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## Fear, Anger, Fruits, and Veggies: Interactive Effects of Emotion and Message Framing on Health Behavior

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### Abstract

**Objective**—Message framing is a theoretically grounded health communication strategy designed to motivate action by emphasizing the benefits of engaging in a particular behavior (gains) or the costs of failing to engage in the behavior (losses). This study investigated whether the effectiveness of a framed message depends on the emotional state of the message recipient. We examined effects of fear versus anger, emotions that frequently occur within the context of health decision-making.

**Methods**—Undergraduate students ( $N = 133$ ) were randomly assigned to complete a fear or anger induction task after which they read a gain- or loss-framed pamphlet promoting fruit and vegetable consumption. Fruit and vegetable intake (servings per day) was subsequently assessed over the following two weeks.

**Results**—As predicted, a significant frame by emotion interaction was observed, such that participants in the fear condition reported eating more servings of fruits and vegetables after exposure to a loss-framed message than to a gain-framed message. In contrast, participants in the anger condition reported eating (marginally) more servings of fruits and vegetables after exposure to a gain-framed message than to a loss-framed message. That is, greater increases in fruit and vegetable intake from baseline to follow-up were observed when frame was matched to participants' emotional state than when it was mismatched.

**Conclusion**—The effectiveness of framed health communications depends on the message recipient's current emotional state. Affective factors that are incidental to the behavior recommended in a health communication can affect the relative success of gain- and loss-framed appeals.

### Keywords

message framing; health communication; emotion; fruits and vegetables; dietary behavior

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Message framing is a theoretically grounded health communication strategy that aims to motivate health behavior through presentation of equivalent appeals framed in terms of either gains or losses (Rothman, Bartels, Wlaschin, & Salovey, 2006; Rothman & Salovey, 1997). A gain-framed message highlights the benefits of engaging in a health behavior (“Eating a diet rich in fruits and vegetables can be beneficial for your health”). A loss-framed message, in contrast, highlights the costs of not engaging in a health behavior (“Eating a diet lacking in fruits and vegetables can be harmful for your health”). Message framing has been shown to be an effective strategy for promoting behavior change across a range of health practices (Rothman et al., 2006).

The present study investigated whether the success of a framed health communication depends on the emotional state of the message recipient. We focused on the emotions of fear and anger because these emotional states are frequently experienced within the context of health decision-making (e.g., receiving a diagnosis; making treatment decisions, etc). The premise behind this research is that people may be especially motivated to adhere to behavior change recommendations if they receive a message that is consistent with their current emotional state.

Rothman and Salovey (1997) developed a framework for generating predictions about the relative effectiveness of gain- versus loss-framed appeals. Drawing on prospect theory (Tversky & Kahneman, 1981), they proposed that the effectiveness of gain- versus loss-framed appeals depends upon whether the recommended behavior is perceived to involve risk. Whereas loss-framed appeals are proposed to be more effective for behaviors associated with risk and uncertainty, gain-framed appeals are proposed to be more effective for behaviors associated with safety and certainty. This framework rests upon the notion that these perceptions of risk stem from beliefs about the behavior described in the message. Yet, as we have asserted previously (Gerend & Sias, 2009), the effectiveness of framed messages may also depend on factors incidental to the behavior in the message. In the present study, we hypothesized that the relative success of a gain- versus loss-framed message would depend upon the emotional state of the individual receiving the message.

A small number of studies have examined effects of positive versus negative mood states on the effectiveness of framed messages, and results have been inconclusive. Some work (e.g., Keller, Lipkus, & Rimer, 2003) has shown that people in a positive mood are most responsive to loss-framed messages while those in a negative mood are most responsive to gain-framed messages, but other work has documented opposite effects (e.g., Wegener, Petty, & Klein, 1994).

