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The authors conduct two experiments that indicate that the effectiveness of loss- versus gain-framed messages depends on the affective state of the message recipient. In Experiment 1, the authors find that participants induced with a positive mood are more persuaded by the loss-framed message, whereas participants induced with a negative mood are more persuaded by the gain-framed message. In addition, the authors observe that participants in a positive mood have higher risk estimates and lower costs in response to the loss frame than the gain frame, whereas the reverse is true for participants in a negative mood. The authors replicate these effects in Experiment 2 in which they measure rather than induce the participants' affective state.

## Affect, Framing, and Persuasion

Despite the growing interest in the role of preexisting states on attitudes toward the ad and brand, few studies examine the interaction between these variables (e.g., Anand and Sternthal 1992; Levin and Chapman 1983; Soldow and Principe 1981; Wright 1981). We address this issue by studying how a person's affect (positive or negative) interacts with the message frame (emphasis on costs versus benefits). Affect-related effects in marketing have been observed in a variety of contexts such as variety seeking, set-size consideration, brand extension acceptability, risk seeking, and altruism (Isen, Nygren, and Ashby 1988; Kahn and Isen 1993; Keller, Lipkus, and Rimer 2002). Similarly, message framing is pervasive in marketing communications and package designs (e.g., 1% fat versus 99% fat-free; Yuspeh 1979). In this study, we examine the effect of affective state on health-related advertising that emphasizes either the benefits of some action or the costs of inaction to persuade the audience.

The literature indicates that intentions to engage in preventative health are generally higher when the behavior is framed in terms of its related costs (loss frames) than its related benefits (gain frames), even when the two frames describe objectively equivalent situations (Rothman and Salovey 1997). A handful of studies show that the main effect of loss-framed over gain-framed messages may depend on individual differences (i.e., prior behavior, see Block and Keller 1995; prior attitudes, see Levin and Chapman 1983; level of involvement, see Maheswaran and

Meyers-Levy 1990 and Rothman and Salovey 1997; for a review, see Levin, Schneider, and Gaeth 1998). For example, a family history of breast cancer may predispose the message recipient to think about breast cancer in terms of losses, thus facilitating her receptivity to a loss-framed message on breast self-examinations (Rothman and Salovey 1997).

How might prior affective states influence framing effects? Although the affect and framing literature suggests that framing effects are likely to interact with people's affect at the time the framed message is processed, with one exception (Wegener, Petty, and Klein 1994), there is no direct evidence to support this claim (Isen, Nygren, and Ashby 1988; Rothman and Salovey 1997). Two affective frameworks predict different effects for those in a positive state. The hedonic contingency framework that Wegener and Petty (1994) develop indicates that people in a positive mood are more likely to process uplifting messages and to avoid messages that may be depressing (Wegener, Petty, and Smith 1995). Consistent with this view, Wegener, Petty, and Klein (1994) find that participants in a happy mood are more persuaded by gain-framed arguments than loss-framed arguments. In contrast to the hedonic contingency framework, Isen (1993) proposes that people in a positive mood disregard negative information only if it is inconsequential. However, when real loss is possible or when the task is important, people in a positive mood may be more inclined to attend to negative information than controls or people in a neutral mood. Increased attention to negative information when stakes are high may occur because participants in a positive mood are thinking about losses, because they have more to lose (Isen and Geva 1987; Isen, Nygren, and Ashby 1988).

The aforementioned studies suggest that affective state can influence framing effects. Several issues remain unresolved. First, there is no empirical evidence on the effect of affect and framing in a context in which losses are conse-

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quential. We cannot assume that the previous study on mood and framing effects (Wegener, Petty, and Klein 1994) generalizes, because a more meaningful loss could vary persuasion patterns (Isen, Nygren, and Ashby 1988). Second, although there is some information on the differences between the processing styles and memory for those in a positive affective state versus controls, there is not similar information on those in positive versus negative affective states. We are particularly interested in the underlying process of framing effects for those in a sad or depressed state. Third, we are interested in testing the generalizability of the affect and framing effects by substituting induced mood with scores on a self-rated affective scale.

We tested these views by varying the framing for a message on breast cancer risk among women between 40 and 70 years of age in different affective states. The gain frame emphasized the benefits of getting a mammogram, whereas the loss frame emphasized the costs of not getting a mammogram. To assess the effect of affect, we induced a happy or sad mood (Experiment 1), or subjects filled out an affective scale (Experiment 2). We measured persuasion by intentions to get a mammogram. In both experiments, we tested the effects of affect and message frame on persuasion, perceived control over long-term health, feelings of anxiety, perceived risk of getting breast cancer, and perceived costs of getting a mammogram (e.g., embarrassment, pain).

#### MOOD AND FRAMING EFFECTS

The majority of studies on framing of personal messages are in the health area (e.g., AIDS, see Levin and Chapman 1983; breast self-examination, see Meyerowitz and Chaiken 1987 and Meyerowitz, Wilson, and Chaiken 1991; coronary heart disease, see Maheswaran and Meyers-Levy 1990; skin cancer, see Block and Keller 1995; and mammography, see Banks et al. 1995). Together, these studies suggest that when people are processing a message systematically, loss frames make the undesirable consequences of not adhering to the recommended behavior seem worse than gain frames. If a bad consequence of rejecting the message advocacy seems more likely (e.g., if I do not get the test, it is more likely that I will not catch the cancer in time), there would be a more compelling reason to adopt the message advocacy (i.e., get a mammogram).

The framing studies cited previously do not consider prior affective states. Three theories suggest that people in a positive or negative mood will differ in their reactions to framed messages. The mood-maintenance/mood-repair explanations suggest that people in a positive mood will choose to attend to information that is likely to maintain their positive mood, whereas people in a negative mood will be motivated to repair their mood by attending to information that will uplift them (e.g., Schaller and Cialdini 1990). Because information on benefits is more uplifting than information on costs, this view suggests a main effect of message frame such that people in a positive or negative mood will consider gain frames more persuasive than loss frames.

