

The Effects of Message Framing and Ethnic Targeting on Mammography Use Among Low-Income Women

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The authors examined the effects that differently framed and targeted health messages have on persuading low-income women to obtain screening mammograms. The authors recruited 752 women over 40 years of age from community health clinics and public housing developments and assigned the women randomly to view videos that were either gain or loss framed and either targeted specifically to their ethnic groups or multicultural. Loss-framed, multicultural messages were most persuasive. The advantage of loss-framed, multicultural messages was especially apparent for Anglo women and Latinas but not for African American women. These effects were stronger after 6 months than after 12 months.

Key words: breast cancer, framing, mammography, persuasion

There were an estimated 182,800 new cases of invasive breast cancer and 40,800 deaths from breast cancer among women in the United States in 2000 (American Cancer Society, 2000). Although the incidence of breast cancer is greater among wealthier than lower income women, wealthier women have lower rates of mortality (Miller et al., 1993; Segnan, 1997). The higher incidence and lower mortality rate among wealthier women may reflect their greater awareness and use of mammography compared with low-income women (Harper, 1993; National Cancer Institute Breast Cancer Screening Consortium [NCI BCSC], 1990; Price, Desmond, Slenker, Smith, & Stewart, 1992; Rajaram & Rashidi, 1998; Segnan, 1997). In one study of women with household incomes less than \$15,000, 90% did not obtain mammograms regularly and more than one third had never even heard of mammography (Mickey, Durski, Worden, & Danigelis, 1995). Because the underutilization of screening mammography can result in diagnosis at a later, less treatable stage of breast cancer, low-income women

are placed at an increased risk for mortality (Mandelblatt, Andrews, Kerner, Zauber, & Burnett, 1991; McCarthy et al., 1998; Wells & Horm, 1992). Although lack of access to quality medical care (Weinberger et al., 1991) and inadequate insurance (Whitman et al., 1991) surely contribute to the low rates of mammography use among low-income women, psychosocial factors, such as negative beliefs about screening for health problems and deficiencies in health-related knowledge, are also thought to deter women from taking action (Danigelis, Worden, & Mickey, 1996; Duke, Gordon-Sosby, Reynolds, & Gram, 1994; Lerman, Rimer, Trock, Balslem, & Engstrom, 1990).

The purpose of this experiment was to test the effectiveness of different persuasive messages designed to instill thoughts and feelings that motivate mammography use and to encourage low-income women from several different ethnic groups to obtain mammograms. Prior research demonstrated that loss-framed messages were effective in persuading middle-class women to obtain mammograms (Banks et al., 1995). We hoped to replicate these effects among low-income women by increasing their interest in breast cancer and mammography through ethnically targeted communications.

Messages Promoting Health Behaviors

Motivating people to perform health behaviors is not as straightforward as merely providing relevant information. The ways people perceive health threats influence their responses to health issues (Rothman & Salovey, 1997; Salovey, Rothman, & Rodin, 1998). The current experiment examined two means by which perceptions of screening mammography might be altered: framing and targeting.

Framing

Health appeals can emphasize the positive outcomes associated with adopting healthy behaviors (a type of gain framing) or the negative outcomes likely if these behaviors are not adopted (a type

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of loss framing), a distinction made by prospect theory (Kahneman & Tversky, 1982; Tversky & Kahneman, 1981). According to prospect theory, decision making depends on how choice-relevant information is presented, or framed. For example, when people are given a choice between two options, one with a certain and one with an uncertain outcome, gain-framed information elicits a preference for the more certain, low-risk option. In contrast, loss-framed information shifts preferences toward the probabilistic, more uncertain option to combat the aversion and anxiety produced by contemplating certain losses. Rothman and Salovey (1997) reviewed how prospect theory provides an effective conceptual framework for understanding how to develop maximally persuasive health messages. Specifically, loss-framed appeals should motivate behavioral decisions that people perceive to involve risky or uncertain outcomes. Because by performing a detection behavior one runs the risk of discovering a health problem, presenting loss-framed messages (emphasizing the costs of not taking action) should be the most effective way to motivate detection behaviors (Rothman & Salovey, 1997). Findings consistent with this prediction have resulted from interventions promoting breast self-examination (Meyerowitz & Chaiken, 1987) and mammography (Banks et al., 1995). Because these previous interventions were directed toward middle-class women, their effectiveness for low-income women is unknown. A goal of the present investigation was to test whether the effectiveness of loss-framed appeals to motivate mammography use could be obtained in a sample of low-income women from diverse ethnic backgrounds.

Targeting

Low-income women are relatively less involved than middle-class women in the practice of screening mammography; this low level of involvement is reflected, in part, by their lack of knowledge (Mickey et al., 1995) and their underutilization of relevant services (Harper, 1993; NCI BCSC, 1990; Price et al., 1992; Rajaram & Rashidi, 1998; Segnan, 1997). One way to enhance people's attention to and involvement with a health issue is to craft health appeals so they are more relevant to message recipients (Kotler & Roberto, 1989; Rimer & Glassman, 1998). Health messages can be tailored to match individual characteristics or targeted to specific group characteristics (Kreuter, Strecher, & Glassman, 1999; Rimer & Glassman, 1998). Tailored messages focus on individual-level attributes so that message content can resonate with these characteristics, whereas targeted messages are geared toward group-level attributes (Kreuter & Skinner, 2000).

