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Getting Emotional About Health

NIDHI AGRAWAL
GEETA MENON
JENNIFER L. AAKER*

* Nidhi Agrawal is Assistant Professor of Marketing and Donald P. Jacobs Scholar at the Kellogg School of Management, Northwestern University, 2001 Sheridan Street, Evanston, IL 60208-2001; nidhi-agrawal@kellogg.northwestern.edu. Geeta Menon is Professor of Marketing and Harold MacDowell Faculty Fellow at the Leonard N. Stern School of Business, New York University, 40 West 4th Street, #806, New York, NY 10012-1126; gmenon@stern.nyu.edu. Jennifer L. Aaker is General Atlantic Professor of Marketing at the Graduate School of Business, Stanford University, 518 Memorial Way, Stanford, CA 94305; aaker@gsb.stanford.edu. We thank Wendy Liu for her helpful comments on this article. Initial results from this article were presented at the annual conferences of the Association for Consumer Research, 2002, Society for Consumer Psychology, 2004, Fuqua School of Business - Duke University, Graduate School of Business - University of Chicago, the Warrington School of Business - University of Florida, and INSEAD - Singapore; comments from the audience are gratefully acknowledged. We are deeply indebted to the late JMR Editor, Dick Wittink, for his insightful comments and suggestions. We also gratefully acknowledge the insights of two anonymous reviewers and the invaluable guidance from the Guest Editor, Mary Frances Luce.
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The consequences of having an illness have two crucial types of stakes: for self and for family. Therefore, the current research examines the effectiveness of health messages that present consequences for the self or family, focusing specifically on the dual role played by emotions in serving these stakes: as a provider of resources and of information. The authors theorize that (a) the valence dimension of discrete emotions influences resources, thereby fostering or hindering the processing of aversive health information, whereas (b) 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 individuals 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, anxiety), however, compatibility hinders processing of the message. In experiment 4, the authors track emotions pre- and post-exposure to a health message to demonstrate that the effect observed occurs due to an increase in the negative emotional state in compatible situations when processing disease-related information. The authors conclude by discussing the implications of the findings for increasing the effectiveness of health-related messages.
Consider an advertisement for the Breast Cancer Research Foundation depicting a picture of a spouse and two children and stating, “Breast cancer doesn’t just affect women…” (New York Times Magazine [October 22, 2000], appendix A). Such advertisements, which are typical of many public service messages issued by government agencies and commercial corporations, focus on the family and ask the reader to think about the consequences of one’s illness on other family members or close others. Consider, in contrast, a hepatitis advertisement focused on the reader as the sole referent: “Five million Americans have hepatitis. Do you?” (New York Times [December 15, 1998], appendix A). 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.

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 suggests that people may assume they are special and hence impervious to diseases, and consequently may 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 health issues (Raghubir and Menon 1998). This finding raises concerns regarding 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 will personally relevant health messages encourage processing when focused on providing disease-related information and taking pro-active preventive measures? On the flip side, 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, thereby 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 phenomenon. Our premise is that emotions point to the stakes of a disease, and health consequences have two crucial types of stakes: for self and for family. Therefore, to understand the effectiveness of health messages that present consequences for the self or family, one needs to take into consideration the role of emotions – both as a provider of resources and of information.

Thus, the current research aims to add to extant work in health marketing which has focused mostly on cognitive factors, largely neglecting the role of emotions underlying the effectiveness of such messages. Some recent research has begun to reverse that trend, where emotions such as fear are explored in relation to message persuasiveness (Keller 1999). For example, Kahn and Luce (2003) show that stress caused by receiving 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, thereby impacting 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 questions pertain to: (a) the role of discrete emotions in fostering the acceptance of vulnerability or leading to the rejection of vulnerability, (b) how discrete emotions and message characteristics interact to influence message effectiveness, and (c) delineating the process by which these effects occur. To address these gaps, we conducted four experiments that examine the role of four strategically-chosen discrete emotions (happiness, peacefulness, sadness, agitation) in influencing message effectiveness, with a particular focus on how the emotions interact with health messages focused on the consequences of an illness for self or family. We show that when primed with a discrete positive emotion, the compatibility between the message referent and the discrete emotion fosters the processing of health information, but that compatibility hinders processing of the message when the emotion primed is negative. Further, we demonstrate that this effect occurs due to an increase in the negative emotional state in compatible situations while processing disease-related information.

