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The consequences of illness have two crucial types of stakes: for the self and for the family. Therefore, this research examines the effectiveness of health messages that present consequences for the self or for the family, focusing specifically on the dual role of emotions in serving these stakes as a provider of resources and information. The authors theorize that (1) the valence dimension of discrete emotions influences resources, thus fostering or hindering the processing of aversive health information, whereas (2) the self-/other-relatedness dimension of discrete emotions provides information that interacts with the focal referent in the message (self or family) to determine compatibility. In Experiments 1–3, the authors demonstrate that when people are primed with a positive emotion (e.g., happiness, peacefulness), the compatibility between the referent and the discrete emotion fosters the processing of health information. When the primed emotion is negative (e.g., sadness, agitation), however, compatibility hinders processing of the message. In Experiment 4, the authors track emotions before and after exposure to a health message to demonstrate that the observed effect occurs because of an increase in the negative emotional state in compatible situations when people process disease-related information. The authors conclude by discussing the implications of the findings for increasing the effectiveness of health-related messages.

Getting Emotional About Health

Consider a Breast Cancer Research Foundation advertisement that depicts a picture of a spouse and two children and states, "Breast cancer doesn't just affect women" (see the Appendix). Such advertisements, which are typical of many public service messages that government agencies and commercial corporations issue, focus on the family and ask the reader to think about the consequences of illness on other family members or close others. In contrast, consider an American Liver Foundation's hepatitis advertisement that focuses on the reader as the sole referent: "Five million Americans have hepatitis. Do you?" (see the Appendix). Thus, health messages can focus on the consequences of the illness for the individual (as in the case of the hepatitis appeal) or close others (as in the breast cancer appeal). The effectiveness of these distinct communication strategies, the reasons for their effectiveness, and the factors that moderate their effectiveness are the focus of this article.

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THE ROLE OF EMOTIONS IN COMMUNICATING HEALTH RISKS

It is well documented that people's self-perceptions are often self-enhancing, even in the face of adverse reality. People tend to underestimate the likelihood of contracting a disease (Perloff and Fetzer 1986), a phenomenon referred to as "unrealistic optimism" (Weinstein 1980) or "self-positivity bias" (Raghubir and Menon 1998). This self-positivity effect is of particular concern in the domain of social and health marketing because it implies that people may assume that they are special and, thus, impervious to diseases, and consequently they might avoid information that would actually help them prevent the disease (Menon, Block, and Ramanathan 2002). Indeed, self-positivity effects typically lead to lower attention paid to communications that encourage caution and awareness about important

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health issues (Raghubir and Menon 1998). This finding raises concerns about the effectiveness of health-related advertising, as well as questions about the degree to which health messages should make people feel vulnerable to a disease (Salovey et al. 2000). Under what conditions do personally relevant health messages encourage processing when they are focused on providing disease-related information and taking proactive preventive measures? Conversely, when can messages that make consumers feel vulnerable backfire, leading to the rejection of the potentially threatening message?

Extant research has focused largely on the role of moderating factors that increase self-risk perceptions, thus heightening health awareness and disease prevention (e.g., Block and Keller 1995; Chandran and Menon 2004; Luce and Kahn 1999; Raghubir and Menon 1998; Rothman and Salovey 1997). We build on this base of research but focus on a different set of phenomena. Our premise is that emotions point to the stakes of a disease, and health consequences have two crucial types of stakes: self and family. Therefore, to understand the effectiveness of health messages that present consequences for the self or for the family, we consider the role of emotions as a provider of both resources and information.

Thus, the current research aims to add to extant work in health marketing, which has focused mostly on cognitive factors and has largely neglected the role of emotions underlying the effectiveness of such messages. Some recent research has begun to reverse this trend; for example, emotions such as fear have been explored in relation to message persuasiveness (Keller 1999). Kahn and Luce (2003) show that stress caused by false-positive test results mitigates the effectiveness of appeals to get tested and reduces intentions to comply with subsequent tests. Keller, Lipkus, and Rimer (2003) demonstrate that positive and negative mood states influence consumers' perceptions of vulnerability, thus influencing the effectiveness of health messages. Such findings underscore the important role of emotions in influencing subsequent compliance with the message.

Despite this growing interest in the domain of emotions and health, scant attention has been paid to the types of emotions that influence the effectiveness of health messages. Important research issues pertain to (1) the role of discrete emotions in fostering the acceptance of vulnerability or leading to the rejection of vulnerability, (2) how discrete emotions and message characteristics interact to influence message effectiveness, and (3) delineating the process by which these effects occur. To address these gaps, we conduct four experiments that examine the role of four strategically chosen discrete emotions—happiness, peacefulness, sadness, and agitation—in influencing message effectiveness, focusing particularly on how the emotions interact with health messages that convey the consequences of an illness for self or for family. We show that when people are primed with a discrete positive emotion, the compatibility between the message referent and the discrete emotion fosters the processing of health information, but this compatibility hinders processing of the message when the primed emotion is negative. Furthermore, we demonstrate that this effect occurs because of an increase in the negative emotional state in compatible situations while a person is processing disease-related information.

In addressing these research issues related to when and why health messages that focus on self versus family may be differentially effective, we build on recent literature on discrete emotions (e.g., Lerner and Keltner 2000; Raghunathan and Pham 1999). We argue that discrete emotions, which vary on the dimensions of valence and self/other relatedness, can influence the processing of health messages that feature the two distinct referent groups. Although the valence of the emotion (e.g., positive, in the case of happiness) becomes a source for the acceptance or rejection of a message that presents a relevant health threat, the self/other-relatedness dimension of the same emotion (e.g., self relatedness of happiness) forms the basis of compatibility with the message referent (e.g., self). Thus, this research integrates recent work on moods as antecedent states that influence the resources to process the message (e.g., Keller, Lipkus, and Rimer 2003; Raghunathan and Trope 2002) with research that indicates that discrete emotions may be appraised on distinct dimensions (e.g., Lerner and Keltner 2000; Tiedens and Linton 2001). We add to the growing stream of research that is focused on the multiple roles of emotions in information processing (e.g., Raghunathan and Pham 1999) and complement the work on fear appeals in health communications, showing that evoking discrete emotions, such as fear, can aid in the acceptance of self-risk, but at other times, it can backfire (e.g., Keller 1999).

CONCEPTUAL BACKGROUND

Current research suggests that discrete emotions can provide information based on the understanding or appraisal of those emotions (Lerner and Keltner 2000). The "emotion-as-information" approach posits that people use their affective states as signals about the current situation or about their judgment. For example, consider hope, an emotion that is typically construed as positive. In addition to providing a positive feeling, it provides information by conveying uncertainty about a situation (Tiedens and Linton 2001). Therefore, hope may be appraised as a positive and uncertain emotion. To understand appraisal dimensions of emotions better, we review the work on the role of emotions as a resource and/or information and the consequences of these roles.

Valence: Emotion as a Resource

A characteristic of health messages, such as those in the Appendix, is that they can be perceived as being emotionally aversive or threatening. Recent research on mood shows that the valence of an emotional state can facilitate or hamper the processing of such relevant emotionally aversive information (Keller, Lipkus, and Rimer 2003). For example, positive mood states encourage the processing and acceptance of emotionally aversive but relevant and useful information by helping people cope with the emotionally dampening effect of threatening information (Raghunathan and Trope 2002). Thus, a positive mood serves as a buffer to help people deal with the emotionally dampening effects of considering health risks. In addition, positive mood states lead to a greater focus on self-efficacy and self-improvement goals (Trope and Pomerantz 1998). Such goals make salient the long-term benefits of the short-term emotional cost of recognizing risk, which often leads to the acceptance of greater health risk. Therefore, participants in positive mood states tend to be less concerned about the

mood-deteriorating consequences of accepting risk, whereas people in negative mood states are often driven to improve their mood (Raghunathan and Trope 2002; Trope and Pomerantz 1998).

Consistent with mood repair theories, several studies have found that people in negative moods make decisions that may be suboptimal in the long run but that would elevate mood temporarily (Leith and Baumeister 1996). Negative mood has also been found to decrease the ability to cope with negative feedback and to enhance a preference for processing positive information. For example, people in negative (versus positive) mood states avoid negative information and process threatening health information more slowly (Aspinwall 1998). In addition, a negative mood leads people to seek positively framed feedback rather than negatively framed feedback (Trope and Pomerantz 1998). Indeed, when people experience a negative mood, health messages that present gain frames are more effective than loss frames (Keller, Lipkus, and Rimer 2003).