Some cancer communications experts prefer the term *cultural tailoring* to *targeting* when describing the development of interventions, strategies, messages, and materials in accordance with specific cultural characteristics (Pasick, 1997; Pasick, D'Onofrio, & Ortero-Sabogal, 1996). They believe that the term *targeting* should be used only to refer to the identification of the appropriate group of individuals to receive the health information. Pasick (in press) has argued that this use of *cultural tailoring* and *targeting* is more consistent with the conventional understanding of their meanings by laypersons as well as individuals involved in the marketing profession; that *targeting* is an objective rather than a process (e.g., one might say *we targeted* low-income women in this experiment). Moreover, when designing messages for a subgroup of individuals, one still must rely on identifying character-

istics that are manifested at the level of the individual, so *tailoring* is a perfectly appropriate term to describe this process. The phrase *cultural tailoring* makes the importance of identifying and incorporating truly cultural factors, rather than merely demographic ones, especially salient. Although we are sympathetic to the issues raised and terminology proposed by Pasick and her colleagues, for the purposes of this article we retain the phrase *targeting* when describing the design of messages around ethnic and cultural group-level characteristics (Kreuter & Skinner, 2000).

Tailored print messages have motivated cancer-detection behaviors effectively. Women who received letters from their physicians whose recommendations to obtain mammograms were tailored to the women's beliefs about breast cancer and mammography risk (e.g., stage of change, attitudes) were more likely to obtain mammograms than those who received recommendations that were not tailored (Skinner, Strecher, & Hospers, 1994). Tailored messages have also been effective when directed toward women with no intention of obtaining mammograms (King et al., 1998). These and similar findings (e.g., Rakowski et al., 1998) suggest that, compared with generic messages that provide all individuals with the same information, tailored messages increase mammography use (see Skinner, Campbell, Rimer, Curry, & Prochaska, 1999, for a review).

Because the development and delivery of a tailored intervention requires that investigators have extensive individualized contact with each message recipient, the costs associated with this intervention strategy can be substantial and consequently limit its utility (Weinstein, Rothman, & Sutton, 1998). A potentially more cost-effective alternative intervention strategy would be to target messages to group characteristics. Messages targeted to a group (e.g., individuals sharing a similar ethnic background) are likely to be more personally involving than generic messages containing limited group-relevant material or messages highlighting diverse groups. There are a multitude of attributes (e.g., sex, ethnicity, living conditions, sexual orientation, values, language) to which messages can be targeted. For example, health-related materials often provide information relevant for specific ethnic backgrounds. Targeting can also be aimed toward a more narrowly defined subgroup (e.g., a neighborhood community). These culturally targeted cues can include community-relevant music, settings, and narrators (Freire, 1970; Kalichman & Coley, 1995; Yancey, Tanjasi, Klein, & Tunder, 1995). One investigation found that, compared with a no-message control, culturally targeted health appeals increased the rates of cervical cancer screening among low-income African American women and Latinas (Yancey et al., 1995). Investigators have advocated the use of targeted messages to motivate breast cancer screening (Forte, 1995; Hubbell, Chavez, Mishra, Magana, & Valdez, 1995); however, targeted messages' effectiveness relative to standard or multicultural messages has not been examined systematically in the context of cancer prevention and early detection.

One study examined the effects of targeted and loss-framed messages on HIV testing among African American women (Kalichman & Coley, 1995). These investigators hypothesized that targeting would increase message effectiveness and loss framing would further accentuate message effectiveness. The study included three conditions: (a) ethnicity-targeted information, (b) ethnicity- and sex-targeted information, and (c) ethnicity- and sex-targeted information that was loss framed. The loss-framed,

ethnically- and sex-targeted video motivated HIV testing best. These findings are intriguing, but given the absence of a complete factorial design, one cannot assess whether the video's influence was due to the targeted or loss-framed content. Thus, it is useful to compare gain- and loss-framed messages in both targeted and multicultural contexts.

In the present experiment, we compared messages targeted to ethnic background with messages that presented information to a range of ethnic groups (i.e., were multicultural). Targeted messages are often thought to be especially involving for recipients (Skinner et al., 1999). In our previous work with middle-class women, who were likely to be involved with the issue of breast cancer, loss-framed messages were more persuasive than gain-framed messages (Banks et al., 1995). For women who are less involved with this issue, targeting might allow for clearer differentiation between gain- and loss-framed messages by encouraging attention to the arguments in the message (Chaiken, 1980; Petty & Cacioppo, 1986).

Potential Mediators Linking Message Effects to Behavior Change

The means by which framed and targeted messages lead to behavior change are often unexplored. Framing and targeting may influence beliefs about illness severity and likelihood, which are thought to motivate health behavior change (Rogers, 1983; Rosenstock, 1974). In addition, framing and targeting may affect beliefs that one can perform the behavior (self-efficacy) and that the behavior will be effective (outcome-efficacy; Bandura, 1977, 1997) or that it affords other desirable outcomes (Sutton, 1987). Because targeting specifically emphasizes the relevance of the health issue to one's social group, it may also affect beliefs about the normative basis for taking action (Ajzen & Fishbein, 1980). In this experiment, we examined whether framing or targeting affected these psychosocial variables, and whether they, in turn, influenced behavior change.

The Present Experiment

The purpose of this experiment was to examine the effects of message framing and ethnic targeting on motivating mammography use in low-income women. We hypothesized that loss-framed messages would motivate mammography use more effectively than gain-framed messages, as has been seen among middle-class women (Banks et al., 1995). We also hypothesized that targeting would enhance attention to the message, making a loss-frame advantage especially apparent. Women over the age of 40 were recruited from community health clinics and public housing developments to view one of four videos that varied in message frame (gain or loss) and targeting (multicultural or targeted) in a 2×2 factorial design. We examined mammography use 6 and 12 months after participation, among the sample as a whole and within ethnic groups, along with factors that might mediate the effects of message framing and targeting on self-reported mammography use.