Similar to the mood-maintenance/mood-repair view, the hedonic contingency theory suggests that people in a positive mood will be motivated to process uplifting messages and avoid depressing or negative information (Wegener and Petty 1994). Consistent with this view, Wegener, Petty, and Klein (1994; Experiment 2) find that happy participants are

more persuaded by gain-framed arguments than loss-framed arguments. However, the hedonic contingency framework also suggests that people in a positive mood are more sensitive to the mood-changing consequences of their actions than people in a negative or neutral mood. In other words, compared with people in a positive mood, people in a negative mood do not care as much about how the information will spoil their mood because they are already in a negative mood. Thus, the hedonic contingency framework predicts that people in a positive mood prefer the gain-framed message to the loss-framed message but that framing effects are weaker or insignificant when people are in a negative mood.

Although these two theories can inform predictions on the relationship between mood and framing effects, several reasons indicate that these explanations may not generalize to the context in which we are interested. In contrast to the context of breast cancer in which loss may include death, loss was not as meaningful in Wegener, Petty, and Klein's (1994) study—in the loss condition, subjects were unable to avail of a hypothetical university part-time employment program. Also, as Wegener, Petty, and Smith (1995) acknowledge, the hedonic contingency framework may not apply when people in a positive mood are motivated to serve long-term mood management goals. Furthermore, the hedonic contingency framework is not supported in the negative mood condition (Wegener, Petty, and Klein 1994). Specifically, significant framing effects in their negative mood condition imply that participants in positive or negative mood treatments are equally aware of the hedonic consequences of their behavior.

Given our interest in designing effective messages in which noncompliance may result in death by breast cancer, we chose to focus on the third theory, the role of mood in the context of meaningful losses and gains. Isen and colleagues (Arkes, Herren, and Isen 1988; Isen and Patrick 1983; Kahn and Isen 1993) provide compelling evidence that people in a positive mood consider negative information carefully by making prudent risk-related decisions. Specifically, they find that though people in a positive mood are more risk seeking than controls when the level of risk is low, they prudently avoid taking large risks in a gambling context (Isen and Geva 1987; Isen, Nygren, and Ashby 1988; Isen and Patrick 1983). Isen and Geva's (1987) and Isen and Patrick's (1983) studies also provide evidence for the process underlying these effects. In particular, Isen and Geva (1987) show that people in a positive mood have more thoughts about losses than controls when the level of risk is moderate to high. This effect is reversed when the level of risk is low.

The increased focus on potential losses among those in a positive mood may be considered a departure from evidence in the mood-memory literature—that positive material from memory is made more accessible in a positive mood state. Isen and Geva (1987) propose that this discrepancy may be explained by a combination of two factors, the high level of risk and the potential real loss. In contrast to the memory literature in which there typically is no fear of potential loss, a consequential loss situation may focus a concern about losing. Along the same lines, Wegener, Petty, and Smith (1995) suggest that the loss frame persuades people in a positive mood if they are more concerned about maintaining their affective state in the long run rather than just their immediate positive mood. This view is also consistent with other studies that indicate that people with favorable (versus unfav-

orable) expectations are better able to recall immediate threatening information (Aspinwall and Brunhart 1996) and that positive feedback reduces ego-defensiveness or increases willingness to accept new negative feedback on an unrelated task (Trope and Neter 1994).

Together, these findings suggest that a health message framed as a loss would be more persuasive to those in a positive state than would a gain-framed message. This may occur because after the affect induction, people in a positive state are more concerned about losses because they have more to lose; so receiving a loss-framed message is consistent with their thoughts (Isen and Geva 1987; Isen, Nygren, and Ashby 1988). People in a positive state may also be more receptive to a loss (versus a gain) frame if they are motivated to maintain control over long-term positive affect rather than worry about spoiling their current positive affect. In our context, the loss frame may be interpreted as, a woman will be unhappy in the future if she does not have a mammogram now. Stated formally,

H<sub>1</sub>: For those in a positive affective state, loss frames will result in higher perceived risk, lower perceived costs, and higher persuasion than will gain frames.

The mood literature reviewed previously provides different accounts for the process guiding the actions of those in a negative mood. For example, the hedonic contingency model suggests that people in a negative mood state will be less responsive to the consequences of how actions influence their mood states than will people in a positive mood, because they have less to lose (Wegener and Petty 1994). This view predicts that people in a negative mood will not respond differently to gain and loss frames.

However, this prediction is inconsistent with the mood-repair literature that predicts that people in a negative mood are motivated to repair their mood. In a series of experiments, Leith and Baumeister (1996) show that people in a negative mood made suboptimal decisions in an attempt to offset their negative moods. Specifically, they find that people in a negative mood ignore odds information and risk nearly certain punishment (such as an aversive noise) for a tiny chance to win a large prize.

Consistent with the mood-repair view, three additional studies suggest that people in more negative affective states are less able to cope with additional negative information and prefer to receive positive rather than negative information. Specifically, Reed and Aspinwall (1998) show that subjects in less positive states are less open to and read threatening health information slower than more positive subjects. Lowenstein and colleagues (2001) indicate that people in negative moods are more anxious and that anxiety increases risk aversion. Similarly, Trope and Pamerantz (1998) find that subjects who receive negative feedback prefer asset-focused feedback than liabilities-focused feedback. These studies suggest that people in negative affective states will prefer a gain-framed to a loss-framed message either because a gain frame would be better for repairing a negative state or because people are less able to cope with additional negative information in a loss frame.

H<sub>2</sub>: For those in a negative affective state, gain frames will result in higher perceived risk, lower perceived costs, and higher persuasion than will loss frames.

