 and 70 years in these areas were identified using Massachusetts Resident Lists. The Resident Lists are public records of persons of voting age mandated by state law. These lists have previously been found to provide excellent coverage of cancer registry cases [30].

The Resident Lists are electronic files containing name, address, gender, and year of birth for all noninstitutionalized adults in the city. All women born between 1929 and 1949 in the selected ZIP codes or wards were identified and sorted in a random order in each area. Using census estimates of minority rates, individuals were then drawn from each area with sampling fractions designed to produce approximately equal numbers of Hispanic, African-American, and Caucasian subjects. The list of sampled subjects was sent to a commercial telephone directory service to obtain the telephone number for each address. Additional Internet telephone directory searching was done by study personnel. A telephone number was obtained for 52% of the addresses.

The study was designed to be able to detect a 10% point difference in mammography rates (70% vs. 60%) between groups. Using Cohen's [31] formulae for differences in proportions, the targeted sample size was a total of 562 women (power = 0.80, alpha = 0.05, one-sided test).

### *Recruitment and contact procedures*

Each sampled woman was sent a package consisting of an introductory letter explaining the purpose of the study, an informed consent document, a payment form, and a questionnaire. The primary purpose of the baseline survey was to assess mammography screening, attitudes, intentions, and beliefs before intervention. All materials contained back-to-back English and Spanish versions. Spanish translations were provided by a professional translation service, back-translated from Spanish to English for accuracy and flow, and reviewed by survey personnel acquainted with the idioms common to the geographical regions of the mailing. Subjects who failed to return the questionnaire within 2 weeks were sent a second package via Federal Express. Women who failed to respond to either mailing were then contacted by telephone, if a telephone number was available. Those who returned partially completed questionnaires were also contacted by telephone to complete key survey items. Telephone interviews were conducted in either English or Spanish, as desired by the respondent. Respondents were sent a US\$20 check for completing the baseline survey. The study protocol was reviewed and approved by the Institutional Review Board at the New England Research Institutes.

Women who completed the baseline survey were randomized to either the pamphlet or video group and sent a copy of the video or a pamphlet in the mail. Two months after the mailing of the materials, women were sent a 2-month follow-up questionnaire. The primary purpose of the 2-month follow-up was to assess changes in the constructs related to the Theory of Planned Behavior and Health Belief Model and reactions to the materials. A 2-month follow-up was selected because we felt it was long enough to provide women the opportunity to view the materials, and short enough to assess their impact on attitudes and intentions. A 12-month follow-up questionnaire was sent to all those who completed a baseline survey. The primary purpose of the 12-month follow-up was to assess mammography screening rates. We also assessed attitudes, beliefs, and intentions to gauge the long-term impact of the materials. Telephone follow-ups were made to those who did not return mailed surveys. Respondents were sent a check for US\$15 for completing each follow-up and an additional US\$20 for completion of all three surveys.

### *Measures*

The questionnaire was designed to assess mammography screening, relevant theoretical constructs, and sociodemographics. A mammogram was described as “an X-ray taken only of the breast by a machine that presses the breast against a plate.” Respondents were asked if they had ever heard of a mammogram and if so whether they had ever had one. Timing was ascertained by the following question: “About how long has it been since you had a mammogram? (1) within the past year, (2) 1 to 2 years ago, or (3) over 2

years ago.” This is the same wording as used by the NHIS [32].

### *Beliefs*

To ascertain beliefs about the benefits of obtaining a mammogram and perceived self-efficacy, women were asked to rate on a 10-point scale how strongly they agreed with the following statements: “A mammogram can help me find out if I have breast cancer early, even before I can feel a lump” and “How much control do you feel you have over getting a mammogram in the next year?” Because these responses were highly skewed toward agreement, they were categorized as 10 (“strongly agree”) vs. <10.

### *Attitudes*

To assess attitudes toward mammograms, women were asked a series of five 10-point semantic differential scales about how they evaluated mammograms with endpoints labeled bad–good, harmful–beneficial, frightening–assuring, foolish–wise, useless–worthwhile. These scales were also used by McCaul et al. [26] in their study of breast self-examination. Responses were highly skewed toward the positive and were coded as 10 vs. <10.

