Attributions of Responsibility and Persuasion:
Increasing Mammography Utilization Among Women
Over 40 With an Internally Oriented Message

Alexander J. Rothman, Peter Salovey, Carolyn Turvey, and Stephanie A. Fishkin

One hundred ninety-seven women over 40 years old and not adhering to national guidelines for
screening mammography viewed persuasive messages varying in attributional emphasis (internal,
external, or information-only). Internal attributions of responsibility for health-promoting behav-
ior were expected to motivate the greatest change in women's attitudes and behaviors in relation to
breast cancer and mammography. Attitudes about breast cancer and mammography were
measured immediately and 6 months after the presentation. Twelve months later, women who
viewed the internal message were more likely to have obtained a screening mammogram than
women assigned to the other 2 conditions. The attributions of responsibility encouraged by the
persuasive messages were associated with whether viewing the presentation led to behavior change.

Key words: attributions, breast cancer, mammography, persuasion

Behavioral choices can account for substantial variance in illness (reviewed by Rodin & Salovey, 1989). As a result, how
best to influence decisions to adopt healthy behaviors is an important psychological question. This experiment investi-
gated the influence of one social psychological variable, attribution of responsibility, on persuasion and the subsequent
adoption of a health protective behavior. Specifically, we
compared the influence of persuasive messages varying in
emphasis on internal versus external attributions of responsibil-
ity for the early detection of breast cancer on attitudes about
and actual use of regular screening mammography.

Attributions of Responsibility and Health Behaviors

A potentially important characteristic of persuasive health messages is their relative emphasis on who is responsible for
maintaining one's health. Often, health messages attempt to
persuade people to take charge of their life and to be more responsible for their health. Smokers are urged to stop
smoking, passengers are instructed to buckle up, alcoholics are
told to stop drinking, and women are advised to perform
early-detection behaviors for breast cancer, such as breast
self-examination. To induce people to change their habits,
these health messages encourage them to take a more active
role in their health care and to attribute responsibility to
themselves for their health-related behavior.

Research on attributions has generally addressed one of two
questions: Attribution theories have examined the cognitive antecedents of attributions, and attributional theories have
examined the attitudinal and behavioral consequences of
attributions (Forsterling, 1985, 1986; Harvey & Weary, 1984;
Kelley & Michela, 1980; see Michela & Wood, 1986, for a
review of this framework within the health domain). Previous
examinations of attributions and health have focused primarily
on explanations for unfortunate events or illnesses. In these
investigations, an attribution operates as an explanation for an
event that has already occurred and serves as the basis on
which to assess controllability, blame, or meaning (Janoff-
Bulman, 1979; Shaver, 1985; Taylor, Lichtman, & Wood, 1984;
Wortman, 1976; but see Downey, Cohen-Silver, & Wortman,
1990). This article, however, focuses on whether internal and
external attributions differentially influence attitudes about,
and the performance of, a health protective behavior.
In comparison with research on the relationship between attribution and adjustment, the premise that attributions have a differential influence on health behavior has been examined only selectively. There is research to suggest that attributional orientation, the way in which a person perceives the causes or motives for changes in beliefs and actions, affects attitude and behavior change. External attributions for the causes of a behavior change are associated with poorer adherence to recommendations and poorer maintenance of new behaviors (e.g., Davison & Valins, 1969; Storms & Nisbett, 1970). Internal attributions for the motives for behavior change, however, are positively correlated with the adoption of health behaviors such as fluoride mouth rinsing (Lund & Kegeles, 1984), smoking cessation (Colletti & Kopel, 1979; Fisher, Levenkron, Lowe, Loro, & Green, 1982), and high blood pressure screening (King, 1982). Similarly, research on health locus of control (Wallston & Wallston, 1981, 1982) has suggested that an internal locus of control is associated with health information seeking, although perhaps only for those people who place great importance on their health (e.g., Quadrel & Lau, 1989; Wallston, Maides, & Wallston, 1976).