We tested the hypotheses in two experiments with the same independent (affect and frame) and dependent (risk, costs, and persuasion) measures. We induced affect with a mood manipulation in Experiment 1, whereas in Experiment 2, participants provided a self-assessment of how they felt prior to message exposure. We describe these experiments and accompanying findings next.

## EXPERIMENT 1

### Participants

We recruited 85 women from a women's resource center to participate in the study. The advertisement asked women between the ages of 40 and 70 to participate in a study on women's well-being in exchange for \$20 and a chance to win a lottery of \$500. Of the participants, 92% were white, 3.5% were African American, and 2.5% were Hispanic. The average age of participants was 49 years (standard deviation [s.d.] = 5.70), and 72% possessed a college education or greater. Of these participants, 82% reported having had a mammogram.

### Procedure

We told participants that the experiment had two different and independent parts. We designed Part 1 to manipulate mood. The procedure was identical to the one used by Bless, Mackie, and Schwartz (1992). In Part 1, we told participants that we were in the process of constructing a "Life Events Inventory." They were required to write a vivid, detailed report of a happy (sad) life event as input. After spending 15 minutes on the life event, participants answered 12 questions. Of these, 9 questions were foils (e.g., how comfortable were you with this task, have you ever told anyone this story in person). Embedded in these questions were the manipulation checks: How do you feel right now? (1 = "very bad, sad, unpleasant;" 11 = "very good, happy, pleasant"). The three items formed a reliable scale ( $\alpha = .86$ ). We computed an average score for each subject (range 1–11). As expected, participants who recalled a sad life event felt sadder ( $\bar{x} = 4.34$ , s.d. = 3.07) than participants who recalled a happy life event ( $\bar{x} = 9.15$ , s.d. = 1.65;  $F(1, 78) = 47.36$ ,  $p < .001$ ).

### Stimulus Message

Part 2 of the experiment required each participant to read an enclosed booklet on mammography. The booklet was based on public information on mammography. The top panel of the Appendix contains the back and front cover of the booklet. The bottom panel contains the inside (pp. 2, 3) of the booklet. The framed information is contained on page 3 and was the only information that was different in the two messages (the gain frame is depicted in the Appendix). After participants read the booklet, we asked them to put it back in the provided envelope before answering any questions.

The gain frame stated that by having regular mammograms, women gain the following benefits:

- You can feel confident and have the peace of mind that you are doing the best you can to find breast cancer early.
- If breast cancer is found early, it is more likely to be curable.
- By finding breast cancer early, women have more treatment options and may need less extreme medical procedures. For



example, women whose breast cancers are found early usually have the choice of surgery that spares the breast.

- If you get a mammogram, you are using the best method to find out if your breasts are healthy.

The loss frame made the same claims by emphasizing the disadvantages of not getting mammograms. Specifically,

- You cannot feel confident nor have the peace of mind that you are doing the best you can to find breast cancer early.
- If breast cancer is not found early, it is less likely to be curable.
- By not finding breast cancer early, women have fewer treatment options and may need more extreme medical procedures. For example, women whose breast cancers are not found early usually do not have the choice of surgery that spares the breast.
- If you do not get a mammogram, you are not using the best method to find out if your breasts are healthy.

After participants reviewed this material, we asked them to complete a questionnaire. We then debriefed, paid, and thanked them for their participation.

#### *Framing check*

Participants indicated whether the information they received emphasized the advantages of getting a mammogram (=1), the disadvantages of not getting a mammogram (=2), or neither the advantages nor the disadvantages of getting a regular mammogram (=3). Only two subjects responded in the third category, and we dropped them from subsequent analyses (the pattern of results was the same with and without these subjects in both experiments). Of the participants in the gain condition, 100% correctly identified receiving the gain frame; of those in the loss condition, 24% incorrectly believed they received the gain frame, and 76% correctly believed they received the loss frame (Fisher's exact test:  $p < .0005$ ).

#### *Persuasion*

We used three items to measure persuasion (1 = "do not intend to get a mammogram," 7 = "intend to get a mammogram;" 1 = "do not plan on getting a mammogram," 7 = "plan on getting a mammogram;" 1 = "mammograms are not at all effective at finding breast cancer for women my age," 7 = "mammograms are very effective at finding breast cancer for women my age"). Because these items loaded on the same factor, they were combined to form a reliable intentions index ( $\mu = .86$ ).

#### *Perceived Risk and Costs*

Similar to Wegener, Petty, and Klein (1994), we measured perceived risk by asking participants to estimate their likelihood of getting breast cancer in their lifetime on two seven-point scales with end-points (1 = "no chance/very unlikely," 7 = "certain to happen/very likely"). We averaged these two items to compute a likelihood estimate ( $\mu = .84$ ). We measured perceived costs by asking participants to assess the costs of getting mammograms (e.g., mammograms often lead to surgery that is not needed, mammograms are not needed unless you had some breast problems or pain, having a mammogram is looking for trouble, you have so many problems that you cannot be bothered with having mammograms, the cost of getting a mammogram would cause me to hesitate about getting one, it is hard to get to a place where they do mammograms, the pain caused by having a mam-

mogram is bad enough to make you put off getting one; 1 = "strongly disagree," 5 = "strongly agree;"  $\mu = .74$ ).

#### *Additional Variables*

We also explored the relationship between affect/framing and feelings of control and anxiety, though neither dependent variable has been previously studied in a framing context. We included feelings of control because Wegener, Petty, and Smith (1995) suggest that the loss frame will persuade people in a positive mood if they are more concerned about maintaining their affective state in the long run rather than just their immediate positive mood. Along the same lines, we included an anxiety measure because Lowenstein and colleagues (2001) indicate that people in negative moods are more anxious than people in positive moods and that anxiety increases risk aversion. To assess perceived control, we asked participants to rate whether having a mammogram every year or two gives the participant a feeling of control over her health (1 = "strongly disagree," 5 = "strongly agree"). To measure different levels of anxiety, we asked participants to rate the extent to which they believed having a mammogram caused a lot of worry or anxiety about breast cancer (1 = "strongly disagree," 5 = "strongly agree").

