

## Message Framing and Sunscreen Use: Gain-Framed Messages Motivate Beach-Goers

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Prospect theory suggests that people respond differentially to factually equivalent messages depending on how these messages are framed (A. Tversky & D. Kahneman, 1981). A. J. Rothman and P. Salovey (1997) relied on prospect theory to predict that messages highlighting potential “gains” should promote prevention behaviors such as sunscreen use best. This experiment compared the effectiveness of 4 differently framed messages (2 highlighting gains, 2 highlighting losses) to persuade 217 beach-goers to obtain and use sunscreen. Attitudes and intentions were measured before and immediately following the delivery of the framed information, and after completing the questionnaire participants were given a coupon redeemable for a small bottle of sunscreen later that same day. People who read either of the 2 gain-framed brochures, compared with those who read either of the 2 loss-framed brochures, were significantly more likely to (a) request sunscreen, (b) intend to repeatedly apply sunscreen while at the beach, and (c) intend to use sunscreen with a sun protection factor of 15 or higher.

*Key words:* framing, sunscreen use, cancer prevention, persuasion, health behavior

Skin cancer accounts for about 40% of all cancers, and approximately one in five Americans develops skin cancer in his or her lifetime. Because exposure to the sun’s ultraviolet rays is responsible for more than 90% of all skin cancers (The Skin Cancer Foundation, 1995), many behaviors can be adopted in order to reduce sun exposure and help prevent skin cancer, such as using waterproof sunscreen with a sun protection factor (SPF) of 15 or higher, repeatedly applying the sunscreen, and wearing protective clothing such as hats

(Council on Scientific Affairs, 1989). For this study, we chose to focus on the use of sunscreen with an SPF of 15 or higher. Many findings point to the protective qualities of regular sunscreen use. Thompson, Jolley, and Marks (1993) found that individuals (40 years of age and older) who used sunscreen with an SPF of 17 every day over the course of one summer showed fewer new skin lesions and more remissions in existing lesions compared with individuals assigned to a control group. Furthermore, consistent use of sunscreen with an SPF of 15 or higher throughout childhood and adolescence may reduce the lifetime incidence of basal and squamous cell carcinomas by up to 78% (Stern, Weinstein, & Baker, 1986).

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Despite the importance of sun-protective behaviors such as sunscreen use, not everyone is equally likely to engage in them (e.g., Keesling & Friedman, 1987; Wichstrom, 1994). How might we persuade people to carry out sun-protective behaviors consistently? A first step would be to deliver a maximally persuasive message designed to elicit these behaviors. Many strategies for developing persuasive messages are suggested by research in social cognition (reviewed by Eagly & Chaiken, 1993; Petty & Wegener, 1998; Salovey, Rothman, & Rodin, 1998). In this investigation, we turned to prospect theory as a guide to the design of our messages (Tversky & Kahneman, 1981).

The framing postulate of prospect theory suggests that people respond differentially to messages depending on how these messages are framed. Health messages can be framed either in terms of potential gains (i.e., advantages or benefits) or in terms of potential losses (i.e., disadvantages

or costs). An example of a gain-framed message is "If you follow the Surgeon General's recommendations, you will increase your chances of living a long, healthy life." In contrast, a loss-framed message might state, "If you do not follow the Surgeon General's recommendations, you will increase your chances of dying early." Prospect theory suggests that people are risk averse (i.e., they avoid taking risks) when gains are made salient, but they are risk seeking (i.e., they are willing to take risks) when losses are made salient. Although the information presented in the messages may be factually equivalent, the willingness to incur risk in order to promote a desirable outcome or avoid an undesirable outcome changes depending on how the message is framed (Kahneman & Tversky, 1979, 1982, 1984).