Method

Participants

This experiment was aimed at a medically underserved population. Participants ($N = 752$) were attending one of two inner-city community

health clinics ($n = 560$) or resided in public housing developments ($n = 192$) in the same neighborhoods. The majority were African American or Latina. Flyers invited women over 40 years of age to participate in a study on women and health by completing two questionnaires and watching a video. Women in health clinic waiting rooms were also approached individually and invited to participate. Clinic participants completed a questionnaire before their appointment and continued with the experiment after their appointment, typically an hour later. The women usually completed the study in small groups (ranging from 2 to 5 participants).¹ The experiment was facilitated by two full-time and several part-time research assistants.

Procedure

Participants completed a questionnaire before and after viewing one of four videos in exchange for \$10.² Women were assigned randomly, either individually or at the group level, to message framing and targeting conditions by two coin flips. The first coin flip determined the framing condition (gain or loss); the second determined targeting (multicultural or targeted).³ Framed flyers were distributed to participants before they were excused from the experimental session. The gain-framed flyer read, "When you get regular mammograms you are doing your best to detect breast cancer early. And detecting breast cancer early can save your life." The loss-framed flyer read, "When you do not get regular mammograms you are not doing your best to detect breast cancer early. And failing to detect breast cancer early can cost your life." All materials were available in English and Spanish. English materials were translated into Spanish and then back-translated to ensure accuracy.

The women were asked about their mammography use 6 and 12 months after participating.⁴ Contact was made either by telephone or by a stamped, preaddressed postcard. Those who reported obtaining a mammogram by the 6-month follow-up were not recontacted. The contact rates across the four framing and targeting conditions at both the 6- and 12-month follow-ups (70% and 71%, respectively) did not differ significantly across, or within, ethnic grouping. The final follow-up rate is comparable to that of other studies with similar populations (e.g., Bastani, Marcus, Maxwell, Das, & Yan, 1994; Blumenthal, Sung, Coates, Williams, & Liff, 1995; Slater et al., 1998). Participants contacted at either follow-up, or both, were included in all relevant analyses.

¹ Two groups from public housing included 11 and 14 participants each. The pattern of mammography use across the framing and targeting conditions was equivalent when including and excluding these larger groups of women, so the larger groups were retained.

² Overall, 12% of the participants had questionnaires read to them rather than completing them on their own. This percentage did not differ significantly between community clinics (11%) and housing developments (15%).

³ Most groups were ethnically homogeneous. In the unusual cases in which groups were ethnically mixed, all participants were assigned to either a gain- or a loss-framed version of the multicultural condition. The percentages of Anglos in the gain- and loss-framed multicultural conditions and the gain- and loss-framed targeted conditions were 27%, 34%, 27%, and 24%, respectively. The breakdown for African American women across these four conditions was, respectively, 52%, 41%, 44%, and 48%, and for Latinas 21%, 25%, 29%, and 29%, respectively. Although somewhat fewer African American women initially were assigned (randomly) to the loss-framed, multicultural video, by the 6- and 12-month follow-ups there were no differences due to ethnicity in who was contacted.

⁴ Self-reports of mammography use by low-income women are correlated reliably with reports in medical records (Etzi, Lane, & Grimson, 1994).

Materials

Pre- and postvideo repeated measures. Before and after the video, we assessed attitudes concerning the extent to which the women thought annual mammograms were important. The women rated how upset they were when thinking about getting a mammogram (anxiety) before video exposure and after video exposure. Before and after the video, the women rated their likelihood of developing breast cancer (subjective risk perceptions) and their intentions to schedule a mammogram within the next year. These single-item measures were rated on 5-point scales.

Prevideo measures only. Worry was indexed by summing three items concerning participants' worry about developing breast cancer, anxiety about getting a mammogram, and nervousness about getting a mammogram ($\alpha = .65$). Normative behaviors were assessed by summing three items concerning the extent to which the women talked with friends and family about the benefits or problems associated with getting a mammogram and ratings of the percentage of women they knew who obtained regular mammograms ($\alpha = .68$). All items were rated on 5-point scales.

Postvideo measures only. The immediate impact of the message-framing manipulation was assessed by summing two items concerning feelings of fear and anxiety in response to the videos, $r(751) = .45, p < .001$, to create a negative affect index. These items have differentiated immediate reactions to gain- and loss-framed messages in some of our previous studies (e.g., Rothman, Salovey, Antone, Keough, & Martin, 1993). Similarity ratings of women in the video to the viewers and ratings of the extent to which the video information mattered to one's family, background, and community were used to assess the effectiveness of the targeting manipulation. Also assessed were interest in, believability of, and amount learned from the videos. These items were rated using 5-point scales.

Knowledge about breast cancer and mammography was assessed by summing the number of correct responses to four items: (a) the duration of growth of a palpable breast lump, (b) the age at which women's objective risk for breast cancer increases, (c) the benefit of mammography over self- and clinical breast examinations, and (d) a widely held myth in this population that bruises or bumps can lead to breast lumps. Self-efficacy was assessed by summing three 5-point items concerning whether participants believed they could (a) schedule a mammogram, (b) show up for a mammography appointment, and (c) get a mammogram if they thought they had breast cancer ($\alpha = .81$). Outcome-efficacy included two 5-point items: (a) whether mammograms could detect a lump not found during breast self-examinations and (b) whether mammograms are able to detect breast cancer, $r(748) = .37, p < .001$.