In an extensive study on attribution and behavior change, Harackiewicz, Sansone, Blair, Epstein, and Manderlink (1987) manipulated internal and external attributions for participation in a smoking cessation program. Subjects who entered the program were randomly assigned to treatments that differed in the externality of the cessation strategy (self-help manual vs. nicotine gum) and in motivational orientation (intrinsic vs. extrinsic). Although initial cessation of smoking was partially associated with external attributions for behavior change, long-term behavior change was predicted best by internal attributions for the success of the treatment program. However, the participants in the extrinsic and intrinsic conditions who made the appropriate attributions for their behavior change, external and internal respectively, successfully quit smoking.

The latter finding is consistent with the framework proposed by Brickman et al. (1982), who suggested that for an intervention to be successful, the causal attributions promoted by the program should correspond to those causal attributions made by people about the health problem and its alleviation. Although Brickman et al. emphasized the importance of the match between the attributions made by a person and an intervention, they also suggested that holding people responsible for their health behavior produces long-term change.

It seems, then, that attributions of responsibility to oneself for the performance of health-related behaviors are positively associated with the execution of these behaviors. However, this conclusion is based primarily on assessments of correlations between self-reported attributions and behavior change (e.g., Colletti & Kopel, 1979; Fisher et al., 1982; King, 1982). In the present study, we manipulated the attributional emphasis for performing health protective behaviors in a persuasive message about breast cancer and mammography. We predicted that a message that attributed responsibility to the self (internal) as compared with one that attributed responsibility to a health-care provider (external) for initiating health-protecting behaviors would lead women to increase their perceived responsibility for breast cancer prevention and would encourage them to obtain a screening mammogram.

Prevention and Early Detection of Breast Cancer: The Use of Screening Mammography

One out of every nine American women will get breast cancer at some point in her life. Each year, over 100,000 women are diagnosed with breast cancer in the United States, one third of whom die of the disease. Breast cancer is the most common cancer found in women and, after lung cancer, is the second leading cancer killer (American Cancer Society, 1990; National Cancer Institute, 1989). Screening mechanisms such as breast self-examination, clinical breast examination by a health professional, and mammography are thought to be highly effective in detecting breast cancer early when treatment options are maximized. Presently, the American Medical Association, the American Cancer Society, and the National Cancer Institute all recommend that asymptomatic women between 40 and 49 years of age have a mammogram every 1 to 2 years and then annually after age 50 (Fox, Klos, & Tsou, 1988).

Mammography is the most controversial, least studied, and least used breast cancer screening device. Despite long-standing guidelines, before 1987, only 15%–20% of women over 50 reported having had a mammogram in the past year (Howard, 1987). Similarly, about 19% of all women between the age of 35 and 49 had ever had a single screening mammogram (Fox, Baum, Klos, & Tsou, 1985). However, more recent data suggest that mammography use is increasing (Centers for Disease Control, 1989a, 1989b; Rimer, Keintz, Kessler, Engstrom, & Rosan, 1989). For example, a recent nationwide study reported that 31% of women were adhering to the mammography guidelines (Centers for Disease Control, 1990). Still, these adherence rates are lower than those for breast self-examination (50%–70%) and clinical breast examination (70%–80%; Fox, Baum, Klos, & Tsou, 1985).

The underuse of mammography is shocking when one considers that mammography is “the most sensitive and reliable method of early detection” (Gold, 1988, p. 517). In the Breast Cancer Detection Demonstration Project (Baker, 1982), 42% of detected breast cancers were found by mammography alone as compared with 9% for clinical breast examination alone. In addition, several studies have shown that mammography may be associated with lowered cancer mortality (Baker, 1982; Eddy, Hasselbald, McGivney, & Hendee, 1988; Newell, Dodd, & Fink, 1988; Shapiro, Vanet, Strax, Vanet, & Roesser, 1982; see Miller, 1991, for a review), although the specific impact of mammography on mortality remains controversial.