One variable that has helped to clarify the influence of message framing on health behaviors is the type of health behavior being promoted—that is, whether it is a prevention behavior or a detection behavior (Rothman & Salovey, 1997; Salovey et al., 1998). A critical difference between performing a prevention and performing a detection behavior is the perceived degree of proximal risk. Detection behaviors such as mammography and Pap testing are generally perceived to be risky at the time of engaging in the behavior because people may discover that something is wrong with their health (Banks et al., 1995; Meyerowitz & Chaiken, 1987). Prospect theory suggests that risky options are preferred when people are considering losses. Therefore, the performance of detection behaviors should be best facilitated by a loss-framed message. Prevention behaviors, in contrast, are less risky than detection behaviors. For example, sunscreen use directly reduces future risk of skin cancer while offering little or no current risk to the individual. Carrying out prevention behaviors would be described, according to prospect theory, as choosing a risk-averse option. Risk-averse or certain other options are preferred when people at a neutral reference point are considering benefits or gains. Thus, we would expect the performance of prevention behaviors to be facilitated best by gain-framed messages. Elsewhere we have investigated the impact of message framing on the performance of detection behaviors (e.g., Banks et al., 1995). In this study, we focus on sunscreen use, a preventative behavior.

Initial empirical support for the gain-frame advantage in promoting prevention behaviors comes from Rothman, Salovey, Antone, Keough, and Martin (1993), who investigated the effects of gain- and loss-framed messages on college students' intentions to use sunscreen. Women who read gain-framed messages were more likely to request sunscreen with an appropriate SPF than those who read loss-framed pamphlets. Men, however, were not influenced differentially by these two messages. The first goal of the present experiment was to extend the findings of Rothman et al. to a more heterogeneous population in a field setting. Specifically, we wanted to test whether the gain-frame advantage for skin cancer prevention behaviors observed among female college students could be replicated among both men and women in a context in which everyone should be especially concerned about these issues—at the beach.

Furthermore, we expected that these results would be strongest among those individuals who came to the beach not intending to use sunscreen. We hypothesized that the intentions and behaviors of these "unprepared" individuals would be more susceptible to change, especially in comparison with those who came to the beach with their sunscreen in hand and strong intentions to use it.

Our second goal was to explore possible dimensions underlying the construction of gain and loss frames. Some investigators have noted that there are many ways to construct gain- and loss-framed messages. For example, Petty and Wegener (1991) observed that a persuasive argument can point to a good consequence that is likely to occur if the advocated position is adopted or a bad consequence that is likely to be avoided. Alternatively, a persuasive argument can highlight a bad consequence that is likely to occur if the position is not adopted or a good consequence that is unlikely to occur. Brendl, Higgins, and Lemm (1995) likewise suggested that there are four ways of framing a message: as a gain, a loss, a nongain, or a nonloss.

In this study, we rely on Rothman and Salovey's (1997) description of these four message frames, which emphasizes two dimensions that underlie the message: the specified behavior's action (attain vs. not attain) and its outcome (desirable vs. undesirable). That is, gain-framed messages focus either on attaining a desirable outcome or not attaining an undesirable outcome. A gain-framed message could be phrased "Use sunscreen to help your skin stay healthy" or "Use sunscreen to decrease your risk of getting skin cancer." Loss-framed messages can also be phrased in two distinct ways: attaining an undesirable outcome or failing to attain a desirable outcome. Both "Without sunscreen you increase your risk of developing skin cancer" and "Without sunscreen you cannot guarantee the health of your skin" are loss-framed messages from this perspective. Our interest in the dimensions underlying framing stems from our concern that previous operationalizations of message framing in the health literature may have confounded the different types of gain- and loss-framed messages.

Whereas some investigators have suggested that each of the four message frames may have a differential impact (e.g., Higgins, Roney, Crowe, & Hymes, 1994; Higgins & Tykocinski, 1992), others believe that it is the gain and loss qualities of the message that are critical (e.g., Petty & Wegener, 1991). We fall in the latter camp but feel that the action and outcome dimensions warrant investigation and, at the very least, should be controlled for experimentally. For that reason, this investigation sought to determine whether the impact of framed health messages varies across the attainment of the action and the desirability of the outcomes. Specifically, the present experiment compared the effectiveness of four types of framed messages to persuade beachgoers to obtain sunscreen. We predicted that people in both gain-framed conditions would show greater intentions to use sunscreen and would be more likely to redeem a coupon for a free sunscreen sample than those people in either of the loss-framed conditions. The two types of gain-framed messages were not expected to differ from each other, nor were

the two types of loss-framed messages expected to differ from each other.