Taken together, this work shows that people in negative moods tend to avoid information that may lead to the further decline of their mood state and instead focus on information that may improve their mood. This finding is due, at least in part, to the notion that experiencing negative emotions depletes the coping resources needed to deal with the potentially threatening impact of health information. Thus, people experiencing a negative emotion often avoid processing emotionally aversive information (Keller, Lipkus, and Rimer 2003).[1]

Self/Other Relatedness: Emotion Creating Compatibility with the Message Referent

Consider again the two advertisements in the Appendix. The most salient difference between these advertisements is the referent group—that is, the group to which the reader is directed to consider, namely, the self (as in the hepatitis C advertisement) or the family (as in the breast cancer advertisement). We argue that when a woman reads a health message that suggests that breast cancer can affect her family directly, the degree to which the message is effective should depend on its compatibility with her emotional state at the time. We hypothesize that the self-/other-relatedness appraisal dimension of emotions has an effect on determining this compatibility with the message referent.

Self/other relatedness refers to the degree to which specific emotions systematically vary in the extent to which they follow from (and also foster) a focus on a self that is disengaged from others versus a self that is intimately intertwined with others (Markus and Kitayama 1991). That is, self-focused emotions (e.g., pride, happiness, frustration, anger) tend to be associated with heightened awareness of a person's internal state (e.g., his or her own needs, goals, and desires) to the exclusion of others. In contrast, other-focused emotions (e.g., empathy, peacefulness, indebtedness, shame) tend to be associated with heightened awareness of the internal state of close others (e.g., family, friends) and thus involve perspective taking (e.g., considering what close others are thinking and how they are feeling; Aaker and Williams 1998).

In this article, we explore the interactive effect of valence and self/other relatedness. Toward this goal, we focus on four discrete emotions: happiness and sadness (self-related emotions) and peacefulness and agitation (other-related emotions). Our main premise is that when the message referent (self versus family) is compatible with the person's emotional state (self- versus other-related emotions), the message becomes more relevant and personal to the decision maker. The literature on discrete emotions provides some evidence that events that are compatible with a person's emotional state appear more personally relevant and more likely to occur. For example, because emotions serve as informational sources about the environment, they affect the perceived likelihood of future events, in which events that are compatible with a person's emotional state appear more likely than incompatible events (DeSteno et al. 2000). In one study, participants in an angry or sad emotional state were asked to judge the likelihood of the occurrence of events that might either cause anger or sadness. Angry participants perceived a greater likelihood of anger-provoking rather than sadness-causing events. The converse occurred for the sad participants. In other words, the event appears more likely when the nature of an event matches the appraisal of a person's emotions, thus demonstrating compatibility effects. Furthermore, extant research suggests that referencing self versus family is associated with different emotions. For example, people who are asked to think only about themselves (to the exclusion of others) are more likely to feel emotions such as happiness and sadness, whereas those who are asked to think about themselves in the context of family and friends are more likely to experience emotions such as peacefulness and agitation (Lee, Aaker, and Gardner 2000). This evidence further suggests a compatible relationship between self-focused emotions and a self-referent message. Similarly, peacefulness and agitation, because of their other-related appraisal, are likely to be compatible with family-referent messages.

The Role of Discrete Emotions in Fostering Rather Than Hindering Health Message Effectiveness

A main goal of this work is to argue that the impact of an emotional state on the effectiveness of a health message should depend not only on the emotional appraisal dimension of valence but also on the compatibility between the self/other relatedness of the emotion and message characteristics. Specifically, we suggest that people in a positive emotional state should be persuaded more by a health message with a compatible appeal than by one without because they have the resources to process the appeal and because the appeal is relevant and personal.

However, a different set of effects should occur when people are in a negative emotional state. The studies we reviewed previously suggest that people in a negative mood are unlikely to process relevant information (as in compatible conditions) related to diseases because they are motivated to repair their mood rather than to attain long-term benefits by processing negative self-relevant information (e.g., Raghunathan and Trope 2002). Thus, they are likely

[1]Note that research on mood maintenance would also predict that people in positive emotional states might be motivated to maintain their positive state and thus avoid emotionally aversive information (e.g., Wegener and Petty 1994). However, this does not apply when people in a positive mood are motivated to serve long-term mood management goals, such as health goals, rather than maintain their immediate positive mood (Aspinwall 1998; Keller, Lipkus, and Rimer 2003; Raghunathan and Trope 2002; Trope and Pomerantz 1998).

to process negative relevant disease-related information only superficially and should be less persuaded by the message. However, when participants in a negative emotional state see an incompatible appeal, they anticipate that it may not be relevant and conclude that they may not be at risk. Thus, they process the message in greater detail, hoping that it will help them confirm that they are not at risk, which in turn would serve to repair their mood. However, after they process strong arguments in a message (i.e., in this research, we use frequent behaviors that cause hepatitis C; Menon, Block, and Ramanathan 2002), they should conclude that they are more at risk than they had initially expected.

In summary, whereas positive emotions should facilitate the processing of relevant information that is emotionally aversive, negative emotions should hinder the processing of such information. Thus, when positive emotional states are induced, we should observe greater message effectiveness in conditions of compatibility. However, when negative emotional states are induced, we should observe a reversal of such compatibility effects. Important in these predictions is the recognition that emotional states can play distinct roles simultaneously. One appraisal (in this case, self/other relatedness) of a discrete emotion may provide information that interacts with message characteristics to determine compatibility. Another appraisal dimension (in this case, valence) of the same discrete emotion may provide resources and motives that facilitate or hinder the subsequent processing of information. Thus:

H_1: When people are primed with positive emotions, appeals that are compatible with the self-/other-relatedness dimension of the emotion will increase the effectiveness of the health message. Specifically, the health message will be more effective (a) when happy participants are exposed to a self- (versus family-) referent appeal and (b) when peaceful participants are exposed to a family- (versus self-) referent appeal.

H_2: When people are primed with negative emotions, appeals that are compatible with the self-/other-relatedness dimension of emotion will decrease the effectiveness of the health message. Specifically, the health message will be less effective (a) when sad participants are exposed to a self- (versus family-) referent appeal and (b) when agitated participants are exposed to a family- (versus self-) referent appeal.

In the first two experiments, we examine whether the valence appraisal dimension of emotions acts as a resource in processing aversive health information. In Experiment 1, we test whether positive emotions enhance processing (H_1), and in Experiment 2, we test whether negative emotions hinder processing (H_2). In both experiments, we rely on self-risk perceptions to capture message effectiveness. In Experiment 3, we manipulate positive and negative emotions in the same experiment to illustrate the two effects simultaneously, capture message effectiveness more directly by using persuasion measures, and we provide insight into the processes that underlie these differential effects. Critical to our hypotheses is the notion that compatibility in a persuasion scenario that involves aversive information (e.g., in the domain of health messages) leads to an increase in a person's negative emotional state. Although there is much research that shows that compatible messages may be more persuasive (Petty and Wegener 1998), no research demonstrates whether compatible messages have specific emotional consequences. To support our theory that processing a compatible health message has such an effect, we examine the way specific emotions shift across time before versus after exposure to the health message. Thus, in Experiment 4, we examine the notion that compatibility that involves aversive information leads to an increase in the negative emotional state.

EXPERIMENT 1: POSITIVE EMOTIONS FOSTER COMPATIBILITY EFFECTS

To examine the role of positively valenced emotional states on the effectiveness of health messages that reference self versus family, we manipulated happiness (self-related emotion) and peacefulness (other-related emotion) in Experiment 1. If emotion indeed operates as a resource, messages in compatible conditions (e.g., when a person views a self-referent message while experiencing a positive self-related emotion) should increase personal relevance and therefore should be more effective than messages in incompatible conditions (e.g., when a person views a family-referent message while experiencing a positive self-related emotion).

Method

Design. Eighty undergraduate students at a large northeastern university participated for course credit. They were randomly allocated to one of four conditions in a 2 (primed positive emotion: happy versus peaceful) × 2 (message referent: self versus family) between-subjects design.