The reason most often suggested for the underuse of mammography is that doctors do not recommend it to their patients (Fox et al., 1988). Consequently, systematic efforts to address the low rates of mammography use have focused almost exclusively on interventions aimed at changing referral practices among health-care providers (Fox, Tsou, & Klos, 1985a, 1985b). Only recently has attention been paid to influencing the behavior of patients (Reynolds, West, & Aiken, 1990; Rimer et al., 1989).
The Present Experiment

This experiment examined how altering attributions of responsibility for maintaining one's health affected women's attitudes and behaviors regarding screening mammography. We presented persuasive educational programs about breast cancer and mammography to women 40 years old and over who were not adhering to the national guidelines for mammography. Women viewed a video that emphasized either internal (self) or external (health-care provider) attributions of responsibility for performing early-detection behaviors. A similar group of women viewed a program that emphasized neither self nor health-care provider attributions of responsibility but contained the same information about breast cancer and mammography. Women's attitudes about breast cancer and mammography and their perceptions of responsibility for getting a mammogram were measured after the presentation. We assessed whether participants obtained a screening mammogram 6 and 12 months later. We predicted that women in the internal condition would show greater attitude and behavior change than women in the external or information-only conditions. The external and information-only messages were not expected to differ significantly from each other in their effectiveness in promoting mammogram use.

Method

Subjects

Women age 40 or over were recruited from a large Northeastern utility company to attend an information session on breast cancer and mammography by a tear-off coupon placed in company and union newsletters. Of the 350 women who responded, 250 were eligible for the study. Women were deemed eligible if they were 40 or over and had not had more than 50% of the number of screening mammograms recommended for someone their age, although they were not told that they had been selected on the basis of this criterion. Women were paid $10 for their participation and, in turn, donated their compensation to the American Cancer Society.

Subjects in this study were assigned to one of three conditions: internal, external, and information-only. Two hundred fifty eligible women signed up to participate in the study, 197 of whom completed and returned the two required questionnaire packets (79% response rate). After a subject was deemed eligible, she selected one of five viewing times to attend the information session. When every subject had selected a viewing time, experimental conditions were randomly assigned to each of the time slots. Because there were only five viewing times, the information-only condition was shown just once. Overall, there were 90 subjects in the internal condition, 44 subjects in the external condition, and 63 in the information-only condition. The unequal number of subjects in each condition was primarily due to differences in preferences for the five viewing times.

Persuasive Message Presentation

Women who were eligible for the videotaped information session viewed one of the three programs (internal, external, or information-only). The three messages varied solely in their attribution of responsibility for preventing and detecting breast cancer.

The internal tape emphasized a woman's own responsibility for getting a mammogram and detecting breast cancer (e.g., “Eight out of 10 lumps that you might find will not be breast cancer,” and “While it is not known yet how to prevent breast cancer, the value and benefits of your finding it early are well-known”).

The external tape emphasized a doctor's responsibility for detecting breast cancer, using mammography (e.g., “Eight out of 10 lumps that a doctor might find will not be breast cancer,” and “While it is not known yet how to prevent breast cancer, the value and benefits of a doctor finding it early are well-known”).

The information-only tape was designed to communicate information without any singular emphasis on internal or external attributions of responsibility (e.g., “Eight out of 10 lumps that are found will not be breast cancer,” and “While it is not yet known how to prevent breast cancer, the value and benefits of finding it early are well-known”).

The “Facts About Mammography” videotape was designed by a collaborative team from the Yale Department of Psychology and the Yale Cancer Prevention Research Unit at the Department of Epidemiology and Public Health. The presentation covered general information about breast cancer, risk factors, and preventive measures. The presentation was a videotaped slide show with an accompanying audiotape that was dubbed on to videotape by professional television technicians. “Facts About Mammography” was written to be understood by individuals reading at the sixth-grade level to ensure comprehension by all subjects. All three conditions of “Facts About Mammography” were the same length and contained exactly the same factual material.

Measures

Prepresentation

General health background. This form contained 22 items concerning demographic characteristics as well as cancer-related health history (e.g., family history of cancer, frequency of medical visits, personal breast problems, frequency of mammograms, frequency of breast self-examination).