*Brochure*

The brochure given to the participants was printed on legal-sized paper and folded in thirds. The brochure was titled "Beach Survey 1996." On the outside of the brochure were instructions about the survey along with premanipulation questions. After filling out these initial questions and on opening the brochure, participants read the framing manipulation along with general information about skin cancer. Statements in this part of the brochure were framed in one of four ways to reflect the two hypothesized dimensions of framed messages: in terms of (a) the benefits gained by sun-protective behaviors, (b) the undesirable outcomes avoided by sun-protective behaviors, (c) the benefits foregone by unsafe sun exposure, or (d) the undesirable outcomes incurred by unsafe sun exposure. Sample sentences from each of the four brochure conditions are provided in Figure 1. This part of the brochure also contained unframed information about the prevalence and severity of skin cancer and melanoma, as well as the American Cancer Society's recommendations about sunscreen use. Participants had to break a seal after reading this information in order to move on to the final part of the

Method

*Participants*

Participants were 217 beach-goers, ages 18 and older, recruited during the month of August at a public beach in southern New England. This beach attracts a diverse crowd in terms of age, race, and socioeconomic status, with the majority being White and of middle income status. This diversity was reflected in our sample. The sample was predominately female (76% women, 24% men). Participants ranged in age from 18 to 79 years old, with a mean age of 38.7 years. Approximately 90% of those asked to participate in the study agreed to do so, and of the brochures that were distributed, over 95% were completed and returned. Because of the nature of the data collection method, we were unable to keep an exact count of the number of brochures distributed, so these percentages are estimated.

<b>Gain: Attain- Desirable</b>	<b>Gain: Not Attain- Undesirable</b>	<b>Loss: Attain- Undesirable</b>	<b>Loss: Not Attain- Desirable</b>
Protect yourself from the sun and you will help yourself stay healthy.	Don't expose yourself to the sun and you won't risk becoming sick.	Expose yourself to the sun and you will risk becoming sick.	Don't protect yourself from the sun and you won't help yourself stay healthy.
If you use sunscreen with SPF 15 or higher, you increase your chances of keeping your skin healthy and your life long.	If you use sunscreen with SPF 15 or higher, you decrease your chances of damaging your skin and of bringing on an early death.	If you don't use sunscreen with SPF 15 or higher, you increase your chances of damaging your skin and of bringing on an early death.	If you don't use sunscreen with SPF 15 or higher, you decrease your chances of keeping your skin healthy and your life long.
Using sunscreen increases your chances of maintaining healthy, young-looking skin.	Using sunscreen decreases your risk for skin cancer and prematurely aged skin.	Not using sunscreen increases your risk for skin cancer & prematurely aged skin.	Not using sunscreen decreases your chances of maintaining healthy, young-looking skin.
The higher the SPF you use, the more you will be protected from the sun's rays.	The higher the SPF you use, the less you will be harmed by the sun's rays.	The lower the SPF you use, the more you will be harmed by the sun's rays.	The lower the SPF you use, the less you will be protected from the sun's rays.
Protecting yourself from [the sun] is the surest way to prevent skin cancer.	Not exposing yourself to [the sun] is the surest way to avoid getting skin cancer.	Exposing yourself to [the sun] is the surest way to get skin cancer.	Failing to protect yourself from [the sun] is the biggest obstacle to preventing cancer.
You are out in the sun right now -- are you protecting yourself and ensuring that your skin stays healthy?	You are out in the sun right now -- Are you protecting yourself and preventing skin damage?	You are out in the sun right now -- Are you not protecting yourself and causing damage to your skin?	You are out in the sun right now -- Are you not protecting yourself and not ensuring that your skin stays healthy?

Figure 1. Critical content of the brochures: four types of framed messages. SPF = sun protection factor.

survey. Inside the sealed portion of the brochure were the postmanipulation questions and instructions reminding participants to return their questionnaire in exchange for a free lottery ticket.

## Measures

*Premanipulation questions.* Three sets of questions were included to assess participants' prior intentions to use sunscreen:

1. *Prior plan to use sunscreen.* First, participants noted whether they came to the beach planning to use sunscreen that day. Participants responded either "yes" or "no."