Inconsistencies across previous studies may stem from the fact that those studies have primarily focused on broadly valenced mood states (i.e., positive vs. negative mood), as opposed to specific emotions. Current theories of emotion highlight the importance of moving beyond a valence-based approach to examine the influence of specific emotional states. Indeed, findings suggest that, although different emotional states such as fear, anger, disgust, sadness, and jealousy share the same (negative) valence, they can nevertheless produce divergent effects on psychological processes. Lerner and Keltner (2001), for example, demonstrated that, despite the fact that fear and anger are both negative emotions, they produce opposite effects on risk-related judgments. People who are feeling afraid tend to make pessimistic risk estimates, whereas people who are feeling angry tend to make optimistic risk estimates.

These findings fit with appraisal theories of emotion (e.g., Smith & Ellsworth, 1985), which imply that specific emotional states are each associated with their own pattern of cognitive appraisal. The emotions of fear and anger are coupled with nearly opposite appraisals of

certainty and control. Fear is typically characterized by appraisals of low certainty and lack of personal control, characteristics that are also associated with high perceptions of risk (Slovic, 1987). Anger, on the other hand, is typically characterized by appraisals of high certainty and personal control, characteristics associated with low perceptions of risk (Slovic, 1987).

The differential effects of fear and anger are also consistent with theories emphasizing the role of approach versus avoidance motivation. Whereas fear typically promotes avoidance of potential negative events and stimuli, anger instead promotes approach-oriented actions (Harmon-Jones & Allen, 1998; Ohman & Mineka, 2001). These orientations, in turn, have implications for people's tendencies to focus on potential threats versus rewards. Whereas fear leads people to attend preferentially to potential threats (Maner & Gerend, 2007), anger leads people to attend preferentially to potential rewards (Ford et al., 2010).

When placed into the context of message framing research, we propose that anger and fear will differentially affect people's receptivity to gain- versus loss-framed messages. We predicted that participants in a fearful emotional state a state typically characterized by high perceptions of risk and a focus on potential threat would be more responsive to a loss-framed message than to a gain-framed message. In contrast, we predicted that participants in an angry emotional state a state typically characterized by low perceptions of risk and a focus on potential rewards would be more responsive to a gain-framed message than to a loss-framed message. Participants were randomly assigned to complete a priming task that temporarily induced the emotions of fear or anger and then read a gain- or loss-framed pamphlet promoting fruit and vegetable intake. Daily fruit and vegetable intake assessed over the subsequent two weeks served as our primary outcome measure.

## Method

### Participants, Procedures, and Materials

Undergraduate students ( $N = 133$ ; 77% female) at a large southeastern university participated for course credit. The experiment used a 2 (emotional state: fear vs. anger) X 2 (message frame: gain vs. loss) between-subjects factorial design. Upon arrival to the lab, participants were randomly assigned to a) complete an anger or fear emotion induction task and b) read a gain- or loss-framed pamphlet promoting fruit and vegetable consumption. Two weeks later, participants completed an online follow-up survey assessing fruit and vegetable intake.

To induce the emotions of fear and anger, we followed procedures validated by Lerner and Keltner (2001). Participants briefly described 4–5 things that make them very scared (or angry) and then wrote an essay about one situation that makes them, or has made them, the most scared (or angry). Participants were asked to write their essay in such detail that someone reading it would become afraid (or angry) just from reading the description.

After this manipulation, participants read a gain- or loss-framed pamphlet promoting fruit and vegetable intake. Pamphlets were based on information from the Centers for Disease Control and Prevention's "Fruits and Veggies: More Matters" website (CDC, 2009). The gain-framed pamphlet focused on benefits of eating a diet rich in fruits and vegetables ("The benefits of eating more fruits and vegetables stack up quickly: Reducing your risk of chronic diseases is only the beginning."); the loss-framed pamphlet focused on costs of not eating a diet rich in fruits and vegetables ("The risks of eating fewer fruits and vegetables stack up quickly: Increasing your risk of chronic diseases is only the beginning.")<sup>1</sup> The pamphlet also discussed the low fruit and vegetable intake of most college students, recommended number of daily servings, tips for making fruits and vegetables part of a weight management

plan, and details about different ways fruits and vegetables can be purchased (e.g., fresh, frozen, canned, dried).