In addressing the above research questions relating 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, varying on the dimensions of valence and self/other-relatedness, can influence the processing of health messages featuring the two distinct referent groups. While 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 influencing the resources to process the message (e.g., Keller, Lipkus, and Rimer 2003; Raghunathan and Trope 2002) with research suggesting that discrete emotions may be appraised on distinct dimensions (e.g., Lerner and Keltner 2000; Tiedens and Linton 2001). In so doing, we add to the growing stream of research focused on multiple roles played by 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 that other times, it can backfire (e.g., Keller 1999).

CONCEPTUAL BACKGROUND

Current research suggests that discrete emotions may provide information based on the understanding or appraisal of those emotions (Lerner and Keltner 2000). The “emotion as information” approach posits that individuals 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. However, in addition to providing a positive feeling, it provides information - 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 as well as the consequences of these roles.

Valence: Emotion as a Resource

One of the characteristics of health messages such as those in appendix A 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). Positive mood thereby serves as a buffer to 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 higher health risk. Therefore, participants in a positive mood state tend to be less concerned about the mood-deteriorating consequences of accepting risk, whereas people experiencing negative mood states often are driven to improve their mood (Raghunathan and Trope 2002; Trope and Pomerantz 1998).

Consistent with mood repair theories, several studies have found that individuals 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 participants’ ability to cope with negative feedback, and to enhance a preference for processing positive information. For instance, those in negative (as compared to positive) mood states avoid negative information and process threatening health information more slowly (Aspinwall 1998). In addition, negative mood leads individuals to seek positively framed feedback rather than negatively framed feedback (Trope and Pomerantz 1998). Indeed, when experiencing negative mood, health messages presenting 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 fact 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

Reconsider the two ads in appendix A. The most salient difference between these ads is the referent group – i.e., the group to which the reader is directed to consider – one’s self (as in the hepatitis C ad) or one’s family (as in the breast cancer ad). We argue that when a woman reads a health message suggesting that breast cancer can affect her family directly, the degree to which the message will be effective should depend on its compatibility with the emotional state experienced by her at the time. We hypothesize that the self/other-relatedness appraisal dimension of emotions has an effect in 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 self as 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 an individual’s internal state such as one’s 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

¹ Note that research on mood maintenance would also predict that people in positive emotional states might be motivated to maintain that 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
internal state of close others (i.e., family, friends), and thus involve perspective taking (e.g., what is a close other thinking, how are they 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 vs. family) is compatible with the individual’s emotional state (self- vs. other-related emotions), the message becomes more relevant and personal to the decision-maker. The literature on discrete emotions provides some evidence that events compatible with one’s emotional state appear more personally relevant and more likely to occur. For example, since emotions serve as informational sources about the environment, they affect the perceived likelihood of future events, whereby events compatible with one’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 matched the appraisal of an individual’s emotions, thereby demonstrating compatibility effects. Further, extant research suggests that referencing self versus family is associated with very different emotions. For example, individuals asked to think only about themselves (to the exclusion of others) are more likely to feel emotions such as happiness and sadness, whereas those 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 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).
further suggests a compatible relationship between self-focused emotions and a self-referent message. Similarly, peacefulness and agitation, due to their other-related appraisal, are likely to be compatible with family-referent messages.

The Role of Discrete Emotions in Fostering versus Hindering Health Message Effectiveness

A main goal of the current 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 individuals in a positive emotional state should be more persuaded by a health message with a compatible appeal because they have the resources to process the appeal and because the appeal is relevant, personal.

However, a very different set of effects should occur when individuals are in a negative emotional state. The studies reviewed above 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 attaining long-term benefits by the processing of negative self-relevant information (e.g., Raghunathan and Trope 2002). Hence, they are likely to process aversive relevant disease-related information only in a superficial manner, 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. Hence, they process the message in more detail hoping that it will help them confirm that they are not at risk, which in turn would serve to repair their mood. However, once 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 in fact conclude they are more at risk than they had initially expected.
In sum, 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:

**H1:** When 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 when happy participants are exposed to a self (vs. family) referent appeal (H1a), and peaceful participants are exposed to a family (vs. self) referent appeal (H1b).