2. *Planned SPF level.* If participants planned to use sunscreen, they also noted what level of SPF they planned to use. If they did not plan to use sunscreen, their planned SPF level was coded as zero. Responses were dichotomized to reflect whether or not participants planned to use the level of SPF recommended by the American Cancer Society, SPF 15 or higher.

3. *Risk level for skin cancer.* Three questions were included to assess participants' objective and subjective risk level for skin cancer: natural hair color and skin tone (combined into a single, continuous index of objective risk) and perceived risk of developing skin cancer (dichotomized to reflect high vs. low perceived risk).

*Postmanipulation questions.* There were four groups of postmanipulation questions:

1. *Immediate affective reactions to the brochure.* Participants were asked about their experience of anxiety after reading the pamphlet. Ratings were made on a 7-point scale ranging from 1 (*not at all anxious*) to 7 (*extremely anxious*). They were also asked about their fear of getting skin cancer, prematurely aged skin, or both. Ratings again were made on a 7-point scale ranging from 1 (*not at all fearful*) to 7 (*extremely fearful*). An index of immediate affective reactions was created by calculating the mean of these two items,  $r(213) = .62, p < .0001$ . This measure was used to test whether the loss-framed messages acted like fear appeals and aroused anxiety and to see if such arousal mediated any effects of message framing (cf. Higbee, 1969; Leventhal, 1970; Robberson & Rogers, 1988).

2. *Perceived efficacy of sun-protective behaviors.* Two questions were included to assess participants' beliefs about sun-protective behaviors. The first asked how their chances of getting skin cancer would change "when you protect yourself from the sun." The next question asked, "If you do *not* protect yourself from the sun, how do your chances of getting skin cancer change?" Ratings for these questions were made on a 7-point scale ranging from 1 (*stay the same*) to 7 (*decrease [increase] dramatically*). The mean of these two items was calculated to form an index of perceived efficacy of sun-protective behaviors,  $r(210) = .56, p < .0001$ .

3. *Anticipated affect.* Four questions were included to assess participants' predictions of how they would feel on applying and, alternatively, on failing to apply sunscreen. The first two questions referred to their anticipated feelings after applying sunscreen. They were asked how "relieved" they would feel and how "unpleasant" they would feel (on a 7-point scale anchored at *not at all* and *extremely*). The second set of questions asked participants about their anticipated feelings in reaction to encountering a barrier preventing them from using sunscreen (i.e., the sunscreen was forgotten at home or the store was sold out). They were asked how "regretful" they would feel and how "anxious" they would feel in this situation (again, on a 7-point scale anchored at *not at all* and *extremely*). An index of anticipated affect was formed by reverse-scoring the "unpleasant" item and then calculating the mean of these four items (Cronbach's  $\alpha = .76$ ).

4. *Sunscreen-related intentions.* We measured intentions to use sunscreen in two ways. First, we looked at future intentions to use sunscreen through self-report items. We were also interested in a more proximal measure of intentions to use sunscreen. For this, we used a behavioral measure of requests for a free sample of sunscreen.

(a) *Self-report.* Four questions assessed participants' intentions to use sunscreen. First, participants were asked how often they intended to use sunscreen at the beach that summer. Next, they were asked how often they intended to use sunscreen during daily activities. Ratings were made on 7-point scales ranging from 1 (*never*) to 7 (*always*). Participants were also asked to note the number of times they would apply sunscreen over the course of a full day at the beach (i.e., 10 a.m. to 4 p.m.). A final measure asked participants to indicate the type of skin product they intended to use that summer (i.e., "none," "tanning oil," or "sunscreen"). If their response was "sunscreen," they were asked to specify an SPF level. This measure was dichotomized to reflect whether participants planned to use an SPF of 15 or higher.<sup>1</sup>

(b) *Behavioral measure.* After returning their completed questionnaires, participants were given a coupon that they could redeem later that day at the beach for a free sunscreen sample. Whether the coupon was redeemed or not constituted the study's primary behavioral measure.

## Procedure

Two experimenters approached seated beach-goers and asked them to participate in a study about "going to the beach." They were informed that they would receive a free Connecticut state lottery ticket in return for their participation (i.e., filling out two brief questionnaires and reading a short passage). Participants were told to return the brochure to the experimenters at a nearby table in order to receive their lottery ticket. Every fourth group (individuals sitting together or an individual sitting alone) that agreed to participate was assigned to the same condition. Because the experimenters approached all eligible individuals and did not know the condition of the brochure that they were distributing, this procedure had the effect of assigning participants randomly to one of the four framing conditions.