Procedure. As a cover story, participants were told that they were taking part in two unrelated studies: an emotions experiment fielded by the psychology department and a marketing survey on health. For the first study, we borrowed from the work of Tiedens and Linton (2001) and induced the relevant emotional state by asking participants to think about an incident that made them feel either happy and cheerful or peaceful and calm and to spend ten minutes writing about the incident. After writing their description, participants rated the degree to which they currently felt a set of emotions on seven-point scales (1 = "not at all," and 7 = "a lot") using two items that measured happiness (happy, cheerful; r = .66) and two items that assessed peacefulness (calm, peaceful; r = .85). Next, participants took part in a second, supposedly unrelated, health survey that contained an advertisement about hepatitis C. We selected hepatitis C as the health hazard of interest for two reasons. First, hepatitis C affects nearly four million Americans and is associated with 8000–10,000 deaths per year in the United States, according to the Centers for Disease Control and Prevention (1998). Second, hepatitis C is transmitted through blood and semen and can be contracted through activities commonly found in a college environment, including sex, body piercing, sharing razors and toothbrushes, and getting tattoos. Consequently, there is a need to increase awareness about hepatitis C among susceptible sections of the population, such as students, the target group for our experiments.

Participants were told that the American Liver Foundation was designing an advertising campaign targeted at students like them. The advertisement we showed introduced hepatitis C by listing eight frequent behaviors that cause the disease (Menon, Block, and Ramanathan 2002). Partici-

pants then read either the self-referent or the family-referent manipulation: "And if you get it, it's a disease that can lead to cirrhosis (scarring of the liver), liver cancer, and liver failure. Picture <yourself (your family)> if you got this disease ~ how would <it (they)> feel? Think of <yourself (your family)>."

After viewing the advertisement, participants rated the main dependent variable, self-risk. We used this measure in light of extant research that suggests that the central challenge in heightening the effectiveness of health messages is to make people feel vulnerable to a disease, thus increasing the likelihood of processing disease-related information and taking proactive preventive measures (Raghubir and Menon 1998). To measure self-risk perceptions, participants assessed the probability that they had hepatitis C (0 = "definitely do not have it," and 100 = "definitely have it"). Participants completed the manipulation checks and were debriefed.

Results

We analyzed the results using a 2 (message referent: self versus family) × 2 (emotions: happy versus peaceful) between-subjects analysis of variance (ANOVA). As a message referent check, participants were asked the degree to which their thoughts about the message made them focus on and think about themselves (self-focus index, r = .79) and the degree to which they believed it focused on and made them think about their family and friends (family-referent index, r = .73; 1 = "not at all," and 7 = "a lot"). A 2 × 2 ANOVA on the self-referent index yielded a main effect of message referent, indicating that the participants in the self-referent-appeal (versus family-referent-appeal) condition indeed focused on themselves more (M_{self} = 4.96, M_{family} = 4.15; F(1, 74) = 4.34, $p < .05$). There was also a main effect of emotion. Happy participants thought about themselves more than did peaceful participants (M_{happy} = 5.24, $M_{peaceful}$ = 3.87; F(1, 74) = 12.67, $p = .001$), which is conceptually consistent with prior theorizing that happiness is a more self-related emotion than peacefulness (Lee, Aaker, and Gardner 2000). The family-referent index revealed only a main effect of message referent such that participants exposed to the family (versus self) advertisements thought more about the family (M_{self} = 3.05, M_{family} = 4.14; F(1, 74) = 7.98, $p < .01$).

The emotions measures elicited after participants recalled the emotional incident served as the emotions check. A 2 × 2 ANOVA on the happiness score revealed that participants who recalled a happy moment were marginally happier than those who recalled a peaceful moment (M_{happy} = 6.24, $M_{peaceful}$ = 5.75; F(1, 71) = 3.05, $p = .08$). A similar analysis on the peacefulness score revealed that participants who recalled a peaceful (versus happy) incident reported higher degrees of peacefulness (M_{happy} = 4.79, $M_{peaceful}$ = 6.14; F(1, 71) = 28.38, $p < .001$). No other effect was significant. Thus, our manipulations worked as intended.

To test H_1, we conducted a 2 × 2 ANOVA on the 101-point self-risk measure; this resulted in a two-way interaction (F(1, 65) = 16.92, $p < .001$). Follow-up contrasts indicated that for participants who experienced happiness, self-referent appeals led to higher estimates for self-risk (M_{self} = 34.75, M_{family} = 13.13; F(1, 65) = 7.20, $p < .01$). For participants who experienced peacefulness, family-referent appeals were more effective in raising self-risk estimates (M_{self} = 7.45, M_{family} = 31.18; F(1, 65) = 9.95, $p < .01$), as we predicted.

To increase confidence in the basic effect and to test H_2, Experiment 2 relied on primed negative emotions. If the emotional states provide motives (e.g., mood repair motives under negative emotions; see, e.g., Leith and Baumeister 1996) and also affect resources to cope with relevant information (e.g., Keller, Lipkus, and Rimer 2003), we should observe a reversal of the aforementioned effects. That is, when people experience compatible messages (e.g., when they view a self-referent message while experiencing a negative self-related emotion), less persuasion should result than in incompatible conditions (e.g., when they view a family-referent message while experiencing a negative self-related emotion). Experiment 2 tests this hypothesis.

EXPERIMENT 2: NEGATIVE EMOTIONS REVERSE COMPATIBILITY EFFECTS

We conducted Experiment 2 with two goals in mind. First, we wanted to manipulate sadness (self-related emotion) and agitation (other-related emotion), and second, we wanted to provide evidence for the role of negatively valenced emotions as an antecedent of risk perceptions by decreasing risk perceptions when the message referent is compatible with the self-/other-relatedness dimension of the emotion.

Method

One hundred three undergraduate students at a large northeastern university participated for course credit; they were randomly allocated to one of four conditions in a 2 (primed negative emotion: sad versus agitated) × 2 (message referent: self versus family) between-subjects design. The procedures were identical to those of Experiment 1 except that participants were exposed to a negative emotion prime rather than a positive emotion prime. They were told to relive a moment during which they felt either sad and disappointed or agitated and uneasy. After recalling the incident, participants indicated the emotions they felt on seven-point semantic differential scales, as in Experiment 1 (1 = "not at all," and 7 = "a lot"). We used measures of sadness (sad, low, discouraged, disappointed; $\alpha = .89$) and agitation (agitated, tense, uneasy, on edge; $\alpha = .86$). Finally, as in Experiment 1, participants read the advertisement and completed the measures.

Results

We analyzed the results using a 2 (message referent: self versus family) × 2 (emotions: sad versus agitated) between-subjects ANOVA. Again, we assessed the efficacy of the message manipulation using two indexes that confirmed that our manipulations worked as intended. A 2 × 2 ANOVA on the self-referent index (r = .76) revealed only a main effect; that is, participants in the self-referent condition focused more on themselves than did those in the family-referent conditions (M_{self} = 4.64, M_{family} = 3.94; F(1, 92) = 3.86, $p < .05$). Furthermore, the family-referent index (r = .79) revealed only a main effect of message; that is, participants exposed to the family-referent advertisements focused more on the family and close others (M_{self} = 2.65, M_{family} = 3.63; F(1, 93) = 8.40, $p < .01$). To check the effectiveness of the emotions manipulation, we ran a 2 × 2 ANOVA on the

sadness score; participants who recalled a sad moment reported greater sadness than those who recalled an agitated moment (M_{sad} = 3.57, $M_{agitated}$ = 2.88; F(1, 92) = 4.12, p < .05). A similar analysis on the agitation score revealed that participants who recalled an agitating (versus a sad) moment reported greater agitation (M_{sad} = 3.22, $M_{agitated}$ = 4.37; F(1, 99) = 14.47, p < .001).

To test H_2, a two-way ANOVA on the self-risk estimates revealed a significant interaction (F(1, 99) = 10.55, p < .01). Follow-up contrasts indicated that for participants who experienced sadness, self-referent appeals led to lower probability estimates for self-risk (M_{self} = 6.30, M_{family} = 15.15; F(1, 99) = 5.66, p < .05). For those who experienced agitation, family-referent appeals were less effective in raising self-risk estimates (M_{self} = 14.85, M_{family} = 6.14; F(1, 99) = 4.93, p < .05). Thus, consistent with H_2, primed negative emotions reversed the compatibility effect.