**H2:** When 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 when sad participants are exposed to a self (vs. family) referent appeal (H2a), and agitated participants are exposed to a family (vs. self) referent appeal (H2b).

We turn next to the results of four experiments. In the first two experiments, we examine whether the valence appraisal dimension of emotions acts as a resource in processing aversive health information, with positive emotions enhancing processing to test hypothesis 1 (experiment
1) and negative emotions hindering processing to test hypothesis 2 (experiment 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 provide insight into the processes that underlie these differential effects.

Critical to our hypotheses is the notion that compatibility in a persuasion scenario involving aversive information (such as in the domain of health messages) leads to an increase in one’s negative emotion state. Although there is much research that shows that compatible messages may be more persuasive (Petty and Wegener 1998), there is no research demonstrating compatible messages have specific emotional consequences. To support our theorizing that processing a compatible health message has such an effect, we specifically examine the way in which specific emotions shift across time, pre-exposure vs. post-exposure to the health message. Thus, in experiment 4 we examine the notion that compatibility involving aversive information leads to an increase in the negative emotion 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 the self versus family, we manipulated happiness (self-related emotion) and peacefulness (other-related emotion) in experiment 1. If emotion indeed operates as a resource, we should observe that messages in compatible conditions (e.g., viewing a self-referent message when experiencing a positive self-related emotion) will increase personal relevance and will therefore be more effective than messages in incompatible conditions (e.g., viewing a family-referent message when experiencing a positive self-related emotion).
Method

Design. Eighty undergraduate students at a large northeastern university participated for course credit, and were randomly allocated to one of four conditions in a 2 (primed positive emotion: happy vs. peaceful) x 2 (message referent: self vs. 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 Tiedens and Linton (2001) whereby the relevant emotional state was induced by asking participants to think about an incident that either made them feel happy and cheerful, or peaceful and calm, and spend 10 minutes writing about the incident. Following their description, participants then rated the degree to which they currently felt a set of emotions on seven-point scales (1 = “not at all”; 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 containing an advertisement about hepatitis C. We selected hepatitis C as the health hazard of interest for two reasons; (a) Hepatitis C has affected nearly four million Americans, and is associated with 8,000 to 10,000 deaths per year in the United States, according to the Centers for Disease Control and Prevention; (b) 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 of 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 subsequently-shown ad introduced hepatitis C by
listing eight frequent behaviors that cause the disease (Menon, Block, and Ramanathan 2002). Participants then read either the self-referent or 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 ad, participants rated the main dependent variable, self-risk. This measure was used in light of extant research suggesting the central challenge in heightening the effectiveness of health messages is to make people feel vulnerable to a disease, thereby increasing the likelihood of processing disease-related information and taking pro-active 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,” 100 = “definitely have it”). Participants completed the manipulation checks, and were debriefed.

Results

The results were analyzed using a 2 (message referent: self vs. family) x 2 (emotions: happy vs. peaceful) between-subjects 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 felt 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 x 2 ANOVA on the self-referent index yielded a main effect of message referent indicating that the participants in the self-referent (vs. 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 more about themselves 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 (vs. self) ads 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 x 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 (vs. happy) incident reported higher degrees of felt 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 hypothesis 1, a 2 x 2 ANOVA was conducted on the 101-point self-risk measure and resulted in a two-way interaction ($F(1, 65) = 16.92$, $p < .001$). Follow-up contrasts indicated that for participants experiencing happiness, self-referent appeals lead to higher estimates for self-risk ($M_{self} = 34.75$, $M_{family} = 13.13$; $F(1, 65) = 7.20$, $p < .01$). For participants experiencing 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 predicted.