On returning their questionnaires to the centrally located table, participants were given a coupon for a free sample of SPF 15 sunscreen and were told to go to a different table after approximately half an hour had elapsed (an exact time was specified) to redeem the coupon. They were told that each person could redeem only their own coupon. Participant identification numbers were copied from the questionnaires onto the coupons before the coupons were distributed so that we could identify who had redeemed the coupon. Those who redeemed their coupon were given a small bottle of sunscreen, and the experimenter offered to answer any questions that the participants may have had about the study.

<sup>1</sup>The premanipulation questions also included three items assessing need for cognition (from Cacioppo & Petty, 1982) and one item assessing subjective beliefs about the barriers to sunscreen use (i.e., the perceived costs associated with sunscreen use). In addition, one item assessing message tone and one item assessing past contact with people having skin cancer were included among the postmanipulation questions. None of these variables was included in our current analyses, however, so there is no further discussion of them in this article.

Table 1  
Adjusted Means and Standard Errors for Self-Reported Sunscreen Intentions and Potential Mediators by Initial Intention to Use Sunscreen and Framing Condition

Variable	Initial plan				No initial plan				Frame × plan <sup>b</sup> <i>p</i>
	Gain frame ( <i>n</i> = 83)		Loss frame ( <i>n</i> = 75)		Gain frame ( <i>n</i> = 26)		Loss frame ( <i>n</i> = 33)		
	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	<i>M</i> <sup>a</sup>	<i>SE</i>	<i>M</i>	<i>SE</i>	
<b>Intentions</b>									
Use sunscreen at beach	6.33	0.13	6.33	0.14	3.84*	0.23	3.18	0.21	.07
Use sunscreen during daily activities	3.72	0.19	3.69	0.20	1.94	0.35	2.17	0.35	<i>ns</i>
Number of times to apply per day at the beach	2.80	0.16	2.99	0.17	2.47*	0.28	1.50	0.26	<.01
<b>Potential mediators</b>									
Negative affective reaction	3.62	0.16	3.60	0.17	3.79	0.29	3.50	0.26	<i>ns</i>
Efficacy of sun-protective behaviors	6.01	0.15	6.04	0.16	5.53	0.26	5.18	0.24	<i>ns</i>
Anticipated affect <sup>c</sup>	5.33	0.14	5.34	0.15	4.21†	0.25	3.57	0.22	.09

*Note.* Except for number of times to apply per day at the beach, all measures were made on a scale ranging from 1 to 7; means are adjusted for objective and subjective risk for skin cancer and initial intention to use sunscreen that day, with higher values indicating stronger intentions, affective reactions, or efficacy expectations.

<sup>a</sup>Tests of simple effects between framing conditions (within plan): †*p* < .06, \**p* < .05.

<sup>b</sup>Message Frame × Initial Plan test with 1 and 210 degrees of freedom.

<sup>c</sup>Anticipated affect = participants' predictions of positive affect on applying sunscreen and negative affect on failing to do so.

## Results

### Variations of Gain- and Loss-Framed Messages

There were no significant main effects due to either the action dimension (i.e., attain vs. not attain) or outcome dimension (i.e., desirable vs. undesirable) of message framing on either sunscreen requests or any of the behavioral intention measures. Our results instead were characterized by a crossover interaction between these two dimensions, representing a simple main effect between the gain- versus loss-framed conditions. That is, the two gain-framed conditions (attain a desirable outcome, not attain an undesirable outcome) acted similarly, and the two loss-framed conditions (attain an undesirable outcome, not attain a desirable outcome) acted similarly. In the remainder of this section, we collapse across the action and outcome dimensions in order to facilitate our discussion of gain versus loss framing. Likewise, because there were no interactions between sex and message framing on any of the dependent variables, we dropped sex from subsequent analyses.