DISCUSSION OF EXPERIMENTS 1 AND 2

The results from Experiments 1 and 2 provide support for our theory that positive emotions provide resources to cope with aversive information and create a greater focus on self-improvement goals, whereas negative emotions deplete such coping resources and provide mood repair goals. Thus, when people experience positive emotions, they are more open to emotionally aversive information, which results in compatibility effects. In contrast, when negative emotions are primed, people reject aversive information, which reverses the compatibility effects.

Why might such effects occur? We argue that when a person's emotional state and message referent are compatible, the message becomes more personally relevant and therefore is more effective (Petty and Wegener 1998), as long as the person has the resources to process the message. If this is the case, we should observe systematic effects by means of increased depth of processing of information related to the health hazard and improved quality of information assimilation, both of which are indications of enhanced message effectiveness. For example, when people experience positive emotions, compatibility should lead to greater attention being paid to relevant information, but when they experience negative emotions, compatibility should lead to lowered attention. Thus, we conducted an additional experiment that incorporates measures of depth and quality of information processing to shed light on the process underlying our effects. Another assumption driving Experiments 1 and 2 was that perceptions of self-risk provide insight into the effectiveness of the health message. Therefore in Experiment 3, we go beyond self-risk perceptions to include another measure of message effectiveness to garner greater confidence in both this assumption and the bigger conceptual picture. Following the procedures that Menon, Block, and Ramanathan (2002) adopt, we measure message effectiveness by presenting a subsequent *New York Times* article about hepatitis C and eliciting participants' attitudes toward this article.

EXPERIMENT 3: UNDERSTANDING THE MECHANISM

The objective of Experiment 3 is to explore the process underlying the effects and to broaden the web of dependent variables used to assess message effectiveness. In addition, for increased parsimony, we manipulate all four emotions that vary in self/other relatedness and valence (i.e., happiness, sadness, peacefulness, and agitation) in a single experiment. Finally, we enhance external validity in two ways: We center these experimental stimuli more squarely in a real-world setting by relying on a new cover story by a magazine to prime emotions, and we shift focus away from evaluating advertisements toward the evaluation of a *New York Times* article on hepatitis C—a type of communication that is often used and is sometimes more effective than traditional marketing messages.[2]

Our rationale for the compatibility effect under positive emotions is based on a focus on long-term benefits and the ability to cope with negative relevant information (Raghunathan and Trope 2002). The reversal of compatibility effects under negative emotions is based on the specific motivation of mood repair (Leith and Baumeister 1996) and lack of resources to cope with negative relevant information. Compatible (versus incompatible) health messages present highly relevant health information that could help people avoid health risks in the long run, but in the short run, they make a person's current mood state more negative. People who are in a positive mood have the buffering mood resources to process relevant (i.e., compatible) negative information more carefully and be persuaded by it. However, people who are in a negative mood attempt to avoid further mood deterioration and thus are likely to process negative personally relevant information only superficially. Thus, a compatible appeal will be processed more superficially than an incompatible appeal. After people process the arguments in a message, which are strong in our stimuli (i.e., we relied on frequent behaviors that cause hepatitis C; Menon, Block, and Ramanathan 2002), they are likely to be more persuaded. In Experiment 3, we attempted to capture this processing element of our theorizing. Thus, we collected process measures (e.g., recall, time, attention, accuracy) to test the theory that compatible (versus incompatible) appeals are processed carefully under positive emotions but incompatible (versus compatible) messages are processed more carefully under negative emotions. We also collected persuasion measures to support our theory that when all messages feature strong arguments, those that are more carefully processed will be more persuasive (Petty and Wegener 1998). Thus, we aimed to demonstrate that the extent of processing and, consequently, persuasion is dependent on the valence of the information and the compatibility between the emotion and the message referent.

Method

Design. Experiment 3 combines the experimental conditions of Experiments 1 and 2 in a 2 (emotion valence: positive versus negative) × 2 (emotion relatedness: self versus other) × 2 (message referent: self versus family) between-subjects design. The first two factors related to emotions led to the manipulation of four distinct emotions: happiness (positive/self), peacefulness (positive/other), sadness (negative/self), and agitation (negative/other). One hundred eighty-eight undergraduate students at a large northeastern university participated for partial course credit; they were randomly allocated to one of eight conditions.

[2]We thank Dick Wittink for this suggestion.

Procedure. The cover story involved the potential introduction of a new magazine launched by a Canadian company in the United States and targeted at young adults. To assess the potential of the magazine, participants were asked to peruse the cover page and the lead article and then answer several questions. The magazine was formatted distinctly from the follow-up questions in terms of font, color, and overall quality to simulate the effect of perusing a real magazine. The cover page included a picture of the ocean, transposed with headlines for stories featured in the issue (e.g., "All About Hydration," "League Sports for Adults"). The feature article involved an emotions quiz, with the headline, "Are You Happy and Cheerful *<Peaceful and Calm, Sad and Disappointed, or Agitated and Uneasy>*? Can You Recall an Incident When You Felt Happy and Cheerful? Take Our Emotions Quiz!" The next page stated, "This quiz is designed to help you become more aware of your emotions and how they map on to your memory of different events in your life. Recall an incident that made you feel happy and cheerful *<peaceful and calm, sad and disappointed, or agitated and uneasy>*." Participants were instructed to be detailed in their written description and were asked to take ten minutes for this task. After this description, the third page measured emotions by asking participants to rate how they were feeling at the time by circling the degree to which they felt specific emotions (1 = "not at all," and 7 = "very strongly"). They then were invited to peruse the key to the magazine emotions quiz.

Next, participants took part in an unrelated health survey that a professor on the West Coast was conducting. Similar to the prior experiments, participants were told about the American Liver Foundation's desire to design a health-based advertising campaign. Then, they read the advertisement (with a self- versus family-referent manipulation) and completed a self-risk measure, which indicated their likelihood of contracting hepatitis C on a seven-point scale anchored by "not at all likely" and "very likely." Participants were given an open-ended task: "Please recall any information that you can remember from the hepatitis C ad that you saw." At the end, they answered manipulation check questions.

A key contribution of this experiment involves an added stimulus and a new set of measures used to assess process and message effectiveness. Participants were asked to read a recent *New York Times* article that provided additional information on hepatitis C (see Menon, Block, and Ramanathan 2002), followed by processing and effectiveness questions pertaining to the article. By including this new stimulus, we could move beyond a conceptual replication of Experiments 1 and 2 by using a set of measures that assessed depth of processing of this information through (1) the time taken to read the article and (2) attention bestowed on the article, as well as the quality of processing through (3) accuracy on a quiz based on the article. In addition, we elicited attitude toward the article as another message effectiveness measure.

We elicited the measures as follows: Before participants began to read the article, we instituted a subtle method for measuring the time spent reading the article, an objective measure of depth of processing (see Menon, Block, and Ramanathan 2002). Under the guise of improving the subject pool experience, participants were instructed to write down the start time after looking at a clock in the room and were told that they would need to write down the time during different points in the questionnaire. Then, they read the *New York Times* article and recorded the time after they finished. In addition, we included a subjective measure of depth of processing (self-reported attention paid to the article on a seven-point scale anchored by "not very much attention" and "a lot of attention"). Next, we measured the accuracy of participants' processing. Participants completed a 15-item quiz based on the hepatitis C article; potential answers were "true," "false," or "don't know" (Menon, Block, and Ramanathan 2002). To assess quality of processing, we created an accuracy score by adding up the correct answers. Finally, we assessed participants' attitude toward the article using five items, which we measured on seven-point scales ("not informative/very informative," "not credible/very credible," "not interesting/very interesting," "not useful to me/very useful to me," and "will definitely not affect my future behavior/will definitely affect my future behavior"; Cronbach's $\alpha = .79$). Participants were then debriefed and dismissed.

Results

We analyzed the results for referent manipulation checks using a 2 (valence of primed emotion: positive versus negative) × 2 (relatedness of emotion: self versus other) × 2 (message referent: self versus family) between-subjects ANOVA. The self-referent index yielded the predicted main effect of message referent; that is, participants in the self-referent-appeal (versus family-referent-appeal) condition focused on themselves more ($M_{self} = 4.74$, $M_{family} = 4.24$; $F(1, 179) = 3.92$, $p < .05$). Furthermore, the family-referent index revealed the predicted main effect of message referent; that is, participants exposed to the family- (versus self-) referent advertisements thought more about family ($M_{self} = 2.44$, $M_{family} = 3.11$; $F(1, 179) = 7.22$, $p < .01$).