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

**EXPERIMENT 2: NEGATIVE EMOTIONS REVERSE COMPATIBILITY EFFECTS**

Experiment 2 was conducted with two goals in mind: (a) manipulate sadness (self-related) and agitation (other-related), and (b) 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 and three undergraduate students at a large northeastern university participated for course credit, randomly allocated to one of four conditions in a 2 (primed negative emotion: sad vs. agitated) x 2 (message referent: self vs. 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 either told to relive a moment where they felt 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”, 7 = “a lot”) using measures of sadness (sad, low, discouraged, disappointed; \( \alpha = .89 \)) and agitation (agitated, tense, uneasy, on edge; \( \alpha = .86 \)). Finally, as in experiment 1, they read the ad and completed the measures.

**Results**

The results were analyzed using a 2 (message referent: self vs. family) x 2 (emotions: sad vs. agitated) between-subjects ANOVA. The efficacy of the message manipulation again was assessed using two indices that confirmed that our manipulations worked as intended. A 2 x 2
ANOVA on the self-referent index (r = .76) only revealed a main effect: Participants in the self-referent condition focused more on themselves than those in the family-referent conditions (Mself = 4.64, Mfamily = 3.94; F(1, 92) = 3.86, p < .05). Further, the family-referent index (r = .79) also only revealed a main effect of message: Participants exposed to the family-referent ads focused more on the family and close others (Mself = 2.65, Mfamily = 3.63; F(1, 93) = 8.40, p < .01). To check the effectiveness of the emotions manipulation, a 2 x 2 ANOVA on the sadness score was run; participants who recalled a sad moment reported greater sadness than those who recalled an agitated moment (Msad = 3.57, Magitated = 2.88; F(1, 92) = 4.12, p < .05). A similar analysis on the agitation score revealed that participants who recalled an agitating (vs. sad) moment reported greater agitation (Msad = 3.22, Magitated = 4.37; F(1, 99) = 14.47, p < .001).

To test hypothesis 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 experiencing sadness, self-referent appeals lead to lower probability estimates for self-risk (Mself = 6.30, Mfamily = 15.15; F(1, 99) = 5.66, p < .05). For those experiencing agitation, family-referent appeals were less effective in raising self-risk estimates (Mself = 14.85, Mfamily = 6.14; F(1, 99) = 4.93, p < .05). Thus, consistent with hypothesis 2, primed negative emotions reversed the compatibility effect.

Discussion

The results from experiments 1 and 2 provide support for our theorizing 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. Hence, when positive emotions are experienced, people are more open to
emotionally aversive information, resulting in compatibility effects. In contrast, when negative emotions are primed, people reject aversive information, reversing the compatibility effects.

Why might such effects occur? We argue that when one’s emotional state and message referent are compatible, the message becomes more personally relevant and is therefore more effective (Petty and Wegener 1998), as long as the individual 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 experiencing positive emotions, compatibility should lead to greater attention being paid to relevant information, but when experiencing negative emotions compatibility should lead to lowered attention. Thus, we conducted an additional experiment which 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 so as to garner greater confidence in this assumption as well as the bigger conceptual picture. Following the procedures adopted by Menon, Block, and Ramanathan (2002), we thus measure message effectiveness by presenting a subsequent New York Times article about hepatitis C and eliciting participants’ attitudes towards this article.

**EXPERIMENT 3: UNDERSTANDING THE MECHANISM**

The objective of experiment 3 is focused on exploring the process underlying the effects, as well as broadening the web of dependent variables used to assess message effectiveness. In
addition, for increased parsimony, we manipulate all four emotions varying 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 via a magazine to prime emotions. Further, we shift focus away from evaluating ads toward the evaluation of a *New York Times* article on hepatitis C -- a type of communication that is often used and 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 (vs. incompatible) health messages present highly relevant health information that could help avoid health risks in the long term, but in the short term, they make one’s current mood state more negative. Participants 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, participants in a negative mood, in an attempt to avoid any further mood deterioration, are likely to process negative personally-relevant information in a superficial manner. Hence, a compatible appeal will be processed more superficially than an incompatible appeal. Once participants process the arguments in the message, which in our stimuli are strong (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 intended to capture this processing element of our theorizing. Hence, we collected process measures (e.g., recall, time, attention, accuracy) to test the theory that

2 We thank Dick Wittink for this suggestion.
compatible (vs. incompatible) appeals are processed carefully under positive emotions but incompatible (vs. compatible) messages are processed more carefully under negative emotions. We also collected persuasion measures to support our theory that given all messages featured strong arguments, messages 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 vs. negative) x 2 (emotion relatedness: self vs. other) x 2 (message referent: self vs. family) between-subjects design. The first two factors relating 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 and eighty-eight undergraduate students at a large northeastern university participated for partial course credit, and were randomly allocated to one of eight conditions.