### Effects of Frame on Sunscreen Requests and Sunscreen-Related Intentions

In our primary analysis, we looked at the percentage of beach-goers who turned in their coupons for a free sample of sunscreen. Of participants in the two gain-framed conditions, 71% redeemed their coupon, whereas only 53% of those in the two loss-framed conditions did so. Controlling for objective and subjective risk for skin cancer, the effect of message frame significantly improved the fit of a logistic regression analysis, Wald  $\chi^2(1, N = 217) = 7.37, p < .01$ . This effect remained significant even when prior intentions to use sunscreen that day and prior intentions to use an SPF of 15 or higher also were included in the model, Wald  $\chi^2(1, N = 217) = 6.66, p < .01$  ( $b = 0.75, SE = 0.29$ , odds

ratio = 2.11). These findings demonstrate the predicted gain-frame advantage in the promotion of an important sun-protective behavior, sunscreen use.<sup>2</sup>

The results for participants' self-reported intentions to use sunscreen are presented in Table 1. Controlling for risk for skin cancer, linear regressions revealed a consistent pattern for both intentions to use sunscreen at the beach and intentions to apply sunscreen repeatedly over the course of a full day at the beach. In both cases, a marginal gain-frame advantage was qualified by an interaction between message frame and participants' initial intentions to use sunscreen that day. The form of this interaction supports our prediction. Specifically, there was a significant gain-frame advantage in promoting intentions among beach-goers who had no prior intention to use sunscreen. Participants who came to the beach with well-formed intentions to use sunscreen did not appear to differentiate between the gain- and loss-framed appeals. (This may be because their intentions were at or near a ceiling—i.e., the mean intention to use sunscreen at the beach was 6.33 on a 7-point scale in both conditions.) On these measures, message framing appears to have affected the intentions of those beach-goers most in need of being convinced, those who had not planned to use sunscreen at the beach that day. Interestingly, these effects did not appear

<sup>2</sup>Even if we take an especially conservative approach and assume complete dependence among group members (given that we assigned group members to the same experimental condition in order to keep the manipulations as distinct as possible), a test of the effect size for the main effect of message frame on sunscreen requests (Cohen's  $d = 0.36$ ) on 108 degrees of freedom (217 participants divided by 2, the estimated average number of participants per group) is still marginally significant ( $p < .10$ , two-tailed). The same is true of the Message Frame × Initial Intention interaction on intentions to repeatedly apply sunscreen (Cohen's  $d = 0.36, p < .10$ , two-tailed).

to generalize to intentions to use sunscreen beyond the beach, during daily activities, perhaps because the appeals were too weak or specific to have an impact in a different setting.

Finally, we examined participants' self-reported intentions to use an SPF of 15 or higher, the level recommended by the American Cancer Society and emphasized in the brochures. The logistic regression for this analysis is presented in Table 2. Controlling for risk for skin cancer, there was a significant gain-frame advantage in promoting intentions to use sunscreen with an adequate level of SPF. As with the two previous intentions measures, this interaction was qualified by the interaction between message frame and participants' initial intentions to use sunscreen that day (see Figure 2). Gain-framed messages were particularly effective among beach-goers who had not planned to use sunscreen. In a separate logistic regression, the effect of message frame among these participants was reliable, Wald  $\chi^2(1, N = 59) = 4.86, p < .03$  ( $b = 1.37, SE = 0.62$ , odds ratio = 3.93).

In sum, a clear gain-frame advantage was demonstrated for three of our five dependent variables: sunscreen requests, intentions to apply sunscreen repeatedly, and intentions to use an adequate level of SPF. For the self-reported intentions, the effect of message framing was qualified by a consistent interaction between framing and participants' initial plans to use sunscreen, such that the gain-frame advantage was strongest among beach-goers who had not intended to use sunscreen that day. On a fourth measure, intentions to use sunscreen at the beach, the same trend was marginally significant.