We also included several measures to check equivalence between messages and participants. Specifically, we asked participants to recall what was in the message. Participants also evaluated whether the message was accurate, credible, and trustworthy (1 = "not at all," 5 = "completely") and whether they thought the message information was relevant (1 = "not at all relevant," 5 = "very relevant"). We asked participants if the risk estimate in the message was lower or higher than expected, whether they were upset at receiving the risk information, and how confident they were about their risk estimate. We used several questions to measure background information such as whether they had had breast cancer, a breast biopsy, and children and their family history of breast cancer. With the exception of perceived anxiety and feelings of control, as these additional measures did not vary by experimental condition in both experiments, these measures are not presented or discussed further.

## *RESULTS*

We used multivariate analysis of variance (MANOVA) with affect (positive/negative) and frame (gain/loss) as the independent variables and intentions, perceived costs, perceived risk, anxiety, and perceived control as the dependent measures. We used two-tailed significance tests for all main effects, interactions, and simple effects. Table 1 presents means and standard deviations.

The MANOVA reveals insignificant main effects for affect ( $F(5, 73) = 1.63, p > .16$ ) and frame ( $F(5, 73) = .96, p > .44$ ) and a significant affect × frame interaction effect for the combined variables ( $F(5, 73) = 13.26, p < .001$ ). The interaction term is also significant for each dependent measure: persuasion ( $F(1, 81) = 8.72, p < .01$ ), perceived risk ( $F(1, 81) = 30.19, p < .001$ ), perceived costs ( $F(1, 81) = 9.86, p < .01$ ), anxiety ( $F(1, 81) = 9.44, p < .01$ ), and perceived control ( $F(1, 78) = 6.89, p < .01$ ).

Consistent with  $H_1$  and  $H_2$ , participants in a positive state were more persuaded to get a mammogram when they

Table 1  
MEANS AND STANDARD DEVIATIONS FOR THE DEPENDENT MEASURES CATEGORIZED BY AFFECT AND MESSAGE FRAME

Dependent Measures	Experiment 1				Experiment 2			
	Positive Affect		Negative Affect		Positive Affect		Negative Affect	
	Gain Frame	Loss Frame	Gain Frame	Loss Frame	Gain Frame	Loss Frame	Gain Frame	Loss Frame
Persuasion: Intentions to get a mammogram	3.91 (2.95)	5.83 (2.40)	6.53 (1.44)	5.17 (2.60)	3.94 (.92)	4.50 (.66)	4.28 (.74)	3.42 (1.66)
Perceived risk of getting breast cancer	2.32 (.99)	3.05 (.86)	3.10 (.70)	1.67 (.66)	2.58 (1.38)	4.00 (1.17)	4.34 (1.61)	2.76 (1.30)
Perceived costs of getting a mammogram	2.64 (.76)	2.09 (.63)	1.92 (.37)	2.33 (.82)	4.00 (2.12)	2.43 (.84)	2.35 (.78)	3.69 (1.59)
Anxiety about breast cancer	2.54 (1.09)	2.10 (1.00)	2.15 (1.09)	2.76 (.70)	2.35 (.71)	1.91 (.79)	2.17 (.89)	2.77 (.93)
Perceived control over health	3.68 (.78)	4.14 (.73)	4.25 (.79)	3.81 (.93)	4.00 (1.17)	4.61 (.50)	4.26 (.81)	3.92 (.95)

received the loss-framed than the gain-framed message ( $F(1, 41) = 5.46, p < .03$ ), whereas participants in a negative state were more persuaded to get a mammogram when they received the gain-framed than the loss-framed message ( $F(1, 39) = 3.89, p < .05$ ).

The pattern of perceived costs and perceived risk is consistent with the hypotheses. Participants in a positive state provided higher risk estimates for getting breast cancer in their lifetime when they received the loss-framed message ( $F(1, 41) = 6.56, p < .02$ ), whereas participants in a negative state provided higher risk estimates when they received the gain-framed message ( $F(1, 39) = 46.39, p < .01$ ). Perceived costs are lower when participants in a positive state received the loss-framed message ( $F(1, 41) = 6.38, p < .02$ ) and when participants in the negative state received the gain-framed message ( $F(1, 39) = 3.78, p < .05$ ).<sup>1</sup>

Participants in a positive state believed they had more control over their health when they received the loss-framed rather than the gain-framed message ( $F(1, 41) = 4.01, p < .05$ ). However, perceived control is not influenced by message frame in the negative state condition ( $F(1, 39) = 2.67, p > .10$ ). Furthermore, participants in a negative state felt less anxious in response to the gain-framed than the loss-framed message ( $F(1, 39) = 4.62, p < .05$ ), though perceived anxiety is not influenced by message frame in the positive state condition ( $F(1, 41) = 2.06, p > .16$ ).

### DISCUSSION

The results from Experiment 1 indicate that participants who are in a positive state were more persuaded to get a mammogram when they received the loss-framed rather than the gain-framed message. In contrast, participants in a

negative state were more persuaded to get a mammogram when they received the gain-framed rather than the loss-framed message. For participants, the combination of a positive state and loss frames also produced higher likelihood estimates of getting breast cancer, more perceived control over their health if they got a mammogram, and lower costs of getting a mammogram. In contrast to those in a positive state, participants in a negative state had higher likelihood estimates of getting breast cancer, had lower costs of getting a mammogram, and were less anxious in response to the gain-framed message.