The emotions measures elicited after participants recalled the emotional incident served as manipulation checks. We conducted a one-way ANOVA with four levels of emotions pertaining to each of the four emotion scores; this revealed a significant effect on happiness ($F(1, 180) = 6.51$, $p < .001$), peacefulness ($F(1, 180) = 2.41$, $p = .07$), sadness ($F(1, 180) = 4.18$, $p < .01$), and agitation ($F(1, 180) = 3.06$, $p < .05$). In addition, for each emotions measure (e.g., happiness score), we calculated a contrast in which we compared the score of the emotion (e.g., happiness score) in the same emotion condition (e.g., happiness) with the average of the other three emotions (e.g., mean of peacefulness, sadness, agitation). Participants in the happy condition were happier ($M = 4.40$, $r = .88$) than those who recalled the other three emotional incidents ($Ms = 3.78$; $t(1, 180) = 2.90$, $p < .01$), and participants in the peaceful condition were marginally more peaceful ($M = 4.31$, $r = .73$) than those who recalled other incidents ($Ms = 3.99$; $F(1, 180) = 1.72$, $p = .08$). We found similar effects for sadness ($M_{sad} = 3.00$, $Ms = 2.19$; $F(1, 180) = 3.26$, $p < .01$; $\alpha = .89$) and agitation ($M_{agitation} = 3.42$, $Ms = 2.72$; $F(1, 180) = 2.69$, $p < .01$; $\alpha = .88$). Specific contrasts suggested that, in general, negative emotional manipulations yielded more discriminatory power than the positive emotions.

We predicted that positive emotions would encourage compatibility effects, but negative emotions would lead to incompatibility effects. We collapsed the data to focus on compatible versus incompatible conditions (see Table 1).

Table 1
EXPERIMENT 3: POSITIVE EMOTIONS FOSTER THE PROCESSING OF COMPATIBLE INFORMATION, AND NEGATIVE EMOTIONS HINDER SUCH PROCESSING

		Discrete Emotions				*F Values and Effect Sizes (μ^2) for the Predicted 2 (Compatible) × 2 (Valence) Interaction*
		Positive		*Negative*		
Dependent Measures	*Message Referent*	*Self-Related (Happiness)*	*Other-Related (Peacefulness)*	*Self-Related (Sadness)*	*Other-Related (Agitation)*	
			Message Effectiveness Measure			
Attitude to the *New York Times* article (five-item, seven-point scales; α = .79)	Self	**5.09**	4.70	**4.20**	4.92	(F(1, 173) = 10.03, $p < .01$
	Family	4.19	**4.95****	4.69	**4.39****	μ^2 = .06
			Depth-of-Processing Measures			
Objective measure: Time spent reading the *New York Times* article (in minutes)	Self	**5.00**	3.04	**2.75**	4.81	(F(1, 173) = 15.12, $p < .001$
	Family	3.54	**3.86****	4.94	**3.45*****	μ^2 = .08
Subjective measure: Attention paid to the *New York Times* article (seven-point scale)	Self	**4.83**	4.25	**3.10**	5.33	F(1, 173) = 19.88, $p < .001$
	Family	3.36	**4.78*****	4.39	**3.75*****	μ^2 = .10
			Quality-of-Processing Measure			
Accuracy on a 15-item quiz based on the *New York Times* article	Self	**10.37**	9.87	**7.75**	10.28	F(1, 173) = 12.63, $p < .001$
	Family	9.18	**10.46***	10.00	**9.05*****	μ^2 = .07

*$p < .10$.
**$p < .05$.
***$p < .01$.
Notes: Numbers in bold are the compatible conditions that are combined within valence in these analyses. Significance values are based on contrasts between compatible versus incompatible cells (averaged across the two self-/other-related emotions and two referents) within each valence.

Specifically, we coded two sets of cells as compatible: the happy or sad conditions when participants were exposed to a self referent and the peaceful or agitation conditions when they were exposed to a family referent. The cells that we coded as incompatible were happy or sad emotion conditions when participants were exposed to a family referent and peaceful or agitation conditions when they were exposed to a self referent. We then conducted 2 (emotion: positive versus negative) × 2 (compatibility: compatible versus incompatible) between-subjects ANOVAs on the different dependent measures.[3]

To determine whether participants indeed processed compatible messages more deeply when they were in a positive emotional state and more shallowly when they were in a negative emotional state, we ran a 2 × 2 ANOVA on the open-ended measure that elicited ad recall. The results yielded a main effect of valence ($M_{positive}$ = 5.55, $M_{negative}$ = 4.67; F(1, 173) = 7.36, $p < .01$), suggesting that participants in negative emotional states did not process information as carefully as those in positive emotional states. There was also a significant 2 × 2 interaction between emotional states and compatibility (F(1, 173) = 22.52, $p < .001$). When the emotion was positive, compatible referents led to higher recall ($M_{compatible}$ = 6.04, $M_{incompatible}$ = 4.97; F(1, 173) = 6.39, $p < .05$), but when the emotion was negative, compatible referents led to lower recall ($M_{compatible}$ = 3.70, $M_{incompatible}$ = 5.61; F(1, 173) = 16.87, $p < .001$). These results indicate that in the positive emotion condition, compatibility enhanced recall, but in the negative emotion condition, compatibility led to lower recall, suggesting that in an attempt to feel better, people who are experiencing negative emotions are less likely to accept themselves as being at risk.

The remaining measures are related to the *New York Times* article that participants read. To provide a complete picture of the data, Table 1 reports the means for the full three-way between-subjects design on these measures. A 2 × 2 ANOVA on the new message effectiveness variable, the five-item attitude index, yielded the predicted emotion × compatibility interaction (F(1, 173) = 10.03, $p < .01$). When the emotion was positive, attitude toward the article was

[3]We also ran a 2 × 2 × 2 full ANOVA and conducted a series of planned contrasts on the four measures related to the *New York Times* article. The omnibus tests revealed a significant three-way interaction (multivariate ANOVA for the following dependent variables: self-likelihood [as in prior studies], time taken to read article, attention paid to article, accuracy in the quiz, and attitude toward article; F(5, 165) = 5.14, $p < .01$). Follow-up contrasts were also supportive (see Table 1). For ease of reporting and because our hypotheses focus on compatibility, the results focus on the 2 × 2 analysis.

more favorable in compatible conditions ($M_{compatible}$ = 5.02, $M_{incompatible}$ = 4.46; F(1, 173) = 5.99, $p < .05$), but this pattern was reversed when the emotion was negative ($M_{compatible}$ = 4.29, $M_{incompatible}$ = 4.81; F(1, 173) = 4.23, $p < .05$). As a side note, the same 2 × 2 ANOVA run on the seven-point self-risk likelihood of contracting hepatitis C revealed the predicted two-way interaction (F(1, 173) = 4.86, $p < .05$). When the primed emotion was positive, compatible referents led to higher likelihood estimates ($M_{compatible}$ = 3.62, $M_{incompatible}$ = 2.82; F(1, 173) = 5.46, $p < .05$), and when the primed emotion was negative, compatible referents led to directionally lower likelihood estimates ($M_{compatible}$ = 2.80, $M_{incompatible}$ = 3.13; F(1, 173) < 1), though the contrast was not statistically significant.