### Potential Mediators of Framing

Little is known about what mediates the effects of gain- and loss-framed messages (Wilson, Purdon, & Wallston, 1988; cf. Wegener et al., 1994). We included three measures in order to investigate mediation, but our results were modest (see Table 1). Although participants' immediate affective reactions to the brochures, subsequent perceptions of the efficacy of sun-protective behaviors, and predictions of how they would feel on applying and, alternatively, on failing to apply sunscreen (anticipated affect) were generally related to sunscreen intentions (average  $r$ s = .17, .20, and .45, respectively), message framing had a marginal effect only on anticipated affect. This effect again showed the

characteristic interaction between message frame and participants' initial intentions to use sunscreen. Among beach-goers who had not intended to use sunscreen, those who read a gain-framed message predicted that they would feel better using sunscreen and would feel worse failing to use sunscreen than did those who read a loss-framed message. Although this interaction further supports a gain-frame advantage among beach-goers who had not planned to use sunscreen, it was much weaker than the effects on intentions, so we did not pursue our investigation of mediation any further.

### Discussion

Because prevention behaviors are perceived as more certain in their consequences than are early detection (screening) behaviors, we hypothesized that gain-framed messages would be more effective in persuading people to perform them (Rothman & Salovey, 1997). In the present experiment, we predicted that beach-goers would be most persuaded to request sunscreen if they read a message that described the gains associated with using sunscreen.

One of the goals of this study was to replicate Rothman and colleagues' (1993) finding that, in a classroom setting, gain-framed messages led to a greater number of sunscreen requests than loss-framed messages. The results of this experiment suggest that the advantage of gain-framed messages for promoting sunscreen is robust across men and women at the beach. In this investigation, there was an advantage for two types of gain frames over two types of loss frames in determining whether beach-goers obtained a sample of sunscreen, whether beach-goers reported that they would repeatedly apply sunscreen throughout the day, and whether beach-goers reported that they would use sunscreen with an SPF of 15 or higher. These effects were strongest for those participants who came to the beach intending not to use sunscreen. The second goal of this study was to determine whether different operationalizations of gain and loss are functionally equivalent. We found no significant differences between the types of gain-framed messages or between the types of loss-framed messages on any of the dependent variables.

One interesting finding of this study was that there were no effects of the framed messages on self-reported intentions to use sunscreen during daily activities other than those at the beach. This result may stem in part from the limited nature of the information given to participants in the brochures. The messages in the brochures specifically targeted beach behavior and immediate intentions (e.g., "You are out in the sun right now—Are you protecting yourself and preventing skin damage?"). Although the framed message addressed the risk of skin cancer and the importance of sunscreen use in general, individuals may have failed to appreciate the importance of generalizing this health behavior to more routine daily activities (e.g., Ajzen, 1982; Ajzen & Fishbein, 1977).

In general, our findings help us to allay the concern that the framing effects found in past research depended not on the gain or loss qualities of the message, but on either the

Table 2  
Simultaneous Logistic Regression Predicting Intention to Use Sunscreen With Sun Protection Factor (SPF)-15 or Higher

Predictor variable	<i>b</i>	<i>SE</i>	Odds ratio	<i>p</i>
Baseline use SPF 15+	3.65	0.53	38.39	<.001
Objective risk	0.55	0.28	1.74	<.05
Subjective risk	0.19	0.20	1.20	<i>ns</i>
Message frame	1.41	0.64	4.11	.03
Initial plan	0.93	0.60	2.55	.12
Frame × Plan	1.49	0.82	4.42	.07



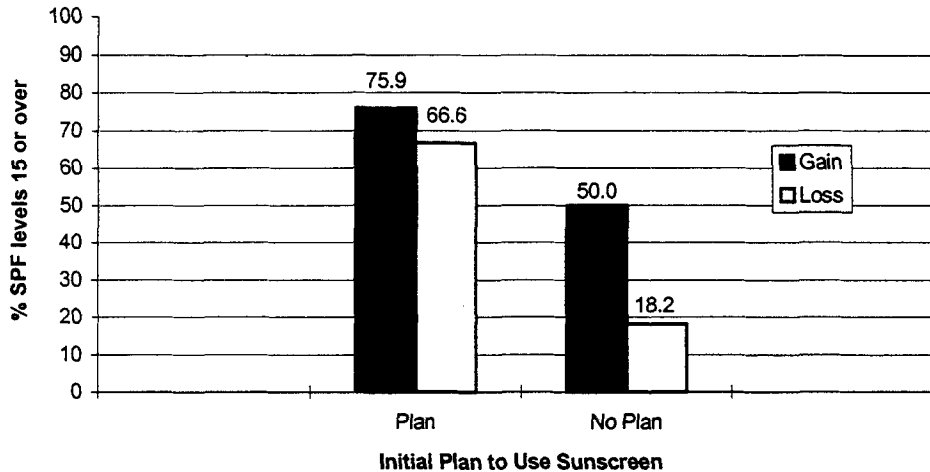


Figure 2. Intention to use sunscreen with sun protection factor (SPF) 15 or higher by framing condition and initial intention to use sunscreen.