Postpresentation

Attitudes about breast cancer and mammography. Twelve questions addressed a woman's perception of the effectiveness and importance of mammography (e.g., “How effective do you think mammography is for finding lumps in a woman’s breast?”) as well as her perceptions of the experience of having a mammogram (e.g., “How painful do you feel mammography is?”). In addition, a woman's perceptions of her own and her doctor's responsibility for keeping herself healthy and detecting breast cancer were measured (e.g., “How responsible do you feel your doctor is for keeping you healthy?” and “How responsible do you feel you are for finding breast cancer?”). All questions were coded on a scale ranging from not at all (1) to very much (5).

1 Noncompliance was determined using the following formula: (Age - 40)/2 ≥ no. reported mammograms. For example, a woman who was 52 years old and had had only 5 mammograms would be eligible, (52 - 40)/2 = 6.

2 Subjects also completed a perspectives-on-cancer scale and rated their perceptions of risk, as well as their perceived self-efficacy for cancer-related behaviors (Rothman, 1990). Because none of these scales provided data that were informative to the hypotheses of this experiment, they are not addressed further.
Procedure

Before attending the educational presentation on breast cancer and mammography, women who were eligible for the study were asked to complete a packet including consent forms and the General Health Background Questionnaire. Using the company's closed circuit television network, women then viewed a 20-min presentation entitled "Facts About Mammography" at one of five presentation times during the day. After the presentation of either the internal, external, or information-only videotape, subjects completed a sealed packet of measures that they had received in the mail. This packet included the postpresentation measures described above. On completion of the measures, subjects were asked to mail all forms to the investigators in a stamped, self-addressed envelope. Once the forms were received, subjects were sent a letter thanking them for their participation as well as an additional pamphlet containing information about the Yale Mobile Mammography Unit. Each pamphlet contained a slogan relevant to the subject's assigned condition. The internal pamphlet stated, "It's your responsibility: Get a mammogram," the external pamphlet stated, "Doctors recommend: Get a mammogram," and the information-only pamphlet stated, "Get a mammogram."

Six months after viewing the program, all subjects were recontacted by telephone and were asked whether they had obtained a mammogram during the prior 6 months. At that time, subjects also answered several questions concerning their attitudes about mammography and their perceptions of responsibility for performing preventive health behaviors related to breast cancer. Any subject who had not yet obtained a mammogram or could not be reached at 6 months was recontacted 12 months after the presentation. The persuasive intervention was conducted in January 1990, and 6- and 12-month behavioral measures were collected in July 1990 and January 1991, respectively.

Results

Subject Demographics

Subjects in the three conditions were compared on an extensive series of non-health-related and health-related demographic variables, and condition differences were not found on these measures. Table 1 contains a general profile of the women who participated in this study.

Scoring of Scales

The scales eliciting reactions to the videotape and the attitudes about breast cancer and mammography questionnaire were expected to be multidimensional. To extract these factors, each scale was submitted to a principal-components analysis with varimax rotation.

Reaction to the videotape. Two components accounting for 55% of the total variance were extracted in a principal-components analysis on these items. Items with loadings greater than or equal to .40 were retained, so long as their second-highest loadings were not within .10 of their highest loading. (This criterion was used for all principal-components analyses.) The first component contained six items reflecting

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3 There was a condition difference in the number of yearly doctor visits, $F(2, 185) = 4.16, p = .02$. Subjects in the information-only condition had fewer visits than subjects in the external condition. However, there was no reliable difference in the number of visits between subjects in the internal and external conditions.
how interesting, hopeful, and relieving the presentation made the women feel and was labeled positive reactions (eigenvalue = 3.36; accounted for 34% of the total variance). The second component contained four items reflecting how sad and afraid the videotape made subjects feel and was labeled negative reactions (eigenvalue = 2.06; accounted for 21% of the total variance). The inter-correlation of the two factor scores was .03.4 (See Appendix A for a complete list of the items loading on each component.)