### *Intentions*

Women were asked to rate on a 10-point scale the strength of their intention to get a mammogram within the next 12 months and every year from now on, with 1 being “definitely do not intend to” and 10 being “definitely do intend to”. These responses were highly skewed toward the positive and were coded as 10 vs. <10.

### *Barriers*

Respondents were asked to rate on a 10-point scale how strongly they agreed with a list of 12 identified barriers to getting a mammogram. Barriers included such items as being embarrassing, too painful, concern about too much X-ray exposure, too hard to find the time, and too difficult to pay for. An item was considered a barrier if the woman rated it as 7 or higher on the scale. We also computed a total barrier score based on the sum of the number of barriers the woman rated as 7 or higher.

### *Sociodemographic factors*

Sociodemographic factors included age, education, race, income, and medical insurance.

### *Intervention materials*

#### *Videotape*

The videotape, which was developed specifically for this project, was designed to demystify the mammography procedure and emphasize the benefits of screening through stories told by real women (i.e., not actresses), including those for whom breast cancer was detected early by mammography. The videotape also addressed the fears, risks, and

barriers associated with mammography. A series of steps were followed in the development of the videotape. First, content areas and format for the videotape were developed through several focus groups of women from the target audience. Second, a prototype of the video reflecting the quality and tone of the full program was developed and evaluated by additional focus groups and a random sample of women. Finally, input was obtained at each step from an ethnically diverse Advisory Committee of community health education experts and physicians specializing in women's (breast) health.

The focus groups were designed to identify culturally specific and more universal constructs regarding barriers and motivating beliefs; identify specific stories, scenarios, and messages that would function to reframe inhibitory beliefs and increase perceived control of the mammogram experience; identify transformative stories where women overcame barriers that prevented them from seeking annual mammograms; and to identify articulate women whose stories could be videotaped. African-American, Caucasian, and Hispanic women aged 50–70 were recruited from the community to participate in the focus groups. An attempt was made to include women who had never received a mammogram.

The final videotape, entitled “Mammograms for Life” and produced in both English and Spanish, is aimed broadly at women over age 50 with a particular focus on minority women over age 60. The video is 23 min long and contains documentary footage of interviews with women of diverse ethnic, geographic, and socioeconomic backgrounds, a leading medical expert in the field of breast oncology, and shows a woman getting a mammogram.

#### Pamphlet

Women randomized to this group received the pamphlet “Mammograms: Not Just Once, But For A Lifetime” distributed by the National Cancer Institute in both English and Spanish. This 2-page, easy-to-read pamphlet defines mammography, explains why it is important, describes who needs a mammogram, and explains the procedure. Women received an English or Spanish version of the materials based on the language in which they answered the baseline questionnaire.

#### Statistical analysis

Descriptive statistics were used to summarize the characteristics of the women participating in the study. Differences between the videotape and pamphlet groups were tested by independent group *t* tests or analysis of variance. Adjusted intervention effects were estimated by logistic regression with prior mammography use and intervention status as the explanatory variables. Logistic regression was also used to explore sample attrition. The probability of completing both follow-up surveys was modeled as a function of age, race, ethnicity, city, telephone availability, and baseline mammography status.

## Results

### Sample characteristics

A total of 1,800 introductory letters were sent to women in the three cities. Of these, 231 women had moved to unknown addresses, 71 were ineligible (due to death, birth date error, language barrier, severe illness), 620 did not respond to repeated contacts, and 169 refused to participate. Baseline interviews were completed with 709 respondents for a response rate of 47.3%. Participation rates were similar across cities: 46.2% in Boston, 47.0% in Lawrence, and 49.0% in Springfield. All but 12% of the interviews were completed by mail; 18% of the respondents used the Spanish version of the questionnaire. Thirty women with a prior history of breast cancer and 10 women whose race was unknown were excluded, bringing the number of women to 669. For longitudinal analyses, we included only women who completed questionnaires at all three time points which resulted in an analytic sample of 581 women (86% response rate). Table 1 shows the original sample and the follow-up sample for each study group. The attrition analyses indicated that women who had baseline mammograms were more likely to complete the follow-up surveys than those who had not had a mammogram (OR = 1.67, *P* = 0.035). Follow-up participation was not affected by age, race, ethnicity, city, or phone availability.