outcome or the action dimensions underlying gain and loss. Although it is difficult to argue on the basis of a null result from a single study, the effect sizes of the action and outcome dimensions for all of our variables were very small. Currently, we have little reason to believe that this distinction is an important one for health message framing. We would posit that, when given a gain-framed message, people are able to think about the suggested behavior both in terms of the good that will be achieved and the bad that will be avoided if it is performed. Similarly, in reading a loss-framed message, people may think about both the bad that could occur and the good that would be foregone if the behavior is not performed. It appears that the former (either type of gain-framed message) is far more motivating than the latter (either type of loss-framed message) in encouraging a preventative behavior such as sunscreen use.

One advantage of this investigation over previous ones was that it targeted people for whom the relevant health behavior was extremely salient. The gain-frame advantage in promoting sunscreen requests, intentions to reapply sunscreen, and intentions to use sunscreen with an adequate SPF adds support to the findings of Rothman et al. (1993), who reported a gain-frame advantage primarily among highly involved (i.e., female) participants. Being at the beach may have defined our entire sample as "highly involved." Involvement or interest in an issue is thought to encourage systematic processing of messages, and sensitivity to message framing may occur only among those individuals who process the messages systematically (Wegeener, Petty, & Klein, 1994).

With the exception of requests for sunscreen samples, the remainder of our findings were driven primarily by those participants who came to the beach not planning to use sunscreen. We believe this finding to be an intuitive one. It seems likely that participants who came to the beach intending to use sunscreen may have "topped out" in their responses, and the relatively simple measures that we used may not have been sensitive enough to detect any further

changes in their attitudes or intentions. These participants may not have distinguished between the loss and gain frames. Both sets of arguments may have appeared equally persuasive given their initial inclinations to use sunscreen. In contrast, those who came to the beach planning not to use sunscreen either had greater room for attitude change or were more sensitive to the distinction between gain and loss frames. Clearly, gain-framed messages had a strong impact on these individuals.

This study, inasmuch as it was an educational intervention in the field, has a number of limitations, three of which deserve comment. First, the "intervention" was extremely brief, consisting of only a few paragraphs of information. Although we tried to be sensitive to the quality and the strength of the messages that we included in the brochures, we were limited by space and by our perceptions of the amount of time that beach-goers would be willing to spend as participants in our investigation.

The second limitation of this study was the restricted nature of our primary behavioral measure: requests for sunscreen with an SPF of 15. This dependent variable was, undoubtedly, a crude indicator of sun-protective behaviors. There is no guarantee that participants who requested the sunscreen had intentions to use it or, for that matter, that participants who did not request the sunscreen had no intentions to use their own. Nevertheless, we believe that this dependent variable has merit for three reasons. First, there were systematic effects of framing on sunscreen requests. Second, these results were supported by participants' self-reported intentions to use sunscreen with an SPF of 15 or higher and by participants' self-reported intentions to reapply sunscreen, as well as by a trend in participants' intentions to use sunscreen at the beach. And third, this study replicates and extends a similar set of findings (Rothman et al., 1993). Nonetheless, it would be important to collect data not only on actual sunscreen-use behavior but also on a number of additional sun-protective behaviors such as

staying in the shade of an umbrella and wearing protective clothing.

The third limitation of this study is that long-term behavioral data were not collected. Although the gain-framed messages may have had an impact on individuals' intentions and behaviors on the day that they participated in our study, we do not know how long-lasting these intentions may have been. A direction for future research would be to develop a more comprehensive intervention that would target beach-goers not only on the day of the study but repeatedly over time. Furthermore, it would be important to expand the intervention by addressing behaviors other than sunscreen use and emphasizing the importance of using sunscreen during all daily activities. In sum, we view this study as a large step out of the laboratory, but still only a small step into the field.

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