To gain insight into the underlying mechanism, we examined the interactive impact of emotion and compatibility on the two depth-of-processing measures: an objective measure of the number of minutes spent reading the article and the self-reported measure of the attention paid while reading the article. A 2 × 2 ANOVA on reading time revealed the predicted interaction between valence of emotion and compatibility (F(1, 173) = 15.12, $p < .001$). When the emotion was positive, participants spent more time reading the article in compatible conditions ($M_{compatible}$ = 4.39, $M_{incompatible}$ = 3.28; F(1, 173) = 4.97, $p < .05$), but when the emotion was negative, they spent less time reading the hepatitis C article in compatible conditions ($M_{compatible}$ = 3.10, $M_{incompatible}$ = 4.87; F(1, 173) = 10.39, $p < .01$). Similarly, a 2 × 2 ANOVA on self-reported attention revealed the interaction (F(1, 173) = 19.88, $p < .001$); when the emotion was positive, participants paid greater attention to the article in compatible conditions ($M_{compatible}$ = 4.80, $M_{incompatible}$ = 3.82; F(1, 173) = 4.90, $p < .01$), but the pattern was reversed when the emotion was negative ($M_{compatible}$ = 3.42, $M_{incompatible}$ = 4.90; F(1, 173) = 7.11, $p < .001$). Finally, we examined the quality of processing by conducting a 2 × 2 ANOVA on quiz accuracy. This analysis yielded the same interaction between valence of emotion and compatibility (F(1, 173) = 12.63, $p < .001$) with marginally higher accuracy in compatible conditions when the emotion was positive ($M_{compatible}$ = 10.42, $M_{incompatible}$ = 9.54; F(1, 173) = 3.15, $p = .07$) and lower accuracy in compatible conditions when the emotion was negative ($M_{compatible}$ = 8.40, $M_{incompatible}$ = 10.15; F(1, 173) = 10.13, $p < .01$). These results provide additional support for both H_1 and H_2.

When a person's emotional state and message referent are compatible, we theorize that the message becomes more personally relevant and thus effective, as long as the person has the resources to process the message. Therefore, the effectiveness of a message should be enhanced in compatible conditions when the experienced emotions are positive, but it should be hindered when the experienced emotions are negative and resources to process the message are low. If this theorizing is correct, the impact of the message on message effectiveness (attitude toward the article) should be mediated by the depth and quality of processing measures.

Thus, we ran mediational analyses following the procedures that Baron and Kenny (1986) outline. Because each of the three sets of mediational analyses showed similar results, we present the results of one of these mediations (attention is the mediator) for illustrative purposes. We ran three regressions. First, we regressed the mediator (attention) on the independent variable (valence, compatibility, and the interaction between valence and compatibility). The interaction between valence and compatibility on attention was significant (R^2 = .10, B = 2.38, $p < .001$). Second, we regressed the main dependent variable (attitude toward the article) on the independent variables, and the interaction between valence and compatibility was significant (R^2 = .05, B = 1.01, $p < .01$). Third, we regressed attitude toward the article on both the independent variables and the mediator. When we included both the independent variables and the mediator (R^2 = .43), the interaction became nonsignificant (B = .22, $p = .41$), but attention remained significant (B = .38, $p < .001$). Thus, taken together, the three regressions suggest that attention that participants paid to the article indeed mediated the effects of the valence × compatibility interaction on attitudes.

Discussion

The results of Experiment 3 suggest that positive emotional states foster the processing of compatible information, whereas negative emotional states hinder the processing of compatible information. These results not only provide a conceptual replication of the prior results but also add to the findings in three ways. First, the results demonstrate that heightened degrees of depth of processing are associated with the compatible conditions, such that both attention and time to process the information increase in compatible conditions when there are resources to process the information (i.e., in positive emotional states). Importantly, however, both measures decrease in compatible conditions when there are limited resources to process the information. Second, the results show that the greater depth of processing in positive emotion conditions (and the hindered depth of processing in negative emotion conditions) translates into patterns of message effectiveness. Depth and quality of information processing mediate the effects we observed in Experiments 1 and 2, thus lending support to our hypothesized process. Third, we expanded the network of measures beyond self-risk by including attitude toward the hepatitis C article and by increasing the generalizability of our results with a focus on more realistic situations.

Next, to support our theory that processing a compatible health message leads to an increase in negative emotional states (or emotional deterioration), we examine the way that specific emotions shift across time, that is, preexposure versus postexposure to a health message. This analysis helps crystallize the process by which negative emotions trigger mood repair motives (observed in our previous experiments) in the context of dealing with the negative emotional consequences of health messages. Furthermore, for construct validity, we relied on a different method to create compatibility with self- versus family-referent messages. Specifically, we used the self-view (the independent versus the interdependent view) such that in situations in which self-related (versus other-related) emotions are primed and the self-view is independent (versus interdependent), the situation is compatible. Conversely, when self-related (versus other-related) emotions are primed and the self-view is interdependent (versus independent), the situation is incompatible. Thus, we expect that the emotional deterioration in the self-based compatibility condition (independent self-view and self-referent message) will occur mostly on the self-related emotions of happiness and sadness. In turn, we expect that an other-based compatibility condition (inter-

dependent self-view and family-referent message) will lead to more emotional deterioration in the other-related emotions of peacefulness and agitation rather than in self-related emotions. Thus, we conducted Experiment 4 with both these expectations in mind.

EXPERIMENT 4: MOVEMENTS IN EMOTIONS AS A FUNCTION OF COMPATIBILITY

Experiment 4 examines the notion underlying our hypotheses that compatibility in a scenario that involves aversive information, such as in the domain of health messages, leads to emotional deterioration. Furthermore, we attempt to establish construct validity by manipulating compatibility using a different manipulation.

Method

Ninety-eight undergraduate students at a large northeastern university participated in the experiment for partial course credit. The experiment was run in small groups. Participants were randomly assigned to one of two between-subjects conditions and were told that they would complete a set of unrelated questionnaires. Participants completed an emotions questionnaire that asked how strongly they currently felt each of the following emotions: happiness (happy, cheerful), peacefulness (calm, peaceful), sadness (depressed, sad, disappointed), and agitation (tense; 1 = "not at all," and 7 = "very strongly"; Higgins, Shah, and Friedman 1997). Next, they were given a 30-minute unrelated filler task. When they finished, participants took part in a second, supposedly unrelated, health survey that contained an advertisement about hepatitis C; we used the same cover story as in the previous experiments. To assess emotional change, participants completed the emotions measures again after exposure to the advertisement and indicated their self-risk perceptions on a 101-point scale. To measure message effectiveness further, we included two items—concern about contracting hepatitis C (1 = "not at all concerned," and 7 = "very concerned") and a behavioral intention question about getting tested for hepatitis C (1 = "will definitely not get tested," and 7 = "will definitely get tested")—and averaged them to create a single attitudes-and-intentions index (r = .72).

After a five-minute unrelated filler task, participants completed Singelis's (1994) scale, which assessed the independent self with 15 items (e.g., "I feel it is important for me to act as an independent person") and the interdependent self with 15 items ("My happiness depends on the happiness of those around me"). As in prior work (Lee, Aaker, and Gardner 2000), we added each set of 15 items to generate a score of independence ($\alpha = .81$) and interdependence ($\alpha = .71$) for each participant. We subtracted the interdependent score from the independent score, yielding an independent–interdependent score for each participant. We then performed a median split; we coded half of the participants as having a dominant independent self (M = 1.03) and half as having a dominant interdependent self (M = –.75; $F(1, 94) = 146.57$, $p < .001$). We did not drop any participants. Participants were then debriefed and dismissed.

Results

Table 2 presents the cell means for all the measures. First, we conducted a 2 (self-view) × 2 (message referent) ANOVA on the two message effectiveness measures. As predicted, we obtained a two-way interaction on each measure such that message effectiveness was higher in conditions of compatibility (ps < .05; for cell means and interaction F values, see Table 1). Follow-up contrasts on the attitude-and-intention index indicate that self-focused appeals were more effective for participants with an independent self-view ($M_{self} = 3.93$, $M_{family} = 2.96$; $F(1, 94) = 4.17$, $p < .05$). In contrast, family-focused appeals were more effective for participants with an interdependent self-view ($M_{self} = 2.64$, $M_{family} = 3.89$; $F(1, 94) = 6.64$, $p < .05$). The self-risk estimates paralleled this pattern. In addition, for convergent validity, we conducted regressions with self-view as a continuous variable, message referent, and the interaction of the two terms. The two-way interaction was significant for the 101-point self-risk probability estimates ($F(1, 94) = 10.67$, $p < .01$) and for the attitude-and-intention index ($F(1, 94) = 5.55$, $p < .05$), in line with our findings using the ANOVA.

Second, we examined changes in emotions as a function of compatibility. Following the procedure that Higgins, Shah, and Friedman (1997) adopt, we added a decrease in happiness (the difference between pre- and postexposure to the advertisement) and an increase in sadness (the difference between post- and preexposure to the advertisement) to compute a deterioration-in-self-related-emotions index. Similarly, we computed a deterioration-in-other-related-emotions index by adding the decrease in peacefulness and increase in agitation. A higher number on these measures indicates changes in self-related (happiness and sadness) or other-related (peacefulness and agitation) emotions, such that negative emotions are enhanced and positive emotions decrease.