Table 2 presents the baseline characteristics of the sample. The mean age of the sample was 58.8 years with more women in the 50–59 age group (58%) than in the 60–70 group. While 45% of the sample was Caucasian, a large percentage was African-American (32%) or Hispanic (23%).

### Beliefs, attitudes, and intentions

Table 3 shows the beliefs, attitudes, and intentions by group for baseline and each follow-up. At baseline, there were no significant differences between groups in beliefs, feelings, or intentions. In general, women had positive feelings toward mammograms and 75% reported intentions to get them every year. The percentages were somewhat lower in terms of believing that mammograms can help detect breast cancer (65% and 68%). At the 2- and 12-month follow-ups, the pamphlet group showed a nonsignificant

Table 1  
Study sample recruitment and retention

	Original sample	Baseline	FU02	FU12	All three interviews
Video	900	331	313	294	285
Pamphlet	900	338	303	303	296
Total	1,800	669 <sup>a</sup>	616	597	581

<sup>a</sup> An additional 30 women completed baseline but were determined ineligible because of previous breast cancer diagnosis and an additional 10 women were determined ineligible because of unknown race.

Table 2  
Baseline sample characteristics ( $N = 581$ )

Characteristic	Percentage ( $N$ )
Age (mean)	58.8
50–59	58.3% (339)
60–70	41.7% (242)
Primary language English	83.6% (486)
Education	
<H.S.	30.1% (175)
H.S.	32.0% (186)
Some college	20.3% (118)
College or more	16.6% (96)
Race	
Caucasian	45.3% (263)
African American	31.7% (184)
Hispanic	23.1% (134)
Difficulty paying for basics	
Very difficult	15.6% (91)
Somewhat difficult	44.1% (256)
Not difficult at all	40.3% (243)
Percentage with medical insurance	90.6% (526)

increase in the belief that mammograms can help detect breast cancer, but there was no change in the video group. The video group showed an increase over time in their belief that they had control over getting a mammogram, while the pamphlet group showed a slight decrease in this belief. The groups were significantly different in this belief at the 12-month follow-up ( $P < 0.05$ ). We also conducted logistic regressions of FU02 and FU12 beliefs, controlling for baseline beliefs. These results showed that the video group had greater odds of feeling control over getting a mammogram at FU02 (OR = 1.228;  $P = 0.05$ ) and at FU12 (OR = 1.799;  $P = 0.01$ ). The video group had lower odds of

believing that a mammogram can help detect breast cancer before feeling a lump (OR = 0.57;  $P < 0.01$ ).

Both groups tended to show an increase in positive attitudes toward mammograms over time. The video group became more likely to feel that mammograms are beneficial and assuring. Both groups increased their intentions to get mammogram, but these differences were not significant.

### Barriers

Table 4 presents the percentage of women in each group by time point who strongly agreed that a particular item was a barrier to getting a mammogram. The most common barrier by far was that mammograms are uncomfortable or painful (44%). This was followed by paying more attention to family needs than one's own health (30%) and concern about too much X-ray exposure (about 23%). The least frequent barriers were not knowing where to go to get a mammogram (6.5%), husband or partner does not want woman's breasts examined (6.5%), a mammogram is only necessary if sick or have symptoms (8%), and it is difficult to get to appointments (9%). There were no significant differences between groups at baseline or 12 months for any of the barriers. The only significant difference was seen for paying more attention to family at the 2-month follow-up. The pamphlet group was much more likely to report this as a barrier. Both groups were slightly more likely to report barriers at the 2-month follow-up, but the total number of barriers generally decreased at the 12-month follow-up. The biggest decreases in barriers were seen for uncomfortable or painful and concerns about X-ray exposure.