Procedure. The cover story involved the potential introduction of a new magazine launched by a Canadian company in the US, and targeted at young adults. To assess the potential of the magazine, participants were asked to peruse the cover page as well as the lead article, and then answer several questions. The magazine was formatted distinctly from the follow-on questions in terms of font, color, and overall quality, so as to better simulate the effect of perusing a real magazine. The cover page involved 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 that read: “Are you
happy and cheerful <vs. 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 10 minutes for this task. Following this description, the third page measured emotions, asking participants to rate how they were feeling right now by circling the degree to which they felt specific emotions (1 = “not at all”; 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 conducted by a professor on the west coast.” Similar to the prior experiments, participants were told of the American Liver Foundation’s desire to design a health-based advertising campaign. They then read the advertisement (manipulating self versus family referent), and completed a self-risk measure indicating the likelihood of contracting hepatitis C for themselves on a seven-point scale anchored “not at all likely” and “very likely.” Participants were asked an open-ended question: “Please recall any information that you can remember from the Hepatitis C ad that you saw.” At the end, they answered manipulation check questions.

One key contribution of this experiment involves added stimulus and a new set of measures used to assess process and message effectiveness. That is, participants were asked to read a recent “New York Times article” providing additional information on hepatitis C (see appendix B), followed by processing and effectiveness questions regarding 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 (a) the time taken to read the article and (b) attention bestowed on the article -- as well as the quality of processing through (c) accuracy on a quiz based on the article. In addition, we elicited attitude towards the article as another message effectiveness measure.

The way in which measures were elicited as follows: Before beginning to read the article, we instituted a subtle method for measuring the time spent reading the article, an objective measure of depth of processing (cf. 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 the down the time during different points in the questionnaire. They then read the New York Times article, recording the time once 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 at “not very much attention/a lot of attention”) over and above the more objective measure (time spent reading the article). Next, we measured the accuracy of participants’ processing of the article. Participants completed a 15-item quiz based on the hepatitis C article to which potential answers were “True,” “False,” or “Don’t know” (Menon, Block, and Ramanathan 2002). To assess quality of processing, an accuracy score was created by adding up the correct answers. Finally, participants assessed their attitude toward the article based on five items on seven-point scales (not informative/very informative, not credible/very credible, not interesting/very interesting, not useful to me/very useful to me, will definitely not affect my future behavior/will definitely affect my future behavior; Cronbach's $\alpha = .79$). Participants were debriefed and dismissed.
Results

The results for referent manipulation checks were analyzed using a 2 (valence of primed emotion: positive vs. negative) x 2 (relatedness of emotion: self vs. other) x 2 (message referent: self vs. family) between-subjects ANOVA. The self-referent index yielded the predicted main effect of message referent with participants in the self-referent (vs. family-referent) appeal condition focusing on themselves more ($M_{self} = 4.74$, $M_{family} = 4.24$; $F(1, 179) = 3.92$, $p < .05$). Further, the family-referent index revealed the predicted main effect of message referent such that participants exposed to the family- (vs. self-) referent ads 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. A one-way ANOVA with four levels of emotions conducted on each of the four emotion scores 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 where the score of that emotion (e.g., happiness score) in that same emotion condition (e.g., happiness) was compared with the average of the other three emotions (e.g., mean of peacefulness, sadness, and 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 ($Ms = 3.99$; $F(1, 180) = 1.72$, $p = .08$). Similar effects were found 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.