A 2 × 2 ANOVA on the deterioration in self-related emotions yielded the predicted two-way interaction between message referent and self-view ($F(1, 94) = 6.38$, $p < .05$); there was a greater deterioration in these emotions when participants with an independent self-view were exposed to an appeal with a self referent rather than a family referent ($M_{self} = 3.27$, $M_{family} = 1.23$; $F(1, 94) = 8.55$, $p < .01$). The deterioration in self-related emotions for participants with an interdependent self-view who were exposed to self- or family-referent appeals was not significant. In turn, a 2 × 2 ANOVA on deterioration in other-related emotions revealed the predicted two-way interaction ($F(1, 94) = 7.18$, $p < .05$). For participants with an interdependent self-view, family-referent appeals led to a greater deterioration in other-related emotions than did self-referent appeals ($M_{self} = .96$, $M_{family} = 2.52$; $F(1, 94) = 3.82$, $p < .05$). The deterioration in other-related emotions for participants with an independent self-view who were exposed to self- or family-referent appeals was marginally significant ($F(1, 94) = 3.36$, $p < .10$). No other effects were significant.

In summary, these results indicate that message effectiveness was highest when the referent used in the health message (self or family) was compatible with the self-view, an effect that was accompanied by systematic shifts in the self-/other-related emotions. These findings suggest that health appeals that are compatible with the perceiver's chronic disposition lead to greater risk perception and are associated with an increase in negative emotional states.

The results of this experiment make important theoretical points. First, to our knowledge, this article is the first in the literature to track how an aversive message leads to deterio-

Table 2
EXPERIMENT 4: AVERSIVE HEALTH INFORMATION CAN LEAD TO EMOTIONAL DETERIORATION

	Independent Self-View		*Interdependent Self-View*		
Dependent Measures	*Self-Focused Appeal*	*Family-Focused Appeal*	*Self-Focused Appeal*	*Family-Focused Appeal*	*Interaction F Values*
			Compatibility Effects: Message Effectiveness		
Self-risk probability estimate (101-point scale)	20.96 (24.02)	7.44** (10.51)	13.57 (17.12)	22.19* (22.35)	7.77***
Attitudes and intentions index (level of concern and intentions to get tested; r = .79)	3.93 (2.05)	2.96** (1.67)	2.64 (1.59)	3.89** (1.27)	10.69***
			Change in Emotions		
Deterioration in self-related emotions (before – after on two seven-point scales indexes; larger number = more negative emotion)	3.27*** (1.33)	1.23 (1.31)	1.68 (1.11)	2.16 (1.14)	6.38**
Deterioration in other-related emotions (before – after on two seven-point scales indexes; larger number = more negative emotion)	2.35 (1.37)	.91 (90)	.96 (1.54)	2.52** (1.59)	7.18**

*$p < .10$.
**$p < .05$.
***$p < .01$.

Notes: The contrasts compare two message referents within each type of self-view. Cell sizes vary from 22 to 27. The interaction between focus and self-view was significant in regressions in which we entered self-view as a continuous variable on deterioration in self-related emotions ($F(1, 94) = 2.86$, $p < .10$) and deterioration in other-related emotions ($F(1, 94) = 5.54$, $p < .05$). We added decrease in happiness (before – after exposure to advertisement) and increase in sadness (after – before exposure to advertisement) to compute a deterioration-in-self-related-emotions index (Higgins, Shah, and Friedman 1997). Similarly, we computed a deterioration-in-other-related-emotions index by adding the decrease in peacefulness and increase in agitation.

ration in specific emotions. Second, this deterioration in emotions testifies to the underlying process that we posited in Experiments 1–3; that is, compatibility between emotions and message referent enhances message processing when people are experiencing positive emotions and hinder it when people are experiencing negative emotions; this is a function of mood repair goals. Finally, we provide construct validity for compatibility effects by creating compatible situations with an individual difference variable.

GENERAL DISCUSSION

This article examined the role of discrete emotions in the effectiveness of health messages focused on self versus family. We primed happiness and peacefulness (Experiment 1) and sadness and agitation (Experiment 2) directly. The results show that when people are in happy emotional states, self-referent health appeals are more effective than family-referent appeals, whereas the converse occurs when people are in peaceful emotional states. When people are in negative emotional states—when they are sad (versus agitated)—compatible self-referent health appeals are less effective than family-referent appeals. Together, these findings suggest that compatibility between message referent and the self-/other-relatedness dimension of the emotion affects message effectiveness, an effect that depends critically on valence of the emotion. In Experiment 3, we expanded the set of message effectiveness measures and enhanced external validity by embedding the message in a more realistic domain in which a magazine primed the emotions that then fostered or hindered the processing of health-related information. Here, too, we demonstrate that a compatible message referent leads to greater message effectiveness, but only in the condition of positive emotional states when people have resources to deal with such emotionally aversive messages. Negative emotions appear to encourage a mood repair motive and thus discourage consumers from accepting the messages that a compatible appeal presents. We also demonstrated that depth and quality of processing information mediate the interactive effect of emotional valence and compatibility on message effectiveness, thus providing evidence for the process that we posit. Finally, Experiment 4 demonstrated that emotional deterioration underlies the effects we observed in Experiments 1–3. In addition, we increased the confidence in our results by establishing construct validity by using a different manipulation for compatibility. Our results have implications for the literature on emotions, compatibility effects, and health.

This research was inspired in part by calls to understand the factors that influence the adoption of healthful behav-

iors to reduce the chance of disease and in part by the increased focus on the role of emotions in health (Salovey et al. 2000). Our research identifies emotions and message frames as ways of making health messages more effective, thus underscoring two recent perspectives in the health literature. Consistent with recent work (e.g., Keller 1999), the current findings indicate that messages that make risk too real by increasing perceived vulnerability might be effective under some conditions, but they can also backfire. Although positive emotions might make amplified health risk acceptable, negative emotions appear to lead to rejection of such risk-promoting messages. The literature on fear appeals has made similar claims, indicating that appeals that create fear or stress might be effective only up to a certain threshold. For example, Kahn and Luce (2003) find that participants who received false-positive test results in the context of mammograms had lower intentions to comply with subsequent testing procedures, an effect that disappeared when participants were provided with ways to cope with the stress. Adding to this literature, we show that the acceptance of health risks may be affected not only by negative emotions caused by a health scenario or message but also by incidental negative emotions. In addition, we extend the extant findings on the role of mood in processing health messages to specific emotions, showing that relevant risk is affected by the compatibility between message features and appraisals of the emotions (other than valence).

Furthermore, these findings extend recent developments in the emotions literature by emphasizing the importance of the role of discrete emotion types in understanding the mechanisms underlying persuasion effects. Bolstering recent work on discrete emotions (e.g., Raghunathan and Pham 1999), the current research demonstrates that message effectiveness is accompanied by changes in specific positive and negative emotions and documents the dual roles of discrete emotions as a provider of resource and information. By examining the interaction of valence with other appraisal dimensions, we also extend work on the role of positive and negative moods and the processing and acceptance of aversive information (Keller, Lipkus, and Rimer 2003; Raghunathan and Trope 2002). Although our studies (see also Keller, Lipkus, and Rimer 2003) show that positive emotions lead to processing of emotionally aversive health information, negative emotions may also inhibit the processing of health threats by triggering mood maintenance goals. Further research is needed to identify the factors that determine when positive (or negative) emotions may facilitate versus hinder the processing of emotionally aversive messages. Indeed, the persuasiveness of emotionally aversive information depends not just on the valence of the emotions being experienced but also on other appraisal dimensions of that emotion, thus highlighting the need for a deeper and broader understanding of the interactive effects of different appraisal dimensions and conditions in which they are manifested.

Several studies in the recent literature on emotions show that conditions of compatibility consistently lead to greater persuasion (e.g., higher perceived likelihood of events; DeSteno et al. 2000). Our finding of the reversal of compatibility effects is novel in that it demonstrates how emotional valence can change the influence of discrete emotions in subsequent judgments. A key in determining whether compatibility conditions help versus harm persuasion efforts appears to be consumer resources and people's motives when they are processing information. When mood repair motives are operant, conditions of compatibility may hurt attempts at persuasion. For example, compatible appeals were more persuasive only in conditions of positive mood.