Table 3  
Beliefs, attitudes, and intentions by time and group ( $N = 581$ )

	Baseline			FU02			FU12		
	Pamphlet	Video	$P$	Pamphlet	Video	$P$	Pamphlet	Video	$P$
Beliefs									
A mammogram can help detect breast cancer before feeling a lump <sup>a</sup>	64.5%	68.4%	0.32	74.0%	67.0%	0.06	73.9%	69.7%	0.26
Degree of control over getting mammogram in next year <sup>b</sup>	78.7	76.1	0.46	75.7	80.4	0.17	77.3	83.8	0.05
Feelings about having a mammogram <sup>c</sup>									
Good	79.9	80.0	0.97	82.0	79.8	0.50	82.3	81.7	0.34
Beneficial	78.6	78.2	0.91	79.2	80.9	0.62	82.9	86.5	0.24
Assuring	70.3	68.6	0.65	67.7	71.9	0.27	70.8	74.7	0.30
Wise	80.6	81.7	0.70	80.3	84.4	0.19	82.0	86.3	0.16
Worthwhile	79.6	83.1	0.27	81.1	84.6	0.27	85.6	85.5	0.99
Intentions to get a mammogram <sup>d</sup>									
Next 12 months	78.6	78.2	0.89	78.0	79.6	0.64	80.7	84.5	0.22
Every year	75.6	75.1	0.88	78.4	78.2	0.97	80.0	83.1	0.33
Percentage who answered "10" on both intention items	72.8	72.3	0.89	73.6	74.7	0.76	77.0	81.7	0.16

<sup>a</sup> Percent who answered "10" "strongly agree".

<sup>b</sup> Percent who answered "10" "complete control".

<sup>c</sup> Percent who answered "10" on a 10-point scale.

<sup>d</sup> Percent who answered "10" "definitely".

Table 4  
Barriers: Percent who strongly agree (7–10); N = 581

Barrier	Baseline		FU02		FU12	
	Pamphlet	Video	Pamphlet	Video	Pamphlet	Video
I think a mammogram can be uncomfortable or painful.	43.9	44.4	44.2	40.5	40.7	39.5
I pay more attention to my family and their needs than I do to my own health.	29.8	29.6	38.3	29.8*	29.6	28.9
I am concerned that too much X-ray exposure might cause health problems.	25.6	20.8	27.2	21.2	20.8	16.9
I think a mammogram is embarrassing.	17.0	20.8	28.2	25.1	18.4	20.1
It is difficult for me to pay for a mammogram.	15.2	17.4	19.8	19.9	13.6	14.5
I have trouble remembering to schedule an appointment for a mammogram.	13.2	12.4	14.2	14.1	9.5	10.6
My doctor did not tell me to have a mammogram.	11.0	9.8	13.0	12.0	8.8	11.4
It is difficult for me to find the time to get a mammogram.	10.2	12.7	11.3	14.9	10.6	13.1
If I had an appt. for a mammogram, it would be difficult for me to get there.	9.1	9.2	9.8	10.9	9.8	9.5
A mammogram is only necessary if I am sick or have symptoms of the breast.	8.5	8.2	10.6	11.0	10.6	10.4
My husband or partner does not want me to have an examination of my breasts.	6.8	5.8	8.5	7.7	7.1	6.9
I do not know where to go to get a mammogram.	5.8	6.7	7.8	10.2	6.1	5.3
Total no. of barriers (mean)	1.9	2.0	2.3	2.1	1.8	1.9

\*P = 0.03.

Time since last mammogram

The results for time since last mammogram are shown in Table 5. There were no significant differences between groups at baseline. Approximately 75% of women reported having a mammogram in the past year and 90% reported having one in past 2 years. At the 12-month follow-up, there was a significant difference between groups (P < 0.05), with

74% of those in the pamphlet group and 82% of those in video group reporting having a mammogram in the past year (Table 5A). A logistic regression analysis of mammography at 12 months (within past year vs. >1 year ago) controlling for baseline mammogram produced an odds ratio of 1.48 for the video group that was not significantly greater than one (95% CI = 0.95–2.28; P = 0.081; Table 5B). It is likely that we did not find a significant effect after adjusting for baseline mammogram because at baseline the video group had a slightly higher percentage of women who had obtained a

Table 5  
Mammogram screening

A. Time since last mammogram at baseline and FU12 (N = 578)				
	Baseline		FU12	
	Pamphlet	Video	Pamphlet	Video
N	294	284	294	284
Within past year	73.1% (215)	76.4% (217)	74.2% (218)	82.0% (230)
1–2 years ago	16.7% (49)	13.0% (37)	18.4% (54)	9.9% (28)
>2 years ago	6.8% (20)	7.0% (20)	4.4% (13)	5.6% (16)
Never	3.4% (10)	3.5% (10)	3.1% (9)	3.5% (10)
P	.6797		.0327	
B. Logistic regression of mammography at 12-month follow-up <1 year controlling for video vs. pamphlet and baseline mammography <1 year				
	Odds ratio			
	Estimate	95% Confidence Intervals		P
		Lower	Upper	
Baseline mammogram <1 year	8.370	5.405	12.963	<0.0001
Video vs. pamphlet	1.475	0.953	2.283	0.0811