**Attitudes about breast cancer and mammography questionnaire.** Four components were extracted from the attitudes about breast cancer and mammography questionnaire, accounting for 55% of the total variance. The first component contained five items that reflected the importance of mammography (e.g., "How important is it for you to have a mammogram?") and was labeled value of mammography (eigenvalue = 2.68; accounted for 22% of the total variance). The second component contained two items that reflected a health-care provider's responsibility for keeping a person healthy, and it was labeled responsibility of a health-care provider for health (eigenvalue = 1.69; accounted for 14% of the total variance). Two items loaded on the third component, reflecting the perceived danger of mammography, which was labeled fear of mammography (eigenvalue = 1.21; accounted for 10% of the total variance). Finally, three items reflecting a person's own responsibility for keeping himself or herself healthy loaded on a fourth component, called responsibility of self for health (eigenvalue = 1.06; accounted for 9% of the total variance). The intercorrelations among the four factor scores ranged from -.17 to .29. (See Appendix B for a complete list of the items loading on each component.)

**Reactions to the Video Presentation**

All three educational videotapes were designed to differ only in the attributional stance emphasized. To ensure that there were no other relevant differences among the tapes, we elicited subjects' reactions to the presentations. Table 2 contains the means for these measures. Subjects' positive and negative affective reactions to the presentation did not differ by condition, $F(2, 194) < 1$, ns, and $F(2, 192) = 2.38$, ns, respectively. In addition, subjects in the three experimental conditions did not differ significantly in the amount of knowledge about breast cancer and mammography they acquired from the presentation, $F(2, 194) < 1$.

**Attributions of Responsibility and Breast Cancer**

The presentations were designed to emphasize different attributions of responsibility for preventing and detecting breast cancer. We hypothesized that women in the internal condition would be more likely to attribute responsibility to the self and that women in the external condition would be more likely to attribute responsibility to health-care providers.

Subjects separately rated their perceptions of responsibility for both themselves and a health-care provider for maintaining a person's health.5 An overall responsibility score was calculated for each subject by subtracting the perceived responsibil-

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4 A two-component solution was selected on the basis of the scree criterion (third component eigenvalue = 1.09).

5 Before viewing the presentation, there were no differences across experimental condition in women's perceptions of responsibility for either themselves or a health-care provider for maintaining health.
Obtaining Mammograms After the Presentation

Subjects were contacted 6 and 12 months after the presentation. Subjects were not contacted at 12 months if they reported having obtained a mammogram at the 6-month interview. After we completed the 12-month follow-up, mammogram data for 185 of the original 197 subjects were available. None of the 185 women who were contacted reported obtaining a mammogram because of a diagnosed breast problem. We had hypothesized that women in the internal condition were more likely to obtain a mammogram than women in either the external or the information-only conditions. Of women in the internal condition, 65.9% reported obtaining a mammogram during the 12 months after the presentation, and 57.1% and 55.2% of the women in the external and information-only conditions, respectively, reported having obtained a mammogram. Haberman’s (1974) analysis of frequency data using the FREQ program, a form of log-linear analysis, was used to test our hypothesis. We tested the fit to the data presented in Table 4 of two alternative models: (a) a model that assumed no difference among the three conditions in the use of mammography and (b) a model that assumed that mammography use in the internal condition was different from use in the external and information-only conditions. A model is said to fit when the residual likelihood ratio chi-square is nonsignificant. The model predicting no difference among conditions did not reliably fit the data, $L^2(2) = 10.77, p < .01$. However, the model testing that mammography use rates in the internal condition were different from the rates in the external and information-only conditions fit the data quite well, $L^2(1) = 2.88, ns$. Furthermore, the improvement in goodness of fit from Model 1 to Model 2 was reliable, $\Delta L^2(1) = 7.89, p < .01$. Women who viewed the internal presentation were significantly more likely to obtain a mammogram than women in either of the other two conditions.

To evaluate further the effectiveness of our intervention, the percentage of women who had a mammogram in each condition was compared with a baseline percentage of women in the state of Connecticut who annually obtained a mammogram. Presently, Connecticut has one of the highest mammography use rates in the United States; in 1989, 48.5% of all eligible women age 40 or over obtained a mammogram (Adams, personal communication, July 16, 1991; Connecticut Department of Health Services, 1990). This baseline is consistent with data from 1987–1988 reporting that 45% of women age 40 or over had a mammogram in the past year (Sackmary, 1989). A comparison of the utilization rates in each condition showed that consistent with hypotheses, women in the internal condition were more likely to obtain a mammogram than the average women in Connecticut, $x^2(1) = 12.10, p < .005$. However, women in both the external and the information-only conditions were not reliably more likely to get a mammogram, $x^2(1) = 2.96, ns$, and $x^2(1) = 1.78, ns$, respectively.