Together, these findings contribute to the understanding of framing effects in a meaningful loss context. First, the results suggest that prior affective states such as mood can determine the effectiveness of a framed message. Our results support Isen's (1993) framework over the hedonic contingency framework that Wegener and Petty (1994) propose. Second, our findings suggest that people in a sad state may have been aware of the mood altering consequences of their actions, though we do not have direct measures of awareness. We found that participants in a sad state became more anxious in response to a loss-framed message and were more persuaded by the benefits in the gain-framed message. Third, our results add to previous findings that as compared with gain frames, loss frames do not always increase risk perceptions and persuasion in a health context (cf. Meyerowitz, Wilson, and Chaiken 1991). On the basis of our results, it might be surmised that the previous main effect of higher persuasion for loss-framed messages depends on the positive affective state of participants.

Two goals motivated the second experiment. First, we wanted to replicate our effects in Experiment 1 with another affect manipulation. Given our interest in using the same message, we relied on health practitioners to identify methods used to assess affective states. They recommended a short depression scale, developed by the Center for Epidemiology. The CES-D scale, which was originally developed for National Institute of Mental Health studies, has been deemed the best screening instrument for judging affective symptoms, especially depression, in older adults (Radloff 1977). The CES-D asks respondents to rate how

<sup>1</sup>There are four significant effects of affect within the frame conditions. Persuasion and risk are higher and costs are lower when participants who received the gain frame were in a negative rather than a positive state (persuasion:  $F(1, 38) = 11.80, p < .01$ ; risk:  $F(1, 41) = 8.70, p < .01$ ; costs:  $F(1, 37) = 12.72, p < .01$ ). In the loss-frame condition, risk is higher among those who were in a positive rather than a negative state ( $F(1, 40) = 33.91, p < .01$ ).

they felt during the past week. The scale consists of a few positive and several negative affective items (e.g., I felt happy, I felt sad, I talked less than usual).

## EXPERIMENT 2

### Participants

A total of 124 women, recruited from local newspaper advertisements, participated in the study. The advertisement asked women between the ages of 40 and 70 to participate in a study on women's health issues. Of the participants, 73% were white and 27% were African American. The average age of the women was 51 (s.d. = 5.20), and 72% possessed a college education or greater; 84% of the women reported having had at least one mammogram.

### Procedure

We asked women interested in participating to call the University Medical Center's Risk Communication Lab (RCL). We told them that the purpose of the study was to gain insights into women's reactions to health education materials that personalized the risk of getting breast cancer. We also told them that they needed to come to the RCL to obtain their risk estimate and to give their reactions to this information. In addition, we told the participants that they would receive \$20 for their help.

When the participants arrived at the RCL, a research assistant reviewed the study's purpose and procedures and obtained written consent. Participants then completed questions from the CES-D scale (Radloff 1977). The scale consists of 20 items (e.g., I felt lonely, I had crying spells, I felt hopeful about the future, I enjoyed life, I felt depressed, my sleep was restless, I thought my life had been a failure, I could not get going), with four rating points (0 = "none of the time," 1 = "a little of the time," 2 = "a moderate amount of the time," and 3 = "most of the time"). The positive items on the scale were reverse-coded so that low scores on the scale indicated a positive affective state whereas high scores indicated a negative affective state (Andresen et al. 1994). We computed a single affect score for each participant by averaging the items in the scale ( $\alpha = .75$ ). The range of scores was 5–47 of a possible 1–60. The mean score for the sample was 18.04, and the standard deviation was 6.26. These mean scores are similar to other samples of nonclinically depressed subject pools (Andresen et al. 1994).

### Stimulus Message

As in Experiment 1, the message contained the risk factors and the framed information. We replaced the general risk information in Experiment 1 with a personalized risk estimate based on a medical algorithm developed by Gail and colleagues (1989). A personalized risk estimate overcomes the difficulty some subjects reported in Experiment 1 (e.g., if the subject was 53 years of age, she needed to estimate risk somewhere between risk at age 50 [1 of 50] and 60 [1 of 24] years).

Then, participants received the same gain- or loss-framed message as in Experiment 1. Participants indicated whether the information they received emphasized the advantages of getting a mammogram (=1), the disadvantages of not getting a mammogram (=2), or neither the advantages nor the dis-

advantages of getting a regular mammogram (=3). Only three subjects responded in the third category, and we dropped them from subsequent analyses. Of the participants in the gain condition, 99% correctly identified receiving the gain frame; of those in the loss condition, 26% incorrectly believed they received the gain frame, and 74% correctly believed they received the loss frame (Fisher's exact test:  $p < .0005$ ). After viewing the framed-message, participants completed the same set of dependent measures used in Experiment 1.

## RESULTS

We used two separate analyses, regression and MANOVA, to test the effects of affect and frame on the dependent measures. We used regression to estimate the effects for affect, frame, and the affect-frame interaction because affect was a continuous variable. To facilitate the comparison with Experiment 1, we used the same analytical procedures (MANOVA and simple effects) in Experiment 2 by assigning participants into three affect conditions (we divided the sample into three approximately equal groups of positive, neutral, and negative affect). Table 2 shows the significance tests for regression analyses.

The *t*-values in Table 2 indicate four significant main effects for frame and affect and five significant affect-frame interactions. Perceived risk and control is higher in response to the loss-framed than the gain-framed message. In addition, as affective responses change from positive to negative, perceived risk and control increases. The remaining main effects are insignificant. More important, we replicated the five significant affect-frame interaction effects.

To interpret these interactions, we estimated the effects of the loss- and gain-framed messages across the range of CES-D scores. We repeated this analysis for each dependent measure (Figure 1). Consistent with  $H_1$  and  $H_2$ , the plots in Figure 1 indicate that persuasion, perceived risk, and perceived control are higher and perceived costs and anxiety are lower when (1) participants who were in a more positive affective state received the loss-framed rather than the gain-framed message and (2) participants who were in a more negative affective state received the gain-framed rather than the loss-framed message.