Video Presentation

We created professional presentations concerning breast cancer and screening mammography by matching a series of 70 photographs, drawings, and graphics to narration (75 sentences) on videotape. The 10-min videos presented equivalent information concerning breast cancer risk factors, detection procedures, the importance of early detection, facts about mammography, and guidelines for obtaining regular mammograms. Videos initially adapted from Banks et al. (1995) were revised using feedback from various community and social groups. Staff members and clients from the two clinic-based research sites also contributed to formative evaluation of the videos. The videos were rated as understandable, interesting, informative, and well paced. In our own pilot testing, African American women and Latinas felt that the targeted videos were more ethnically relevant than the multicultural videos.

The gain-framed video emphasized the benefits of getting a mammogram, whereas the loss-framed video emphasized the costs of not getting a mammogram. In the framed videos, 9% of the visuals included framed information (e.g., title slides were "The Benefits of Mammography" vs. "The Risks of Neglecting Mammography"), and 40% of the narrative was framed. Multicultural videos included photographs of ethnically diverse

women (African Americans, Latinas, Anglos, and others) in relative proportion to their representation in the larger urban community (approximately 30%, 15%, 50%, and 5%, respectively) as well as information about breast cancer and mammography relevant for all women. In contrast, targeted videos included still photographs representing primarily Anglo, Latina, or African American models (60% of photos depicted women of one of these particular ethnic backgrounds) and ethnically specific breast cancer morbidity and mortality statistics. Additional graphics (9%) in targeted videos included targeted text (e.g., "White women get mammograms 3 times more than African American women," "Latinas do not get mammograms as often as Anglos," or "Less than 1/3 of white women aged 40 and older got mammograms in the last year"), and 26% of the narrative was targeted. Videos were available in English or Spanish. Table 1 provides systematic examples of the framing (gain vs. loss) and targeting (multicultural vs. ethnically targeted) manipulations.

Analysis Plan

The analysis of data proceeded in several steps. First, we explored the demographic characteristics of the sample and looked at differences due to ethnicity. Second, we verified that the framing and targeting manipulations had some immediate impact on the viewers of the various video programs. We then examined whether there were differences due to framing, targeting, and ethnicity in mammography use 6 and 12 months after women viewed the videos. The reliability of differences due to framing, targeting, ethnicity, and their various interactions was tested in logistic regression models for each follow-up period. Finally, we explored potential mediators of the effects of framing and targeting on mammography use.

Results

Demographics

Forty-three percent of the participants were African American, 27% Anglo, 25% Latina, 2% American Indian, 1% Asian, and 3% from other ethnic groups. Table 2 shows that most participants had some high-school education, low household incomes (less than \$13,500), fair health ratings, and numerous physical examinations in the last year. The average age of the women was 56 ($SD = 12$; range = 40 to 91).

There were differences among the three ethnic groups on several demographic variables. Latinas had less education than the other two ethnic groups, $F(2, 690) = 28.27, p < .01$. Latinas were more likely to be married, Anglos were more often widowed, and African Americans were more often single, $\chi^2(6, N = 707) = 33.05, p < .01$. Latinas rated their health as worse, compared with both Anglos and African Americans, $F(2, 692) = 10.95, p < .01$. Anglos were older than the other two ethnic groups, $F(2, 748) = 22.99, p < .01$. These differences were confirmed using Bonferroni-corrected comparisons. There were no ethnic group differences in family income or in the number of physical examinations women obtained per year. Variables on which there were differences among ethnic groups (age, education, health ratings, and marital status) were entered as covariates in analyses involving ethnicity. The findings did not change systematically whether statistically controlling for these baseline differences or not.

Manipulation Checks and Evaluations of the Video

Loss-framed messages elicited greater negative affect ($M = 4.28, SD = 2.04$) than gain-framed messages ($M = 3.81, SD =$

Table 1
Samples of the Content of the Four Message Framing and Targeting Conditions

Condition	Message
Gain-framed, multicultural	Breast cancer is the most common cancer found in women. . . . detecting breast cancer early can save a woman's life. When a woman gets regular mammograms, she is doing her best to detect breast cancer early. And, detecting breast cancer early can save her life. (Accompanying photos depicted African American, Latina, and Anglo women).
Loss-framed, multicultural	Breast cancer is the most common cancer found in women. . . . failing to detect breast cancer early can cost a woman her life. When a woman does not get regular mammograms, she is not doing her best to detect breast cancer early. And, failing to detect breast cancer early can cost her life. (Accompanying photos depicted African American, Latina, and Anglo women).
Gain-framed, targeted (Latina)	Breast cancer is the most common cancer found in Latinas. . . . detecting breast cancer early can save your life. When you get regular mammograms, you are doing your best to detect breast cancer early. And, detecting breast cancer early can save your life. (Accompanying photos primarily depicted Latinas).
Loss-framed, targeted (Latina)	Breast cancer is the most common cancer found in Latinas. . . . failing to detect breast cancer early can cost your life. When you do not get regular mammograms, you are not doing your best to detect breast cancer early. And, failing to detect breast cancer early can cost your life. (Accompanying photos primarily depicted Latinas).

1.94), $F(1, 729) = 9.92, p < .01$, suggesting the framing manipulation had some immediate impact on participants' feelings. Other studies have demonstrated that anxiety can differentiate gain- and loss-framed messages (Rothman et al., 1993). In addition, ethnically targeted videos elicited higher ratings of video model similarity ($M = 3.30, SD = 1.18$) than multicultural videos ($M = 2.99, SD = 1.19$), $F(1, 723) = 11.59, p < .01$. Ethnically targeted videos were also rated as more important to participants' families and backgrounds ($M = 3.93, SD = 0.97$) than multicultural videos ($M = 3.55, SD = 1.15$), $F(1, 721) = 24.61, p < .01$. There were no interactions of participant ethnicity with framing or targeting on any of these measures. As anticipated, there were no differences due to framing, targeting, or their interaction on the believability of or interest in the video presentations. All the videos were rated as highly believable and interesting.