Our key prediction is that positive emotions will encourage compatibility effects, but negative emotions will lead to incompatibility effects. We collapsed the data to focus on compatible versus incompatible conditions (table 1; shaded cells denote compatible conditions). Specifically, two sets of cells were coded as compatible: the happy or sad conditions when exposed to a self-referent, and the peaceful or agitation conditions when exposed to a family-referent. The cells that were coded as incompatible were: happy or sad emotion conditions when exposed to a family-referent, and peaceful or agitation conditions when exposed to a self-referent. We then conducted 2 (emotion: positive vs. negative) x 2 (compatibility: compatible vs. incompatible) between-subjects ANOVAs on the different dependent measures.3

To determine whether compatible messages were indeed processed more deeply in a positive emotional state and processed in a shallow manner in a negative emotional state, we ran a 2 x 2 ANOVA on the open-ended measure that elicited ad recall. The results yielded a main effect of valence ($M_{\text{positive}} = 5.55$, $M_{\text{negative}} = 4.67$; $F(1, 173) = 7.36$, $p < .01$), suggesting that individuals in negative emotional states did not process information as carefully as those feeling positive emotions. There was also a significant 2 x 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 ($M_{\text{compatible}} = 6.04$, $M_{\text{incompatible}} = 4.97$; $F(1, 173) = 6.39$, $p < .05$), but when the emotion was negative, compatible referents led to lower recall ($M_{\text{compatible}} = 3.70$, $M_{\text{incompatible}} = 3.70$, $M_{\text{incompatible}} = 3.70$).

3 We also ran a 2 x 2 x 2 full ANOVA, and conducted a series of planned contrasts on the four measures related to the NYTimes articles reported here in the text of the article. The omnibus tests revealed a significant three way interaction (MANOVA 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 towards 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 will focus on the 2 x 2 analysis.
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 people under negative emotions, in an attempt to feel better, are less likely to accept themselves being at risk.

The remaining measures reported below relate to the New York Times article that participants read. Table 1 reports the means for the full three-way between-subjects design on these measures to provide a complete picture of the data.

A 2 x 2 ANOVA on the new message effectiveness variable, the five-item attitude index, yielded the predicted emotion x compatibility interaction (F(1, 173) = 10.03, p < .01). When the emotion was positive, attitude towards the article was more favorable in compatible conditions \( (M_{\text{compatible}} = 5.02, M_{\text{incompatible}} = 4.46; F(1, 173) = 5.99, p < .05) \), but this pattern reversed when the emotion was negative, \( (M_{\text{compatible}} = 4.29, M_{\text{incompatible}} = 4.81; F(1, 173) = 4.23, p < .05) \). As a sidenote, the same 2 x 2 ANOVA run on the 7-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 \( (M_{\text{compatible}} = 3.62, M_{\text{incompatible}} = 2.82; F(1, 173) = 5.46, p < .05) \), and when the primed emotion was negative, compatible referents led to directionally lower likelihood estimates \( (M_{\text{compatible}} = 2.80, M_{\text{incompatible}} = 3.13; F(1, 173) < 1) \), though the contrast was not statistically significant.

**Process Insight.** For 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 x 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, more time was spent reading on 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, less time was spent on reading the hepatitis C article in the compatible condition (M_{compatible} = 3.10, M_{incompatible} = 4.87; F(1, 173) = 10.39, p < .01). Similarly, a 2 x 2 ANOVA on self-reported attention revealed the interaction (F(1, 173) = 19.88, p < .001), such that when the emotion was positive, greater attention was paid to the article in compatible conditions (M_{compatible} = 4.80, M_{incompatible} = 3.82; F(1, 173) = 4.90, p < .01). 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 x 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 hypothesis 1 and 2.

When one’s emotional state and message referent are compatible, we theorized that the message becomes more personally relevant and thus effective, as long as the individual 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 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 towards the article) should be mediated by the depth and quality of processing measures.