Discriminant Analysis: Who Obtains a Mammogram?

A stepwise discriminant analysis was performed to determine the variables most associated with obtaining versus not obtaining a mammogram during the 12 months after the presentation. Controlling for the nonindependence among measured variables, this analysis allowed us to determine which of these variables maximally discriminated the adherent from the nonadherent women. For the analysis, we considered reactions to the presentation, knowledge about mammography, self versus other responsibility at both time points, all attitudes toward mammography at both time points, age, number of prior mammograms, annual doctor visits, income, intention to get a mammogram, and experimental condition. Table 5 contains the results of this analysis. Six variables (number of mammograms obtained previously, expressed intention to get a mammogram, relative responsibility of self versus others for health at 6 months, knowledge about mammography, experimental condition [internal], and negative reactions to the presentation) reliably discriminated between women who had and who had not received a mammogram. The discriminant function accounted for 28% of the variance in

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**Table 3**

Means and Standard Deviations for Attitudes About Breast Cancer and Mammography and Attributions of Responsibility for Health by Condition

<table>
<thead>
<tr>
<th>Variable</th>
<th>Internal</th>
<th>External</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Postpresentation value of mammography</td>
<td>4.62</td>
<td>0.41</td>
<td>4.64</td>
</tr>
<tr>
<td>Postpresentation fear of mammography</td>
<td>1.57</td>
<td>0.80</td>
<td>1.65</td>
</tr>
<tr>
<td>Postpresentation responsibility of self minus health-care provider</td>
<td>0.75</td>
<td>1.00</td>
<td>0.34</td>
</tr>
<tr>
<td>6-month follow-up responsibility of self minus health-care provider</td>
<td>0.25</td>
<td>3.53</td>
<td>−0.72</td>
</tr>
</tbody>
</table>

**Table 4**

Twelve-Month Behavioral Follow-Up: Mammography

<table>
<thead>
<tr>
<th>Obtained Mammogram</th>
<th>Condition</th>
<th>Internal</th>
<th>External</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>% yes</td>
<td>65.9</td>
<td>57.1</td>
<td>55.2</td>
<td></td>
</tr>
<tr>
<td>% no</td>
<td>34.1</td>
<td>42.9</td>
<td>44.8</td>
<td></td>
</tr>
</tbody>
</table>

Note: Conditions with different subscripts differ reliably from each other at $p < .01$. 

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**Table 5**

Discriminant Analysis: Who Obtains a Mammogram?

<table>
<thead>
<tr>
<th>Discriminant Function</th>
<th>$x^2(6) = 28.22, p &lt; .001$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of mammograms</td>
<td>6.70, p &lt; .01</td>
</tr>
<tr>
<td>Experimental condition (internal)</td>
<td>5.62, p &lt; .05</td>
</tr>
<tr>
<td>Relative responsibility of self versus other</td>
<td>5.62, p &lt; .05</td>
</tr>
<tr>
<td>Attitudes toward mammography</td>
<td>5.24, p &lt; .05</td>
</tr>
<tr>
<td>Age</td>
<td>5.14, p &lt; .05</td>
</tr>
<tr>
<td>Number of prior mammograms</td>
<td>4.88, p &lt; .05</td>
</tr>
<tr>
<td>Annual doctor visits</td>
<td>4.88, p &lt; .05</td>
</tr>
<tr>
<td>Income</td>
<td>4.77, p &lt; .05</td>
</tr>
<tr>
<td>Intention to get a mammogram</td>
<td>4.64, p &lt; .05</td>
</tr>
<tr>
<td>Negative reactions to the presentation</td>
<td>4.52, p &lt; .05</td>
</tr>
</tbody>
</table>

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mammography use \((R = .53, \text{ Wilk's lambda} = .72), F(6, 145) = 9.51, p < .0001\).