Six-Month Behavioral Follow-Up

Framing and targeting effects on mammography use. We first examined the influence of message framing and targeting on mammography use by pooling the data across participant ethnicity.⁵ We expected the loss-framed message to motivate more of these low-income women to get mammograms than the gain-framed message, as demonstrated in our prior work among a different population of women (Banks et al., 1995). We expected this framing difference to be especially apparent when the context was targeted compared with multicultural.

Overall, 41% of the participants reported obtaining a mammogram by the 6-month follow-up. Self-reported rates of mammography use by condition are shown in Figure 1A. Controlling for the past year's mammography use, the data showed a significant improvement in fit to a logistic regression model after including the interaction of framing and targeting with the main effects in the model, Δ Wald $\chi^2(1) = 5.15, p < .05$, as reported in the top part of Table 3. On the basis of the calculated odds ratios, participants were 1.81 times more likely to report getting a mammogram when

the multicultural message was loss framed (50%), compared with gain framed (36%; $p < .01$). However, participants were only 1.22 times as likely to report getting a mammogram when the targeted message was gain framed (41%), compared with loss framed (36%; $p > .10$). Within 6 months after participation, loss-framed videos persuaded more participants to obtain mammograms than gain-framed videos, but only in a multicultural context, and the loss-framed, multicultural message was more persuasive than the other three kinds of messages.

Mammography use by participant ethnicity. We next examined mammography use after stratifying the sample by participant ethnicity, as shown in Figure 1A. Forty percent of Anglo and Latina women and 41% of African American women reported obtaining a mammogram by the 6-month follow-up. A 2 (framing) \times 2 (targeting) \times 3 (ethnic group) logistic regression model was computed, controlling for the past year's mammography use and those demographic variables on which the ethnic groups differed. To conclude that the pattern of mammography use across the four conditions differs by ethnic group (i.e., that there is a significant three-way interaction), both dummy variables representing ethnicity must make significant contributions to the logis-

⁵ The pattern of mammography utilization across the four framing and targeting conditions was quite similar for participants recruited from community clinics compared with those recruited from public housing. Therefore, data also are pooled across recruitment site in all analyses. Participants from these recruitment sites did not differ in education, number of annual physicals obtained, or health ratings. Women recruited from clinics were more likely to be African American, whereas those recruited from public housing were about equally likely to be Anglo or African American, $\chi^2(2, N = 568) = 10.59, p < .05$. Those attending community health clinics reported higher incomes ($M = 1.79, SD = 1.53$) than those residing in public housing ($M = 1.41, SD = 1.09$), $t(345) = 3.36, p < .01$. Participants recruited at clinics were more often separated or divorced, whereas participants from public housing were more often widowed, $\chi^2(2, N = 596) = 38.46, p < .05$.

Table 2
Demographic Characteristics of the Entire Sample and by Participants' Ethnicity

Measure	Entire Sample (<i>N</i> = 752)		Anglos (<i>n</i> = 205)	Latinas (<i>n</i> = 189)	African Americans (<i>n</i> = 318)
	<i>n</i>	%	%	%	%
Education					
Grade 5 or less (1)	77	10	6	27	4
Grade 6 to 8 (2)	108	14	14	25	9
Grade 9 to 12 (3)	372	50	54	31	59
Vocational (4)	62	8	8	6	9
Some college (5)	83	11	10	6	14
Bachelors or beyond (6)	47	6	8	4	6
Means (<i>SD</i>) by ethnicity			3.3 _a (1.3)	2.5 _b (1.4)	3.4 _a (1.2)
Income					
\$13,500 or less	440	62	76	84	71
\$13,500 to 18,999	67	9	12	8	13
\$19,000 or beyond	73	10	8	3	9
Rather not report	126	18	4	5	6
Marital status					
Married	152	20	19	30	16
Widowed	167	22	31	19	18
Separated or divorced	285	38	35	36	42
Never married	145	19	15	15	25
Health ratings					
Poor (1)	59	8	7	11	6
Fair (2)	290	39	29	53	38
Good (3)	236	31	39	20	31
Very good (4)	125	17	19	12	18
Excellent (5)	41	6	6	3	8
Means (<i>SD</i>) by ethnicity			2.9 _a (1.0)	2.4 _b (1.0)	2.8 _a (1.0)
Health exam frequency					
More than one a year	419	56	50	65	55
One a year	225	30	35	20	33
One every 2–5 years	91	12	14	13	11
Never	12	2	2	2	1
Age means (<i>SD</i>) by ethnicity			60 _a (14)	55 _b (11)	53 _b (11)

Note. Different subscripts denote significant simple effects using Bonferroni-corrected comparisons. Because 40 women in the sample did not classify themselves as Anglo, Latina, or African American, *ns* do not total to 752.

tic regression model. The top part of Table 4 shows the last step in the model, which included the three-way interaction of framing, targeting, and ethnic group. Including the three-way interaction contributed significantly to the logistic regression model, revealing that the influence of framing and targeting on mammography use differed by ethnic group.