Table 6  
Evaluation of media materials

Item	Pamphlet (%)	Video (%)	P
Remember receiving materials—Percent yes	83.2	89.0	0.0435
Read or viewed material—Percent yes	95.8	81.0	<0.0001
Had impact on intention to get mammogram	72.3	76.1	0.3655
Addressed concerns about mammograms	82.1	85.9	0.7011
Encouraged regular mammograms	89.7	89.4	0.9056
Opinions about materials <sup>a</sup>			
Informative	92.2	94.2	0.4319
Assuring	87.8	89.1	0.6775
Understandable	90.9	93.1	0.3948
Interesting	85.7	88.8	0.3395
High quality	88.8	94.1	0.0508
Would you recommend to others			0.8351
No—maybe	5.6	4.4	
Probably	13.3	12.8	
Definitely	81.1	82.8	
Other problems not covered	23.9	18.6	0.1962

<sup>a</sup> Percent who responded 8–10 on a 10-point scale.

recent mammogram. Analyses based only on those who read or viewed the materials produced results similar to the intent-to-treat analysis. Twelve-month mammography rates, adjusted for baseline screening, were 80.4% for the video group and 74.8% for the pamphlet group.

#### *Evaluation of intervention materials*

Finally, we were also interested in respondents' evaluation of the intervention materials. As shown in Table 6, women were more likely to remember receiving the video, but were more likely to read the pamphlet (96%) than watch the video (81%). This is not surprising given the ease of reading the pamphlet. Both groups thought the materials were informative, understandable, assuring, and interesting. The video was rated as slightly higher quality ( $P=0.051$ ). High percentages of women said they would recommend the materials to others. Both groups thought the materials encouraged regular mammograms, and more than 70% reported that the materials had an impact on their intention to get a mammogram.

#### **Discussion**

This study examined the effectiveness of a videotape vs. a standard pamphlet for increasing mammography screening in a multiethnic sample of Caucasian, African-American, and Hispanic women aged 50–70. Although the percentage of women who had a mammogram within the past year increased 5.6% in the video group compared to only 1.5% in the pamphlet group, this difference was not statistically significant in analyses adjusting for baseline screening. Mammography screening within the past year was high at baseline for both groups, with 76.4% of women in the video group and 73.1% in the pamphlet group reporting having a mammogram within the past year.

The biggest factor predicting mammography screening at 12 months was having a mammogram within the past year at baseline. Other studies have also found that prior mammography influences subsequent screening [33]. This suggests that interventions might have their greatest impact if directed toward women who do not report recent screening. Future randomized intervention trials should target this group of women. Research based on the transtheoretical stages of change model also suggests that interventions are most effective if targeted differently to those who do not engage in the behavior than to those who do. In the case of mammography screening, one might particularly target those women who do not engage in regular screenings [34].

The results related to attitudes and beliefs provide guidance for future interventions. Both groups had positive attitudes toward mammograms at baseline and baseline analyses revealed that positive attitudes were one of the most important factors related to recent screening (Goldman et al., submitted for publication). In particular, believing one has control over getting a mammogram was related to recent

mammography. In the present study, the video group became more likely to report feeling control over getting a mammogram (self-efficacy) and the percent of women who believed they had control increased over time in the video group. This belief is likely to remain stable over time as a woman gets screened and her feelings of control should increase. The video group also became more likely to report feeling that mammograms are beneficial and assuring. Some of the written comments from the participants suggest that they found hearing from other women to be beneficial. They particularly mentioned that they liked hearing from women of diverse racial or ethnic backgrounds. A number of women also reported that they liked seeing the whole mammogram procedure. These findings suggest that interventions might best focus on the benefits of mammograms and how women can go about getting screened.