## Measures

Before the emotion induction task, baseline fruit and vegetable intake was assessed with a single item adapted from the Block Food Frequency questionnaire (Block et al., 1986), a measure used extensively in previous research (e.g., Williams-Piehota, Pizarro, Silvera, Mowad, & Salovey, 2006): “Over the past 2 weeks, about how many servings of fruits and vegetables did you usually eat or drink on an average day? Please include fruits, vegetables, and 100% fruit or vegetable juices in your answer.” Participants chose from 12 response options: 0 = 0 per day; 1 = 1 per day; ...10 = 10 per day; 11 = more than 10 per day. Participants also completed the trait anger ( $\alpha = .86$ ) and anxiety ( $\alpha = .81$ ) scales from Spielberger’s State-Trait Inventory (1983 1996). Trait levels of anger (e.g., “I have a fiery temper”) and anxiety (e.g., “I feel nervous and restless”) were each assessed with ten items. Immediately after reading the pamphlet, participants rated the pamphlet’s relative emphasis on the costs of not eating enough fruits and vegetables (= 1) versus the benefits of eating enough fruits and vegetables (= 7), as a manipulation check. Demographic characteristics and contact information were also assessed. All baseline measures were assessed with a computer-administered survey. Two weeks after baseline, participants received an email invitation to complete a brief online follow-up survey. The survey assessed daily fruit and vegetable consumption over the past two weeks with the same item and format used at baseline. 100% of participants completed the follow-up survey.

## Results

At baseline, fruit and vegetable intake was 2.1 servings per day ( $SD = 1.5$ ) and was equivalent across the four experimental conditions ( $F < 1$ ). A 2 (anger vs. fear) X 2 (gain vs. loss) Analysis of Variance (ANOVA) conducted on the framing manipulation check confirmed that participants in the gain-framed condition ( $M = 6.02$ ,  $SD = 0.94$ ), compared to the loss-framed condition ( $M = 3.87$ ,  $SD = 1.22$ ), reported that the pamphlet focused more on the benefits of eating fruits and vegetables than on the costs of not eating fruits and vegetables,  $F(1, 129) = 130.75$ ,  $p < .001$ , partial  $\eta^2 = .50$ ; no other effects were observed.

Our primary analysis was a 2 X 2 Analysis of Covariance (ANCOVA) predicting fruit and vegetable intake at two-week follow-up, controlling for participant gender, trait anger, and trait anxiety. We observed a marginal main effect of emotion,  $F(1, 125) = 3.29$ ,  $p = .072$ ,  $\eta^2 = .026$ , which was qualified by a significant frame by emotion interaction,  $F(1, 125) = 6.87$ ,  $p = .01$ , partial  $\eta^2 = .052$  (see Figure 1). No other effects were observed. Notably, the frame by emotion interaction remained statistically significant when controlling for baseline fruit and vegetable intake,  $F(1, 124) = 5.94$ ,  $p = .016$ , partial  $\eta^2 = .046.2$

Simple effect tests confirmed that, among participants in the fear condition, those who read the loss-framed pamphlet reported eating more servings of fruits and vegetables per day (covariate-adjusted means:  $M_{adj} = 3.54$ ;  $SE = .30$ ) than those who read the gain-framed pamphlet ( $M_{adj} = 2.69$ ;  $SE = .29$ ),  $F(1, 125) = 4.20$ ,  $p < .05$ , partial  $\eta^2 = .033$ . The opposite pattern was observed for participants in the anger condition: those who read the gain-framed pamphlet ( $M_{adj} = 2.93$ ;  $SE = .30$ ) reported eating (marginally) more fruits and vegetables per

<sup>1</sup>Given space constraints, detailed information about the framed messages could not be included. This information is available by request from the authors.

<sup>2</sup>Treating pre-to-post change in fruit and vegetable intake as a within-subjects factor yielded equivalent results. The 3-way interaction between measurement occasion (pre-post), emotion, and frame remained significant,  $F(1, 125) = 3.92$ ,  $p = .05$ , partial  $\eta^2 = .03$ .

day than those who read the loss-framed pamphlet ( $M_{adj} = 2.22$ ;  $SE = .29$ ),  $F(1, 125) = 2.77$ ,  $p < .10$ , partial  $\eta^2 = .022$ .