The means of the discriminating variables by group, which can be found in Table 5, indicated that women who obtained mammograms were those who had obtained several mammograms at a younger age, who had intended to get a mammogram, who were knowledgeable about the value of mammography, and who had felt sad or scared after viewing the presentation. Of particular interest, however, was that women who obtained a mammogram were also more likely to have viewed the internal-attribution videotape and 6 months later attributed more responsibility to themselves than health-care providers for maintaining health.

**Discussion**

We hypothesized that persuasive messages varying in attributions of responsibility would differentially affect women's attitudes and subsequent behavior concerning the prevention of breast cancer. Women who viewed a presentation that emphasized internal attributions of responsibility for health were then expected to attribute greater responsibility for health to themselves and to be more likely to obtain a mammogram during the ensuing year than women in either of the other two conditions.

There were no differences in affective responses to the three presentations, nor were there any differences in the knowledge that the three presentations conveyed. Furthermore, women in each presentation condition reported no difference in their value or fear of mammography, indicating that the three conditions did not differ in the emotions they aroused or in the information about breast cancer and mammography communicated. However, there was a difference among conditions in whether a woman obtained a mammogram during the 12 months after the presentation. Women who viewed the presentation that emphasized internal attributions of responsibility for health were more likely to describe themselves as responsible for the prevention of cancer and then to obtain a mammogram than women who viewed either the external or the information-only presentation. Furthermore, only women who viewed the internal presentation were reliably more likely to obtain a mammogram than the average eligible woman in Connecticut. This increase was particularly impressive given that the women who participated in our study previously had not complied with guidelines for mammography, whereas the comparative baseline percentage for Connecticut was computed on a random sample that included both compliant and noncompliant women.

Women were recruited for this study with the assistance of the utility company's health education program. Although we would have preferred to have recruited a no-intervention control group from the same pool of women who participated in our three experimental conditions, the company would not allow us to withhold information about breast cancer from any interested employee, for obvious ethical considerations. The option of merely delaying the transmission of information about breast cancer for 1 year was unacceptable to both the experimenters and the company both because of the possible development of breast cancer in any woman during those 12 months and because such a "wait list" group quite likely would receive additional breast cancer information through contact with study participants and the media.

The finding that the internal-attribution condition was most effective in promoting mammography is generally compatible with previous studies. Perhaps this message of responsibility enables people to feel in control of their life and therefore encourages them to take an active role in monitoring their health. Unfortunately, at the present time, these mediating variables have not been measured.

The framework proposed by Brickman et al. (1982) suggests that behavior is facilitated if there is a match between the attributions made by the individual about some behavior and the attributions promoted by the intervention. However, the present experiment did not provide support for this hypothesis. Women who were internally oriented in their attributional style before the video were not more likely to obtain a mammogram after viewing the internally oriented presentation. Likewise, women who were externally oriented in their attributional style before the video were not more likely to obtain a mammogram after viewing the externally oriented presentation.

The findings presented in this article, if replicated, have important implications for public health campaigns designed to promote mammography. Our results suggest that when presenting information about breast cancer and mammography, emphasizing a woman's responsibility for taking care of her health will significantly increase the likelihood that she will obtain a mammogram. However, in assessing the public health implications of this study, one needs to consider characteristics of the sample of women who participated. The women in this sample were educated, relatively affluent, and predominantly White. Unfortunately, the percentage of non-White women was too small to investigate whether there were any differences