Our findings also indicate that mood repair might not be a general "negative mood" phenomena but that people may use specialized strategies to repair specific types of negative emotional states. For example, the negative emotion of agitation led participants to process compatible other-related information superficially in an attempt to repair emotion, but agitated participants still processed incompatible information. Furthermore, negative health-related information affected specific emotional states. In Experiment 4, family-referent appeals had a negative emotional impact on other-related emotions but not on self-related emotions. Thus, motives such as mood repair may also have more "specific" versions of repair motives that protect current specific emotional states in addition to protecting a more general negative mood state (Zemack-Rugar 2006). In general, our findings emphasize the importance of studying the possible roles (e.g., resource, information, motives) of emotions in decision making.

More broadly, our findings speak to the general stream of research that (1) examines compatibility effects between message characteristics and individual factors and (2) posits specific cognitive-based mechanisms underlying the effects, including elaboration likelihood, experienced fluency, and perceptions that a persuasive message "just feels right" (e.g., Lee and Aaker 2004). We add to this literature in three ways. First, we show that compatibility can occur not simply between a primed construct and message characteristics but also between one dimension of an incidental discrete emotion and message characteristics. Second, we extend this emotion-based compatibility finding by demonstrating its dependence on the valence of the emotion such that positive emotions foster compatibility effects but negative emotions make compatible appeals less persuasive. Extant research on compatibility effects has found only argument strength to be a moderator of the persuasiveness of compatible messages (Petty and Wegener 1998). Our findings introduce valence of emotion as another moderator. Third, our results suggest that a consequence of compatibility could be a shift in emotional responses along a specific dimension, which indeed could contribute to the "feeling right" experience that is often transferred to subsequent product evaluations (Cesario, Grant, and Higgins 2004).

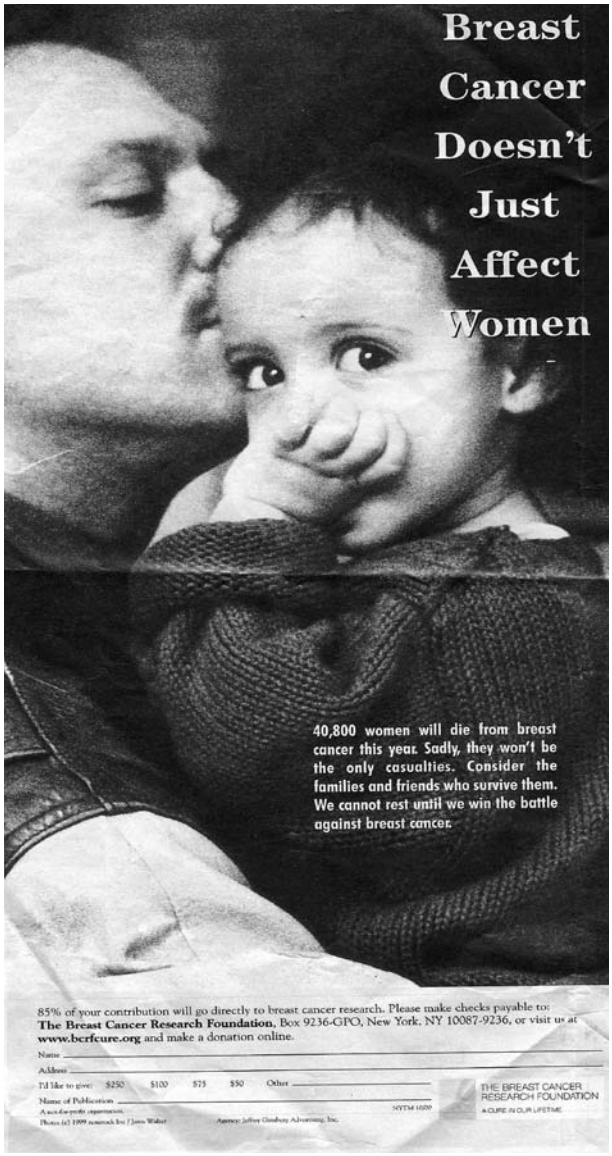
In addition, these findings have managerial implications (e.g., for the placement of marketing communications). The finding that people are more likely to process emotionally aversive information when they are in a positive mood implies that a health message may be more effective if it is aired in the context of a situation comedy than in the context of a crime or hospital drama. Relatedly, if the content of the health message (e.g., focusing on family) is compatible with the content of the television show (e.g., *Everybody Loves Raymond*), the message is likely to be more effective.

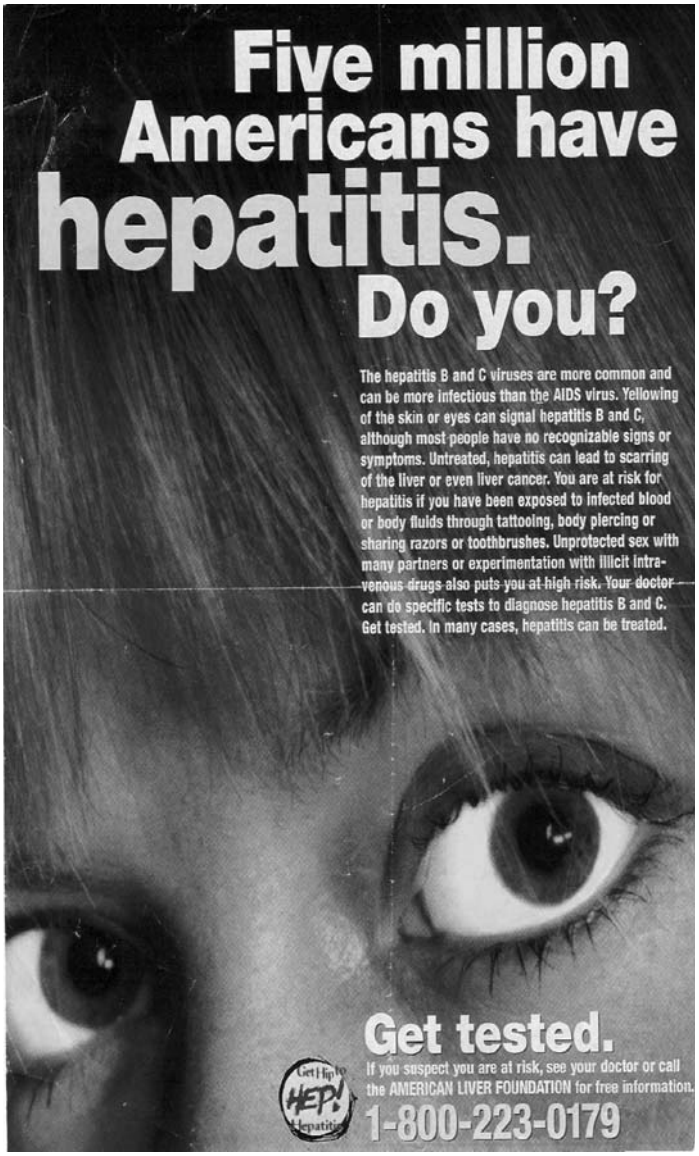
Finally, the current studies' limitations merit attention because they afford opportunities for future work. For example, there are limits to the generalizability of our

results because this research focused on a single disease (hepatitis C), examined only two dimensions of emotions (valence and relatedness, but not, for example, arousal), and explored the effects of only pure emotional states (it did not explore the existence and impact of mixed emotions). Furthermore, although we find evidence of an emotion-based mechanism underlying the effects, the possibility remains that other mechanisms (e.g., involvement, fluency) are operant as well and thus need further attention. In addition, the current work focused only on messages oriented toward the self or family when people contemplate the consequences of an illness, thus raising the question of what occurs when multiple points of reference are used. For example, arguing that "breast cancer does not only affect you" might trigger both referents. Thus, an examination of the role and impact of multiple references is worthy of further research. Finally, the current research assessed only self-risk perceptions after participants imagined the consequences of illness for close others. What remains unknown is how such messages affect risk perceptions for the family. The prospect that the vulnerability of close others may lead to favorable health behaviors is compelling and opens novel avenues for further research.

Appendix

EXAMPLES OF HEALTH MESSAGES THAT USE FAMILY AND SELF REFERENTS





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