Logistic regression analyses were repeated to explore framing and targeting effects separately for each ethnic group, controlling for the past year's mammography use. The model significantly improved in fit when we included the two-way interaction (Framing × Targeting) in the logistic regression for both Anglo women, Δ Wald $\chi^2(1) = 5.18$, $p < .05$, and Latinas, Δ Wald $\chi^2(1) = 7.67$, $p < .01$. On the basis of the calculated odds ratios, Anglos were 3.04 and Latinas 7.67 times more likely to report obtaining a mammogram when their multicultural message was loss framed (55% and 61%) compared with gain framed (29% and 21%; $p < .01$ and $< .001$, respectively). Anglos were only 1.86 and Latinas were only 1.27 times as likely to report obtaining mammograms when their targeted message was gain framed (42% and 41%) compared with loss framed (28% and 35%; $p = .22$ and $.59$, respectively), and these differences were not significant. Use of

mammography by African American women within 6 months of seeing the video was predicted by the past year's mammography use only; the fit was not improved by including message framing, targeting, or their interaction in the model ($p > .10$). Overall, Anglos and Latinas were most persuaded to obtain a mammogram when exposed to a loss-framed, multicultural message. Self-reported mammography use among African American women was not influenced significantly by framing or targeting.

Twelve-Month Behavioral Follow-Up

Framing and targeting effects on mammography use. Overall, 57% of the participants reported obtaining a mammogram within a year of participating in the study. Figure 1B shows that at the 12-month follow-up, the multicultural video appeared to be more persuasive when loss framed (61%) than gain framed (55%); however, this difference was not significant. Controlling for past year's mammography use, the fit to a logistic regression model was not enhanced when the interaction of framing and targeting was added to the model ($p > .10$), as shown in the bottom part of Table 3.

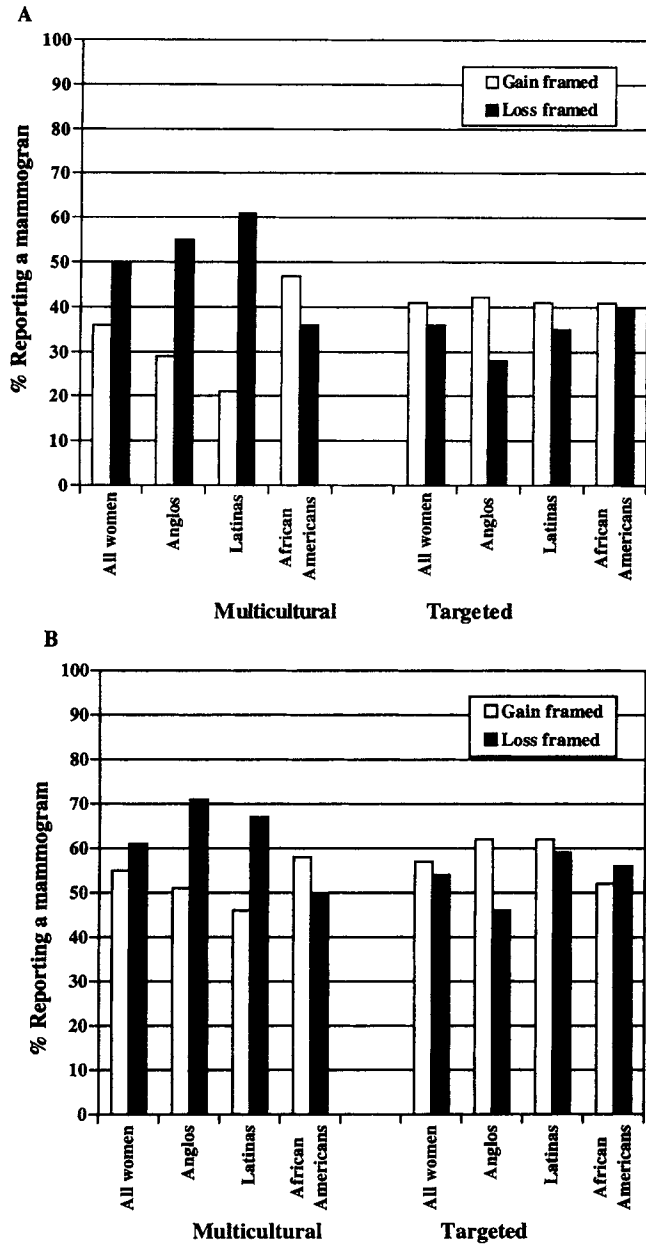


Figure 1. Percentage of women in the four message framing and targeting conditions who reported obtaining a mammogram 6 months (A) and 12 months (B) after exposure to video presentations, for all participants and by ethnicity.

Mammography use by participant ethnicity. Examining mammography use by participant ethnicity revealed that 59% of Anglo women and Latinas and 54% of African American women reported obtaining a mammogram within a year after participating in the study (see Figure 1B). A 2 (framing) × 2 (targeting) × 3 (ethnic group) logistic regression model was computed, controlling for the past year's mammography use and demographic differences. It is reported in the lower part of Table 4. With the three-way interaction of framing, targeting, and ethnic group included in the model, the 12-month follow-up data improved fit to

the logistic regression. Although the pattern of reported use rates was consistent with the ethnic group differences in the influence of message framing and targeting observed at 6 months, these differences should be interpreted with caution because both dummy variables did not significantly contribute to the improved fit of the model.

Mediators of Message Framing and Targeting on Self-Reported Mammography Use

We obtained robust effects of message framing and targeting at the 6-month follow-up for women with Anglo or Latina backgrounds; therefore, the search for mediators of these effects was limited to those women. For a variable to mediate the relation between an independent and a dependent variable, it must be associated with both variables, and the influence of the independent on the dependent variable must attenuate significantly, if not completely, when controlling for the mediator (Baron & Kenny, 1986). We examined the effects of message framing and targeting on numerous psychosocial variables suggested by various theories of health behavior change (e.g., perceptions of risk for developing breast cancer, self-efficacy, outcome efficacy, attitudes toward mammography, intentions to obtain a mammogram, knowledge, social norms). None of the potential mediators was influenced systematically by the interaction of framing and targeting. As in some of our previous experiments on the impact of message variables on behavior, demonstrations of mediation remain elusive (Banks et al., 1995; Detweiler, Bedell, Salovey, Pronin, & Rothman, 1999; Rothman et al., 1993; but see Kelly & Rothman, 2000; Rothman, Martino, Bedell, Detweiler, & Salovey, 1999).