<table>
<thead>
<tr>
<th>Variable entered</th>
<th>Group M*</th>
<th>Mammogram</th>
<th>No mammogram</th>
<th>F to enter</th>
<th>Canonical R²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. No. mammograms since age 35</td>
<td>2.27</td>
<td>1.15</td>
<td>23.19</td>
<td>.13</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td>2. Intention to have mammogram</td>
<td>0.97</td>
<td>0.80</td>
<td>15.82</td>
<td>.22</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td>3. Responsibility of self minus other for health at 6 months</td>
<td>0.03</td>
<td>-0.32</td>
<td>3.55</td>
<td>.24</td>
<td>&lt; .07</td>
<td></td>
</tr>
<tr>
<td>4. Knowledge of mammography</td>
<td>4.89</td>
<td>4.53</td>
<td>3.44</td>
<td>.25</td>
<td>&lt; .07</td>
<td></td>
</tr>
<tr>
<td>5. Internal condition</td>
<td>0.50</td>
<td>0.40</td>
<td>3.01</td>
<td>.27</td>
<td>&lt; .09</td>
<td></td>
</tr>
<tr>
<td>6. Negative reaction to film</td>
<td>1.57</td>
<td>1.46</td>
<td>2.90</td>
<td>.28</td>
<td>&lt; .10</td>
<td></td>
</tr>
</tbody>
</table>

*Note. Discriminant function statistics: Wilk's lambda = .72, \(F(6, 145) = 9.51, p < .0001\), canonical \(R² = .28\).*
that were due to race or ethnicity in the effectiveness of the messages. Previous research, however, has demonstrated that the use of mammography can vary depending on culture and ethnicity (e.g., Bastani, Marcus, & Hollatz-Brown, 1991; Rimer et al., 1989; Stein, Fox, & Murata, 1991).

Finally, the differential effect of attributions of responsibility demonstrated in this experiment is noteworthy, given that the manipulation of attributional orientation was subtly imbedded in an involving persuasive message about a serious health concern. Although the role that attributions play in coping processes has recently been challenged (Downey et al., 1990), this experiment affirms the importance of attributions of responsibility for influencing actions taken to minimize a potential health problem.

Conclusion

The relationship between attributions of responsibility and health behavior is complex (Michela & Wood, 1986). In a large field experiment, we examined whether women obtained a screening mammogram after viewing an educational presentation that emphasized attributing responsibility for performing health behaviors to either themselves or to health-care providers. An analysis of the number of women who obtained a mammogram during the year after the presentation strongly suggests that a persuasive presentation that emphasizes one's own responsibility for maintaining health is most effective in promoting mammogram use.

References

Appendix A
Principal-Components Analysis of Reaction to Presentation Scale

<table>
<thead>
<tr>
<th>Reaction</th>
<th>Component 1: Positive reactions (eigenvalue = 3.36)</th>
<th>Component 2: Negative reactions (eigenvalue = 2.06)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Component I</td>
<td>II</td>
</tr>
<tr>
<td>How interesting was the slide show?</td>
<td>.82</td>
<td>.05</td>
</tr>
<tr>
<td>How relieved did the slide show make you feel?</td>
<td>.78</td>
<td>-.02</td>
</tr>
<tr>
<td>How much did you learn about breast cancer from the slide show?</td>
<td>.78</td>
<td>.14</td>
</tr>
<tr>
<td>How happy did the slide show make you feel?</td>
<td>.74</td>
<td>-.07</td>
</tr>
<tr>
<td>How believable was the slide show?</td>
<td>.58</td>
<td>.00</td>
</tr>
</tbody>
</table>

Appendix B
Principal-Components Analysis of Attitudes About Breast Cancer and Mammography Questionnaire

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Component I</td>
<td>II</td>
<td>III</td>
<td>IV</td>
</tr>
<tr>
<td>How important do you think mammography is for finding breast cancer?</td>
<td>.76</td>
<td>.00</td>
<td>.16</td>
<td>.20</td>
</tr>
<tr>
<td>How effective do you think mammography is for finding lumps in a woman's breast?</td>
<td>.71</td>
<td>.24</td>
<td>.07</td>
<td>.08</td>
</tr>
<tr>
<td>How important do you think it is for you to have a mammogram?</td>
<td>.67</td>
<td>-.13</td>
<td>.21</td>
<td>.09</td>
</tr>
<tr>
<td>How likely do you think it is that mammography could expose you to too much radiation?</td>
<td>-.62</td>
<td>.27</td>
<td>.22</td>
<td>.13</td>
</tr>
</tbody>
</table>