The MANOVA results are consistent with the regression analyses and Experiment 1. To facilitate comparison with Experiment 1, we did not include the neutral condition in this analysis (for means and standard deviations, see Table 1). The MANOVA reveals insignificant main effects for affect ( $F(5, 68) = 1.51, p > .10$ ) and frame ( $F(5, 68) = .40, p > .84$ ) and a significant affect-frame interaction effect for the combined variables ( $F(5, 68) = 11.26, p < .001$ ). The interaction term is also significant for each dependent measure: persuasion ( $F(1, 76) = 9.60, p < .01$ ), perceived risk ( $F(1, 76) = 7.33, p < .01$ ), perceived costs ( $F(1, 76) = 19.60, p < .001$ ), anxiety ( $F(1, 76) = 7.03, p < .01$ ), and perceived control ( $F(1, 76) = 5.48, p < .05$ ).

The simple effects indicate that, consistent with  $H_1$ , persuasion ( $F(1, 39) = 5.06, p < .05$ ) and perceived risk ( $F(1, 39) = 4.46, p < .05$ ) are higher and perceived costs are lower ( $F(1, 39) = 10.38, p < .05$ ) when participants who were in a positive state received the loss-framed rather than the gain-framed message. Consistent with  $H_2$ , participants

Table 2  
EXPERIMENT 2: REGRESSION ANALYSES ON AFFECT AND MESSAGE FRAME

Dependent Measures	Constant	Frame		Affect		Interaction		R <sup>2</sup>
			t-Value		t-Value		t-Value	
Persuasion: Intentions to get a mammogram	7.70	1.56 (.41)	1.51	.11 (.35)	1.31	-.13 (-.84)	-2.43*	.13
Perceived risk of getting breast cancer	-.40	.252 (.64)	3.52*	.23 (1.17)	4.50*	-.12 (-1.25)	-3.68*	.15
Perceived costs of getting a mammogram	1.83	-.43 (-.34)	-1.22	-.04 (-.46)	-1.67	.03 (.70)	1.97*	.14
Anxiety about breast cancer	3.33	-.88 (-.53)	-1.87	-.06 (-.45)	-1.59	.05 (.71)	1.95**	.04
Perceived control over health	2.62	1.38 (.77)	2.76*	.09 (.62)	2.62*	-.08 (-1.03)	-2.90*	.08

\* $p < .05$ , two-tailed.

\*\* $p = .056$ , two-tailed.

Notes: Standardized regression coefficients are in brackets. Frame: 0 = gain, 1 = loss; Affect: 0 = more positive, 60 = more negative.

in a negative state were more persuaded ( $F(1, 35) = 4.65, p < .05$ ), had higher risk estimates ( $F(1, 35) = 4.81, p < .05$ ), had lower cost estimates ( $F(1, 35) = 9.82, p < .01$ ), and were less anxious ( $F(1, 35) = 3.68, p < .05$ ) in response to the gain-framed than the loss-framed message.<sup>2</sup>

Similar to the pattern obtained in Experiment 1, perceived control ( $F(1, 39) = 5.01, p < .05$ ) is higher when participants who are in a positive state received the loss-framed rather than the gain-framed message. We obtained a null framing effect on perceived control with participants in the negative state condition ( $F(1, 39) = 3.31, p = .08$ ). In addition, participants in a negative state were less anxious ( $F(1, 35) = 3.68, p < .05$ ) in response to the gain-framed than the loss-framed message, whereas framing effects on anxiety were insignificant for positive states ( $F(1, 35) = 1.27, p = .27$ ).

### DISCUSSION

We demonstrate that the persuasiveness of a message frame is dependent on people's affective state under conditions of high potential loss. Specifically, participants who were in a positive affective state were more persuaded by the loss-framed than the gain-framed message, whereas participants who were in a negative affective state were more persuaded by the gain-framed than the loss-framed message. We assessed persuasion by intentions to get a mammogram.

Our results support Isen's (1993) view that people in a positive mood only disregard negative information if it is inconsequential (Isen and Geva 1987; Isen, Nygren, and Ashby 1988). However, when real loss is possible, as in the

case of breast cancer, people in a positive mood may be more inclined to attend to negative information than are controls. Our results from Experiment 2 replicate this effect; participants in a positive affective state were more persuaded by the loss frame than participants in a neutral affective state.

The persuasiveness of loss over gain frames in a positive state implies that Wegener and Petty's (1994) hedonic contingency framework may only be applicable to contexts in which short-term losses are not meaningful or when people in a positive mood are not motivated to serve long-term mood management goals. Consistent with Wegener, Petty, and Smith's (1995) conjecture, we provide indirect support for the view that people in positive moods may forgo mood maintenance in the short run by attending to mood-deflating information if it serves the goal of long-term mood maintenance. Although we do not have a direct measure for long-term mood, we find that loss frames are appealing to those in positive states, in part, because they enhance women's belief that having a mammogram will increase their feelings of control over their health. Future studies must include direct measures of mood awareness and long-term mood management to test this proposition.

Our persuasion results indicate that people in a negative state may be as responsive to the hedonic consequences of their actions as has been thought for people in positive states. In contrast to the hedonic contingency model (Wegener and Petty 1994), we find that people in negative states are less anxious and more persuaded by the gain than the loss frame. Our findings are more consistent with the mood-repair literature, which predicts that people in negative moods will be motivated to attend to information that will uplift them (Leith and Baumeister 1996; Schaller and Cialdini 1990). However, our results may be specific to sad and depressed negative states. Additional investigation is needed to demonstrate that these effects are generalizable to other negative states such as fear and anger (DeSteno et al. 2000).