Discussion

We examined the effects of message framing and ethnic targeting on motivating mammography use in low-income women. Because obtaining screening mammography is a detection behavior with relatively uncertain consequences, we expected loss-framed messages to motivate mammography utilization better than gain-framed messages (Rothman & Salovey, 1997). Such findings have been demonstrated in prior research with middle-class women (Banks et al., 1995). We hoped to enhance low-income women's involvement with the practice of mammography by targeting messages to their ethnic backgrounds. We expected that targeting would increase attention to the message (Kotler & Roberto, 1989), thus augmenting the differential impact of the loss- and gain-framed video programs. We found that loss-framed messages were best at persuading low-income women to obtain mammograms 6 months after our educational intervention, particularly among Anglos and Latinas, but this was only the case for the multicultural videos, not the targeted videos.

The demonstrated advantage of motivating mammography screening with loss-framed messages not only replicated prior findings with similar, multicultural videos (Banks et al., 1995) but also extended these findings to a different population. Women who participated in the Banks et al. (1995) study were recruited from their place of employment and had a median household income of \$45,000. In contrast, women who participated in the current study were recruited from community health clinics and public housing developments and had a median household income of \$13,500.

Table 3
Hierarchical Logistic Regression Analyses of Message Framing and Targeting as Predictors of Self-Reported Mammography Use by All Women

Predictor	b	SE	Odds ratio	95% CI	Model $\Delta\chi^2$
6 months after exposure to video presentations					
Step 1					
Past year's mammography use	0.35	0.19	1.42		
Step 2					
Past year's mammography use	0.36	0.19	1.43		
Message frame	0.15	0.18	1.16		0.09 ^a
Step 3					
Past year's mammography use	0.35	0.19	1.42		
Message frame	0.15	0.18	1.16		
Targeting	0.24	0.18	1.27		1.82 ^a
Step 4					
Past year's mammography use	0.36	0.20	1.44	0.98–2.11	
Message frame	0.24	0.25	1.27	0.78–2.08	
Targeting	0.18	0.26	1.20	0.72–1.99	
Message Frame \times Targeting	0.82	0.36	2.27*	1.12–4.63	5.15*
12 months after exposure to video presentations					
Step 1					
Past year's mammography use	1.06	0.18	2.90**		
Step 2					
Past year's mammography use	1.06	0.18	2.90**		
Message frame	0.04	0.17	1.04		0.05 ^a
Step 3					
Past year's mammography use	1.07	0.18	2.91**		
Message frame	0.04	0.17	1.04		
Targeting	0.18	0.17	1.19		1.04 ^a
Step 4					
Past year's mammography use	1.07	0.18	2.93**	2.05–4.18	
Message frame	0.17	0.24	1.18	0.74–1.89	
Targeting	0.05	0.25	1.05	0.65–1.70	
Message Frame \times Targeting	0.44	0.35	1.56	0.79–3.08	1.65 ^a

Note. CI = confidence interval.

^a Nonsignificant value.

* $p < .05$. ** $p < .01$.

However, the relative advantage of loss-framed, multicultural messages faded by the 12-month follow-up, which was not the case in the Banks et al. (1995) experiment. Although it is unclear why the persuasiveness of the loss-framed message dissipated over time, it may be that participants did not process the message deeply enough for them to recall its unique aspects 12 months after having seen it. Future research in this area would benefit if greater attention were paid to indicators of both the manner in which participants processed the message and the degree to which participants recalled aspects of the message at follow-up.

Unexpectedly, targeting did not enhance the persuasiveness of loss-framed mammography messages. Participants perceived the targeted videos as more relevant than the multicultural videos. This increase in relevance likely promoted attention to both gain- and loss-framed videos, but it did not motivate screening behavior. Although targeting seemed to enhance the effectiveness of gain-framed messages, these findings were not reliable, nor did they supersede the persuasiveness of the loss-framed, multicultural message. The targeting manipulation was based on modifications made to the multicultural presentation. First, we removed as many ethnically dissimilar model photographs from the multicultural presentations as possible and replaced them with photographs of

women with ethnic backgrounds similar to the participant (i.e., Anglo, Latina, or African American). In addition, statistics pertaining to women living in the United States were replaced with breast cancer morbidity and mortality statistics specific to Anglo women, Latinas, or African American women, depending on the participant's ethnicity. The effects of this kind of targeting in the present study were to diminish the effectiveness of loss-framed messages on motivating mammography use. Although one might speculate that the loss-framed, targeted message elicited some defensiveness among participants, negative affect in response to the video and anxiety about getting a mammogram increased in response to both the targeted and the multicultural loss-framed messages. Moreover, the mediational analyses revealed that these affective reactions were unrelated to subsequent behavior.