Thus, we ran mediational analyses following the procedures outlined by Baron and Kenny (1986). Since each of the three sets of mediational analyses showed similar results, we present the results of one of these mediations (using attention as the mediator) for illustrative purposes. Three regressions were run: (a) we regressed the mediator (attention) on the independent variable (valence, compatibility and the interaction of valence and compatibility). The interaction of valence and compatibility on attention was significant ($R^2 = .10, B = 2.38, p < .001$). Next (b), the main dependent variable (attitude towards the article) was regressed on the independent variables and the interaction between valence and compatibility was significant ($R^2 = .05, B = 1.01, p < .01$). Finally (c), attitude toward the article was then regressed on both the independent variables and the mediator. When both independent variables and mediator were included ($R^2 = .43$), the interaction became non-significant ($B = .22, p = .41$) but attention remained significant ($B = .38, p < .001$). Thus, the three regressions together suggest that attention paid to the article indeed mediated the effects of the valence and 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, they 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 attention and time to process the information both increase in compatible conditions when there are resources to process the
information (i.e., in positive emotional states). But importantly, the measures both decrease in compatible conditions when there are limited resources to process the information. Second, the results show that the greater depth of processing under conditions of positive emotions (and the hindered depth of processing in conditions of negative emotions) translates to patterns of message effectiveness. In fact, the effects observed in experiments 1 and 2 are mediated by depth and quality of information processing, 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 increasing the generalizability of our results with a focus on more realistic situations.

Next, to support our theorizing that processing a compatible health message leads to an increase in one’s negative emotional state (or emotional deterioration), we examine the way in which specific emotions shift across time: pre-exposure vs. post-exposure to a health message. This analysis helps to crystallize the process by which mood repair motives are triggered by negative emotions (observed in our earlier experiments) in the context of dealing with the negative emotional consequences of health messages. Further, for construct validity, we relied on a different method to create compatibility with self versus family referent messages. Specifically, we used self-view (independent vs. interdependent) such that in situations when self-related (vs. other-related) emotions are primed and the self-view is independent (vs. interdependent), the situation created is compatible. On the other hand, when self-related (vs. other-related) emotions are primed and the self-view is interdependent (vs. independent), the situation created is incompatible. Thus, one would expect the emotional deterioration in the self-based compatibility condition (independent self-view and self-referent message) to occur mostly on the self-related emotions of happiness and sadness. And in turn, one would expect an other-based compatibility (interdependent self-view and family-referent message) to 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 goals 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 involving aversive information, such as in the domain of health messages, leads to emotional deterioration. Further, we seek 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. Participants, run in small groups and randomly assigned to one of two between-subjects conditions, were told they would complete a set of unrelated questionnaires. First, participants completed an Emotions Questionnaire in which they were asked how strongly they currently felt each of these emotions: happiness (happy, cheerful), peacefulness (calm, peaceful), sadness (depressed, sad, disappointed) and agitation (tense; Higgins, Shah, and Friedman 1997; 1 = “not at all” and 7 = “very strongly”). Next, they were given a 30-minute unrelated filler task. When finished, participants took part in a second, supposedly unrelated, health survey containing an advertisement about hepatitis C, where the same cover story was used as in the previous experiments. To assess emotional change, participants completed the emotions measures again after exposure to the ad and indicated their self-risk perceptions on a 101-point scale. To further measure message effectiveness, we included two items: (a) concern over contracting hepatitis C (1 = “not at all concerned”, 7 = “very concerned”) and (b) a behavioral intention question about getting tested for hepatitis C (1
= “will definitely not get tested”, 7 = “will definitely get tested”), averaged to create a single Attitudes and Intentions index; (r = .72).

After a five-minute unrelated filler task, participants completed the Singelis scale (1994) that assessed the independent self via 15 items (e.g., “I feel it is important for me to act as an independent person”) and interdependent self via 15 items (“My happiness depends on the happiness of those around me”). As in prior work (Lee, Aaker, and Gardner 2000), each set of 15 items was added to generate a score of independence (α = .81) and interdependence (α = .71) for each participant. The interdependent score was subtracted from the independent score, yielding an independent-interdependent score for each individual. A median split was then performed, such that half of the participants were coded as having a dominant independent self (M = 1.03); the others were coded as having a dominant interdependent self (M = -.75 F (1, 94) = 146.57, p < .001). No participants were dropped. Participants were debriefed and dismissed.

Results

Table 2 presents the cell means for all the measures.

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First, we conducted a 2 (self-view) x 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 (p’s < .05; see table 1 for cell means and interaction F-values). 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. Also, for
convergent validity, we conducted regressions with self-view as a continuous variable, message
referent, and the interaction of two terms. The two-way interaction was significant for the 101-
point self-risk probability estimates (F(1, 94) = 10.67, p < .01) as well as the Attitude and
Intention index (F(1, 94) = 5.55, p < .05) in line with the findings reported using ANOVA.