Matching emotion and message frame resulted in substantial increases in participants' fruit and vegetable intake from baseline to two-week follow-up. Participants in the "matched conditions" (anger-gain and fear-loss) increased their fruit and vegetable intake by almost one full serving per day from baseline to follow-up ( $M = .95$ ,  $SD = 1.41$ ),  $F(1, 64) = 29.84$ ,  $p < .001$ , partial  $\eta^2 = .32$ ). This increase was considerably larger than the increase observed in the "mismatched conditions" (anger-loss and fear-gain;  $M = .46$ ,  $SD = 1.43$ ),  $F(1, 131) = 4.09$ ,  $p < .05$ , partial  $\eta^2 = .03$ ), although the increase from baseline to follow-up in these latter conditions was significant, as well,  $F(1, 67) = 6.92$ ,  $p < .05$ , partial  $\eta^2 = .09$ .

## Discussion

Findings from the present study support the hypothesis that responses to framed health communications vary as a function of people's current emotional state. Results provide further support for the notion that framing effects depend not only on characteristics of the behavior recommended in a message, but also on characteristics within the message recipient. A growing body of research has shown that framing effects are moderated by individual differences (Rothman et al., 2006). The current findings extend this literature by demonstrating that transient emotional states factors that are completely incidental to the behavior recommended in the message can affect the way people respond to framed health communications. Moreover, findings suggest that two affective states sharing the same negative valence may exert highly divergent effects on people's receptivity to framed messages.

The current findings are consistent with appraisal theories of emotion (e.g., Lerner & Keltner, 2001; Smith & Ellsworth, 1985) and previous studies highlighting the role of approach versus avoidance motivation in explaining framing effects (Rothman et al., 2006). Although we did not specifically test whether the moderating effects of fear and anger were due primarily to cognitive factors (e.g., appraisals of risk, certainty, or control) versus motivational factors (approach versus avoidance motivation), we suspect that both kinds of factors may operate synergistically. Nevertheless, this remains an important question for future research, and the current work represents a valuable springboard for addressing that question.

Findings have important practical implications for patient care situations that evoke emotions such as fear and anger. Being diagnosed with a health problem, for instance, could elicit powerful emotions which, in turn, could affect the way people respond to forthcoming health recommendations. Consider the following illustrative example: A young woman goes to the clinic for a routine cervical screening. A week later she learns that her Pap test was abnormal and she has contracted a sexually transmitted infection called human papillomavirus (HPV), an infection that can ultimately lead to cervical cancer. In this scenario, the woman could respond with powerful feelings of fear (e.g., at the thought of having cancer) or anger (e.g., at her sexual partner). Findings from the present study suggest that the woman's emotional reaction to the diagnosis could have important implications for how health recommendations (e.g., repeat Pap testing or condom use) should be framed. As such, we hope these findings spur future translational research on the effects of framing and emotion in patient care settings.

Study limitations provide important opportunities for future research. First, although we were able to demonstrate effects on fruit and vegetable intake, we used a single-item measure, the follow-up period was limited to two weeks, and effects were demonstrated for

only one health behavior. It will be important for future research to assess whether such effects persist for a longer duration and are observed for other types of health behaviors. Second, although the study provided a rigorous and controlled test of our hypotheses, we acknowledge that changing dietary behavior is inherently more complex than our lab situation allowed. Third, inducing fear versus anger may oversimplify the sometimes complex emotional reactions people experience in health-related situations. When receiving a diagnosis, for example, people may experience a variety of emotions, and it is possible that those emotions could include some combination of fear and anger. A related limitation is that we examined moderating effects of only two negatively valenced emotional states. To further illustrate the value of the current theoretical framework, future research should examine other emotions, including positive emotions (e.g., relief, curiosity, or elation). Finally, our study was conducted with a college student sample in a laboratory rather than a clinical setting, which limits the generalizability of our findings.