Although the targeted messages used in this study were perceived as relevant, they might have been more effective if they had spoken to these groups of women's specific concerns and beliefs about breast cancer and mammography (e.g., Skinner et al., 1994). Moreover, because sociocultural and family issues perhaps are more important aspects of social identity, targeting to them rather than to ethnicity might have better motivated screening mammography (Herek et al., 1998; Huerta & Macario, 1999). Indeed,

Table 4
Hierarchical Logistic Regression Analyses of Message Framing, Targeting, and Ethnic Group as Predictors of Self-Reported Mammography Use

Predictor	b	SE	Odds ratio	95% CI
6 months after exposure to video presentations ^c				
Age	0.02	0.01	1.02*	1.00–1.04
Education	0.09	0.08	1.09	0.94–1.27
Health ratings	0.08	0.10	1.08	0.89–1.31
Marital status	0.06	0.10	1.06	0.87–1.29
Past year's mammography use	0.24	0.21	1.28	0.85–1.92
Message frame	0.06	0.39	1.07	0.49–2.30
Targeting	0.24	0.41	1.27	0.57–2.82
Dummy 1 ^a	0.12	0.45	1.13	0.48–2.72
Dummy 2 ^b	0.15	0.46	1.16	0.48–2.84
Message Frame × Targeting	0.41	0.59	1.51	0.47–4.78
Message Frame × Dummy 1 ^a	0.49	0.66	1.63	0.45–5.88
Message Frame × Dummy 2 ^b	0.30	0.60	1.34	0.41–4.39
Targeting × Dummy 1 ^a	0.66	0.65	1.93	0.54–6.90
Targeting × Dummy 2 ^b	1.08	0.73	2.94	0.70–12.35
Frame × Targeting × Dummy 1 ^a	1.90	0.92	6.68*	1.09–40.90
Frame × Targeting × Dummy 2 ^b	2.50	0.97	12.22**	1.82–81.93
12 months after exposure to video presentations ^d				
Age	0.02	0.01	1.02*	1.00–1.04
Education	0.02	0.07	1.02	0.89–1.18
Health ratings	0.17	0.09	1.19	0.99–2.61
Marital status	0.11	0.10	1.11	0.92–1.34
Past year's mammography use	0.98	0.19	2.66**	1.82–3.88
Message frame	0.09	0.37	1.09	0.53–2.27
Targeting	0.09	0.38	1.10	0.52–2.32
Dummy 1 ^a	0.27	0.44	1.31	0.56–3.08
Dummy 2 ^b	0.05	0.45	1.05	0.43–2.56
Message Frame × Targeting	0.35	0.55	1.42	0.48–4.18
Message Frame × Dummy 1 ^a	0.84	0.60	2.31	0.71–7.52
Message Frame × Dummy 2 ^b	0.32	0.59	1.38	0.43–4.42
Targeting × Dummy 1 ^a	0.47	0.62	1.61	0.48–5.41
Targeting × Dummy 2 ^b	0.48	0.65	1.62	0.45–5.85
Frame × Targeting × Dummy 1 ^a	1.73	0.87	5.63*	1.02–31.01
Frame × Targeting × Dummy 2 ^b	1.39	0.91	4.03	0.68–23.88

^a Anglos versus Latinas and African Americans. ^b Latinas versus Anglos and African Americans. ^c For model, $\Delta\chi^2 = 8.10, p < .05$. ^d For model, $\Delta\chi^2 = 4.65, p < .05$.
 * $p < .05$. ** $p < .01$.

culture and ethnicity are more complex than what is implied by merely matching ethnically similar photographs and statistics to message recipients. Future research examining different aspects of targeting may demonstrate that targeting in a richer and more meaningful way—such as focusing on community values—can be a powerful tool for promoting cancer-prevention behaviors. Lastly, targeting solely to ethnic background may be ineffective in motivating screening mammography because breast cancer is a disease somewhat indifferent to ethnic background—it affects all women.

The present data suggest that Anglo women and Latinas were best motivated to obtain a mammogram with a loss-framed, multicultural message. However, African American women were not differentially responsive to the four messages. African American women often report greater barriers to screening (Mickey et al., 1995). These impediments to screening may be such that they overwhelm the potential impact of a loss-framed appeal. Further research might be conducted that compares the relative advantages of gain- and loss-framed messages for African Americans in a setting that actively minimizes the barriers to behavior faced by

this population (e.g., offering free screening at a mobile mammography clinic).

In this experiment, we measured factors that might have mediated the influence of message framing and targeting on behavior change. We included variables from familiar theories accounting for the adoption of health behaviors (e.g., protection motivation theory [Rogers, 1983], health belief model [Rosenstock, 1974], subjective expected utility theory [Sutton, 1987], theory of reasoned action [Ajzen & Fishbein, 1980]). None of these variables mediated the effects of the messages on behavior change. Although a number of factors have been proposed to mediate the influence of message frames on behavior (Rothman & Salovey, 1997), intervention studies such as the one reported in this article have been unable to provide evidence of mediation (Banks et al., 1995; Detweiler et al., 1999; Rothman et al., 1993). Of course, some of the measures of these potential mediators were not developed or validated in the kinds of populations that participated in this experiment, and that, in part, may account for this finding. Research that focuses more directly on how framed messages are

processed (e.g., Kelly & Rothman, 2000; Rothman et al., 1999; Schneider et al., in press) may prove to more effectively specify the means by which message factors elicit behavior change.

A limitation of the current study that should be addressed in subsequent work is the 12-month follow-up period. Very little is known about the longer term impact of framed appeals on health behavior. For example, would repeated exposure to framed "booster" messages strengthen the effects of loss-framed, multicultural messages over time? Another limitation of this study is that only two levels of comparison were used to examine the effects of targeting on screening mammography: multicultural versus ethnically targeted messages. Further research is necessary to examine the relative effectiveness of individualized tailoring versus group-based targeting in various forms (e.g., to ethnic origin and sociocultural and familial factors).

The findings of the current study, together with those of prior research (Banks et al., 1995), recommend the use of loss-framed, multicultural messages to motivate mammography screening. Nonetheless, community and governmental organizations involved in promoting cancer detection behaviors have resisted using messages that emphasize undesirable consequences (Egger, Donovan, & Spark, 1993). As stronger findings for the value of loss-framed messages in this domain are obtained, perhaps this hesitancy will disappear, at least for message recipients other than African American women.

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