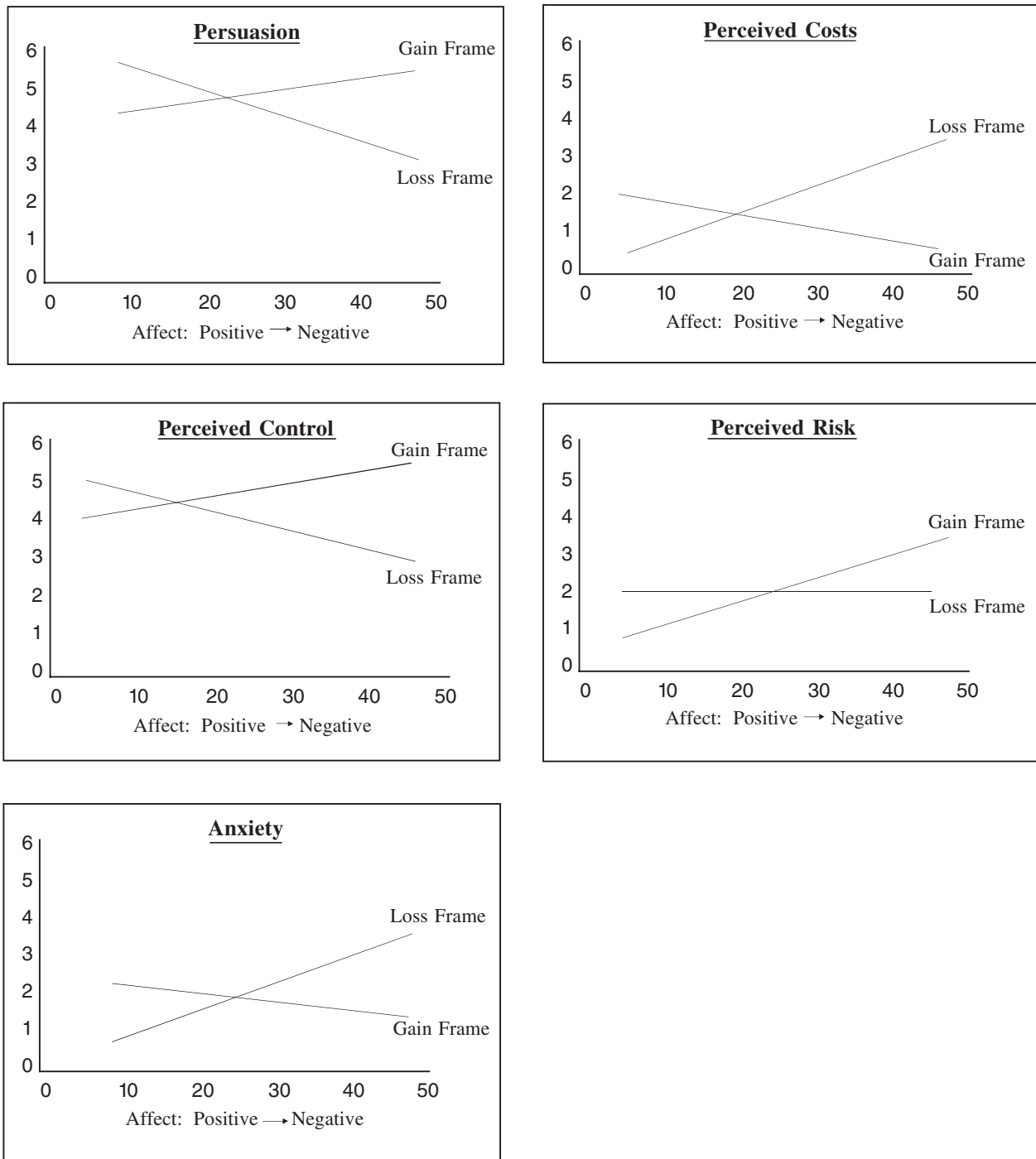
Our findings also suggest that people in positive states have a greater need to believe they have control over their long-term mood (health) than people in negative states. In contrast, people with negative affect seem to be more con-

<sup>2</sup>There are four significant effects of affect within the frame conditions. Perceived risk estimates are higher and perceived costs are lower when participants who received the gain frame were in a negative rather than a positive state (risk:  $F(1, 38) = 7.19, p < .01$ ; costs:  $F(1, 38) = 11.90, p < .01$ ). In the loss-frame condition, persuasion is higher and perceived costs are lower among those who were in a positive rather than a negative state (persuasion:  $F(1, 34) = 7.72, p < .01$ ; costs:  $F(1, 34) = 8.21, p < .01$ ). Consistent with Isen and Geva (1987), Experiment 2 also indicates that participants in a positive affective state were more persuaded by the loss frame than participants in a neutral affective state ( $F(1, 39) = 4.61, p < .05$ ). The simple effects of frame for the other dependent measures are insignificant in the neutral affect condition. We do not report these data here, but they can be obtained from the first author.



Figure 1

EXPERIMENT 2: THE IMPACT OF SWITCHING FROM A GAIN TO A LOSS FRAME IN POSITIVE AND NEGATIVE AFFECTIVE STATES



cerned with managing short-term affect (anxiety) than people with positive affect. This difference in time orientation deserves further investigation.

The pattern of risk estimates extends our understanding of the relationship between framing and persuasion. The conventional wisdom is that loss frames are more persuasive than gain frames because loss frames increase perceived risk

or likelihood estimates (Kahneman and Tversky 1982, 1984). Given that we observed this effect only for the positive affect condition, not for the negative affect, our findings imply that previous experiments may have used participants in predominantly positive affect, and these results may not be generalizable to those populations that have lower levels of positive affect.