In closing, findings from the current study suggest that framing effects can be influenced by factors that are incidental to the message itself factors that reside in the person receiving the message. We demonstrated that framing effects can be moderated by an individual's current emotional state, with fearful participants responding especially well to a loss-framed appeal and angry participants responding especially well to a gain-framed appeal. Findings illustrate the value of investigating specific emotions in the context of health communication research.

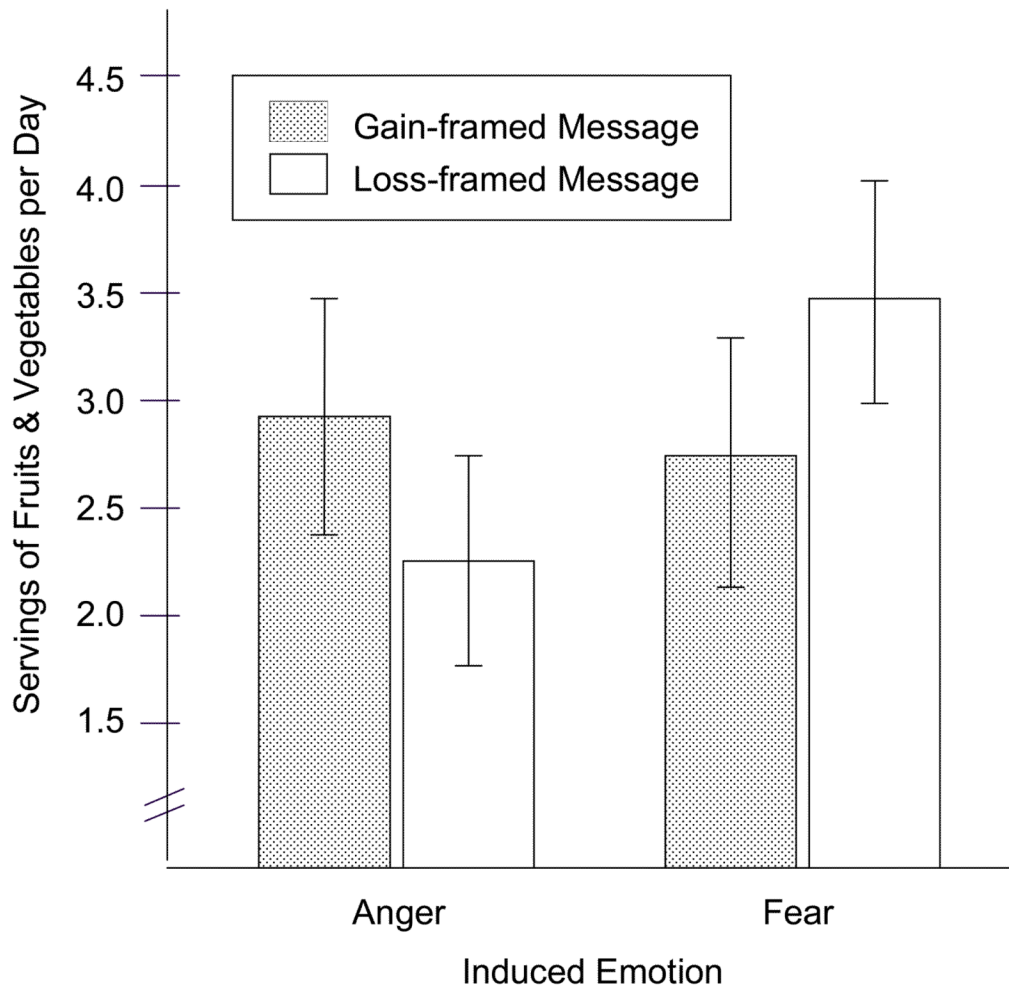
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**Figure 1.**

Covariate-adjusted means (with 95% confidence intervals) of daily fruit and vegetable intake assessed two weeks after exposure to a framed pamphlet. In the fear condition, participants exposed to a loss-framed message reported significantly higher fruit and vegetable intake than participants exposed to a gain-framed message. In the anger condition, participants exposed to a gain-framed message reported marginally higher fruit and vegetable intake than participants exposed to a loss-framed message.