Although we did not find a significant effect of the video after controlling for baseline screening, the increase in recent screening was higher than many other interventions. A recent meta-analysis of interventions designed to promote mammography screening among all women reported that the odds of mammography screening are 1.91 times higher with an intervention. Interventions that target women over aged 50 are less effective than those that target younger women (OR, 0.57; 95% CI, 0.32–1.03) [35]. The percentage increase of 5.6% in the video group was only slightly lower than more intensive tailored interventions [36]. This study suggests that the video developed for this project may still be a useful tool to increase rates of mammography screening. A video is a relatively easy intervention with duplication and distribution expenses less costly and time consuming than personnel time for behavioral interventions. The video may also be a useful tool in conjunction with behavioral interventions.

The study design itself is of some note. Our target sample was a multiethnic community-based sample of Caucasian, African-American, and Hispanic women. Communities were selected based on their high percentages of minority women. Because women were selected at random, we did not know their ethnic background ahead of time. All survey materials were mailed in English and Spanish. Our response rates suggest that we successfully recruited women from all three groups. Study retention was excellent and did not vary by city or race.

There are several limitations to the study. First, mammography screening rates were higher at baseline than we anticipated, thus leaving less room for either of the materials to have an effect. Both educational materials might have shown a greater effect in populations with lower baseline screening rates. The high screening rate is not unique to our sample. Data from the Behavioral Risk Factor Surveillance System show that Massachusetts has one of the highest screening rates in the country with 72.6% of women reporting screening in the previous year [7]. Second, we did not have a control group that did not receive any educational materials. Although the pamphlet group showed

only a very small increase in screening, it is possible that a comparison between the video group and a no materials control group would have yielded a larger effect. Finally, other delivery methods such as showing the video (or distributing the pamphlet) in physician offices or other settings may be more likely to reach women who would not ordinarily read or watch the materials.

In conclusion, it appears that the videotape developed for this study had a small effect on increasing mammography screening among women aged 50–70. These results suggest that a high quality, engaging video that addresses the benefits of mammograms can have a small impact on screening. Because repeat mammography rates are so high, interventions like this videotape are likely to have their greatest impact when targeted to women who have not recently had a mammogram. Although reaching such women remains a challenge, a videotape as described here can be shown in a wide variety of settings that may reach more women.