The literature on mood and framing indicates that a negative mood or a loss frame can result in higher levels of perceived risk for unfavorable consequences (Gasper and Clore 1998; Kahneman and Tversky 1982, 1984; Pietromonaco and Rook 1987; Wegener, Petty, and Klein 1994). Although these main effects of affect and framing are qualified by a significant frame by affect interaction, our results from Experiment 2 replicate these effects. Furthermore, our results from this experiment indicate a new effect of frame and affect; that is, perceived control increases with loss frames and with increased negative affect. The increase in perceived control may mediate the positive relationship between perceived risk and persuasion found in this and other studies (Keller, Lipkus, and Rimer 2002; Luce and Kahn 1999; McCaul et al. 1996).

A comparison of our results with findings from Aspinwall and colleagues (Aspinwall and Taylor 1997; Reed and Aspinwall 1998) suggests that loss frames may be perceived as more threatening than gain frames. Aspinwall's studies show that participants in a positive state are more receptive to threatening health information than are less positive subjects (Aspinwall and Brunhart 1996; Reed and Aspinwall 1998). Similarly, a comparison of our results with work done by Trope and colleagues (Trope and Neter 1994; Trope and Pamerantz 1998) suggests that loss-framed messages may be perceived as negative feedback whereas gain-framed messages may be perceived as positive feedback.

Framing effects may be strong in our study because participants were highly involved because of their gender and age (Block and Keller 1995; Maheswaran and Meyers-Levy 1990; Smith and Petty 1996; Takemura 1992; Wegener, Petty, and Klein 1994). The role of high involvement is consistent with other findings that show stronger effects of frame and mood for high-cognition subjects (Wegener, Petty, and Klein 1994). Along the same lines, our findings are consistent with other studies that show higher persuasion in schema-incongruent conditions among participants who have a high need for cognition (Srull, Lichtenstein, and Rothbart 1985) and low dogmatism (Meyers-Levy and Tybout 1989).

Our effects may be limited to detection (e.g., mammography, colorectal exams) behaviors that are perceived as riskier than either prevention behaviors (e.g., using a condom or sunscreen) or recuperative behaviors (for a review, see Rothman and Salovey 1997). Prevention behaviors are assumed to be less risky because they are performed to minimize risk or the occurrence of disease. In contrast, detection behaviors are perceived as a riskier choice, because in the short run, the risk may be greater (people might find an abnormality) even though they are performed to minimize long-term risk of succumbing to the disease (Rothman and Salovey 1997).

Our findings have implications for marketing and health practitioners. In marketing, positive affect has been induced in consumers in a variety of subtle (e.g., through program and editorial environments; Chook 1985; Yuspeh 1979) or obvious ways (e.g., receiving a free sample or coupon; Kahn and Isen 1993). Our study indicates that advertising effectiveness will depend not only on the message execution (e.g., frame) but also on the affect generated by the individual and the context. Premessage exposure affect can be

added to the list of other context factors that determine advertising effectiveness (e.g., arousal, see Kennedy 1971; involvement, see Anand and Sternthal 1992 and Soldow and Principe 1981; distraction, see Wright 1981).

Our study provides several guidelines to health practitioners. First, either the CES-D or some other affect scale may be used to determine which message frame will be more persuasive. Our results suggest that nondepressed women should receive a loss-framed health message that emphasizes the costs of not engaging in preventative health behaviors, whereas depressed women should receive a gain-framed message that emphasizes the benefits of engaging in the health behavior. Second, the message should aim to increase perceptions of long-term health for nondepressed women, whereas messages that aim to reduce anxiety would be more appealing to depressed women. In general, this approach highlights the value of understanding the role of individual and message factors for more effective targeting of persuasive messages.

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Appendix  
GAIN FRAME STIMULUS

**A Woman's Chances of  
Getting Breast Cancer  
Increase with Age**

<b>By Age 30</b>	1 out of 2,525 women
<b>By Age 40</b>	1 out of 217 women
<b>By Age 50</b>	1 out of 50 women
<b>By Age 60</b>	1 out of 24 women
<b>By Age 70</b>	1 out of 14 women
<b>By Age 80</b>	1 out of 10 women

For more information about mammograms contact the Cancer Information Service at 1-800-422-6237

*Mammograms*

Simply being a woman and getting older puts you at some risk for breast cancer.



**What factors can increase your  
risk for breast cancer?**

One or more of the following conditions place a woman at higher than average risk for breast cancer:

- personal history of a prior breast cancer
- evidence of a specific genetic change that increases susceptibility to breast cancer (BRCA1/BRCA2 mutations)
- mother, sister, daughter, or two or more close relatives, such as cousins, with a history of breast cancer (especially if diagnosed at a young age)
- a diagnosis of a breast condition (i.e., atypical hyperplasia) that may predispose a woman to breast cancer, or a history of two or more breast biopsies for benign breast disease

**Additional factors can play a role in a  
woman's risk for breast cancer.**

- Women age 45 or older who have at least 75 percent dense tissue on a mammogram are at some increased risk.
- A slight increase in risk for breast cancer is associated with having a first birth at age 30 or older.

In addition, women who receive chest irradiation for conditions such as Hodgkin's disease at age 30 or younger, remain at higher risk for breast cancer throughout their lives.

Not having any of the above risk factors does NOT mean that you are "safe." The majority of women who develop breast cancer do not have a family history of the disease, nor do they fall into any other special high-risk category.



**By having regular mammograms,  
you gain the following benefits:**

- You can feel confident and have the peace of mind that you are doing the best you can to find breast cancer early.
- If breast cancer is found early, it is more likely to be curable.
- By finding breast cancer early, women have more treatment options, and may need less extreme medical procedures. For example, women whose breast cancers are found early usually have the choice of surgery that spares the breast.
- If you get a mammogram, you are using the best method to find out if your breasts are healthy.

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