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### References

- [1] American Cancer Society. Cancer facts and figures. Atlanta, GA: American Cancer Society; 2003.
- [2] Feuer EJ, Wun LM, Boring CC, Flanders WO, Timmel MJ, Tong T. The lifetime risk of developing breast cancer. *J Natl Cancer Inst* 1993;85:892–7.
- [3] Fletcher SW, Black W, Harris R, Rimer BK, Shapiro S. Report of the international workshop on screening for breast cancer. *J Natl Cancer Inst* 1993;85:1644–56.
- [4] Fletcher SW, Elmore JG. Mammographic screening for breast cancer. *N Engl J Med* 2003;348:1672–80.
- [5] Harris R, Leininger L. Clinical strategies for breast cancer screening: weighing and using the evidence. *Ann Intern Med* 1995;122:550–2.
- [6] Humphrey LL, Helfand M, Chan BKS, Woolf SH. Breast cancer screening: a summary of the evidence for the U.S. preventive services task force. *Ann Intern Med* 2002;137:347–60.
- [7] Centers for Disease Control and Prevention. Behavioral Risk Factor Surveillance System reports. Available at: <http://apps.nccd.cdc.gov/brfss/>. Accessed on April 26, 2004.
- [8] Rimer BK. Interventions to increase breast screening. *Cancer, Suppl* 1994;74:323–8.
- [9] Yabroff KR, Mandelblatt JS. Interventions targeted toward patients to increase mammography use. *Cancer Epidemiol Biomarkers Prev* 1999;8:749–57.
- [10] Meade CD, McKinney WP, Barnas GP. Educating patients with limited literacy skills: the effectiveness of printed and videotaped materials about colon cancer. *Am J Public Health* 1994;84:119–21.
- [11] Breckon DJ, Harvey JR, Lancaster RB. Community health education: settings, roles, and skills for the 21st century. Third ed. Gaithersburg, MD: Aspen; 1994.
- [12] Cassileth BR, Heiberger RM, March V, Sutton-Smith K. Effect of audiovisual cancer programs on patients and families. *J Med Educ* 1982;57:54–9.
- [13] Israel MJ, Mood DW. Three media presentations for patients recovering from radiation therapy. *Cancer Nurs* 1982;5:57–63.
- [14] Marshall WR, Rothenberger LA, Bunnell SL. The efficacy of personalized audiovisual patient education materials. *J Fam Pract* 1984;19:659–63.
- [15] Stone S, Holden A, Knapic N, Ansell J. Comparison between videotape and personalized patient education for anti-coagulant therapy. *J Fam Pract* 1989;29:55–7.
- [16] Gagliano ME. A literature review on the efficacy of video in patient education. *J Med Educ* 1988;63:785–92.
- [17] Partridge MR. Asthma education: more reading or more viewing? *J R Soc Med* 1986;79:326–8.
- [18] Reith S, Graham JL, McEwan C. Video as a teaching aid. *Br Med J* 1984;289:250.
- [19] McCulloch DK, Mitchell RD, Ambler J, Tattersall RB. Influence of imaginative teaching of diet compliance and metabolic control in insulin dependent diabetes. *Br Med J* 1984;287:1858–61.
- [20] Self TH, Brooks JB, Lieberman P, Ryan MR. The value of demonstration and the role of the pharmacist in teaching the correct use of pressurized bronchodilators. *Can Med Assoc J* 1988;15:6–11.
- [21] Ajzen I. The theory of planned behavior. *Org Behav Human Decis Process* 1991;50:179–211.
- [22] Janz NK, Becker MH. The health belief model: a decade later. *Health Educ Q* 1984;11:1–47.
- [23] Lauver D, Chang A. Testing theoretical explanations of intention to seek care for a breast cancer symptom. *J Appl Soc Psychol* 1991;21:1440–58.
- [24] Brubaker RG, Fowler C. Encouraging college males to perform testicular self-examination: evaluation of a persuasive message based on the revised theory of reasoned action. *J Appl Soc Psychol* 1990;17:1411–22.
- [25] Young HM, Lierman L, Powell-Cope G, Kasprzyk D. Operationalizing the theory of planned behavior. *Res Nurs Health* 1991;14:137–44.
- [26] McCaul KD, Sandgren AK, O’Neill HK, Hinz VB. The value of the theory of planned behavior, perceived control, and self-efficacy expectations for predicting health-protective behaviors. *Basic Appl Soc Psychol* 1993;14:231–52.
- [27] Kurtz ME, Given B, Given CW, Kurtz JC. Relationships of barriers and facilitators to breast self examination, mammography, and clinical breast examination in a worksite population. *Cancer Nurs* 1993;16:251–9.
- [28] Murray M, McMillan C. Health beliefs, locus of control, emotional control, and women’s cancer screening behavior. *Br J Clin Psychol* 1993;32:87–100.
- [29] Rimer BK, Keintz MK, Kessler HB, Engstrom PF, Rosan JR. Why women resist screening mammography: patient related barriers. *Radiology* 1989;172:243–6.
- [30] Bohlke K, Harlow BL, Cramer DW, Spiegelman D, Mueller NE. Evaluation of a population roster as a source of population controls: the Massachusetts resident lists. *Am J Epidemiol* 1999;150:354–8.
- [31] Cohen J. Statistical power analysis for the behavioral sciences. Hillsdale, NJ: Erlbaum; 1988.
- [32] National Center for Health Statistics (NCHS). 1996–1997 an injury chartbook. United States: Health; 1997.
- [33] Taplin SH, Barlow WE, Ludman E, MacLehos R, Mayer DM,

- Seger D, et al. Testing reminder and motivational telephone calls to increase screening mammography: a randomized study. *J Natl Cancer Inst* 2000;92:233–42.
- [34] Brenes GA, Skinner CS. Psychological factors related to stage of mammography adoption. *J Women's Health Gen-Based Med* 1999; 8:1313–21.
- [35] Ratner PA, Bottorff JL, Johnson JL, Cook R, Lovato CY. A meta-analysis of mammography screening promotion. *Cancer Detect Prev* 2001;25:147–60.
- [36] Rakowski W, Ehrich B, Goldstein MG, et al. Increasing mammography among women aged 40–74 by use of a stage-matched, tailored intervention. *Prev Med* 1998;27:748–56.