Next, we examined changes in emotions as a function of compatibility. Following the
procedure adopted by Higgins, Shah, and Friedman (1997), a decrease in happiness (difference
between pre- and post-exposure to the ad) and an increase in sadness (difference between post-
and pre-exposure to the ad) were added to compute a “deterioration in self-related emotions”
index. Similarly, a “deterioration in other-related emotions” index was computed by adding the
decrease in peacefulness and increase in agitation. A higher number on these measures indicates
an increased sensitivity to emotions varying in self/other-related emotions such that negative
emotions are enhanced and positive emotions decreased.

A 2 x 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 exposed to self or family-referent appeals was not significant. In turn, a
2 x 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, appeals
with a family-referent led to a greater deterioration in other-related emotions than 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 when exposed to self or family-referent appeals was marginally significant ($F(1, 94) = 3.36; p < .10$). No other effects were significant.

In sum, 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 related 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 is the first time that an aversive message leading to deterioration in specific emotions has been tracked in the literature. 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 enhance message processing under positive emotions, and hinder it under negative emotions, as a function of mood repair goals. Finally, we provide construct validity for compatibility effects by creating compatible situations using an individual difference variable.

GENERAL DISCUSSION

This article examined the role of discrete emotions in the effectiveness of health message focused on self versus family. We primed happiness and peacefulness (experiment 1), sadness and agitation (experiment 2) directly. The results showed that under happy emotional states, self-referent health appeals are more effective than family-referent appeals, whereas the converse occurred for peaceful emotional states. And under negative emotional states like sadness (vs. agitation), the compatible self-referent health appeals were less effective than family-referent appeals. Together, these findings suggest that compatibility between message referent and
self/other relatedness dimension of the emotion impacts message effectiveness – an effect that is critically dependent 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 where a magazine primes the emotions that then foster or hinder the processing of health related information. Here too, we demonstrate that a compatible message referent leads to greater message effectiveness, but only in condition of positive emotional states when there are resources to deal with such emotionally aversive messages. Negative emotions appear to encourage a mood repair motive, discouraging consumers from accepting the messages presented by a compatible appeal. We also demonstrated that the interactive effect of emotional valence and compatibility on message effectiveness is mediated through depth and quality of processing of information, thereby providing evidence for the process that we posit. Finally, experiment 4 demonstrated that emotional deterioration underlies the effects 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, as well as health.

This research was inspired in part by calls to understand the factors that influence the adoption of healthy behaviors to reduce the chance of disease, and an 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, thereby underscoring two recent perspectives in the health literature. Consistent with recent work (e.g., Keller 1999), the current findings suggest that messages that make risk too real by increasing perceived vulnerability might be effective under some conditions, but 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 suggesting that appeals that create fear or stress might be effective only up to a certain threshold. For example, Kahn and Luce (2003) found 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 what is a “relevant risk” is impacted by the compatibility between message features and appraisals of the emotions (other than valence).

Further, these findings extend recent developments in the emotions literature by highlighting 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 played by discrete emotions – a provider of resource and information. Further, these findings extend the work on the role of positive and negative moods on processing and acceptance of aversive information (Keller, Lipkus, and Rimer 2003; Raghunathan and Trope 2002) by examining the interaction of valence with other appraisal dimensions. Although our studies (along with 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 will 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 on other appraisal dimensions of that emotion – thereby highlighting the need to understand more deeply and broadly 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. One of the keys in determining whether compatibility conditions will help versus harm persuasion efforts appears to be consumer resources and motives held when processing information. When mood repair motives are operant, conditions of compatibility may hurt attempts at persuasion. It was only in conditions of positive mood, for example, where compatible appeals were more persuasive.

Our findings also suggest 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 instance, the negative emotion of agitation led to the superficial processing of compatible other-related information in an attempt to emotion-repair but agitated individuals still processed incompatible information. Also, negative health-related information was found to impact specific emotional states. In experiment 4, family-referent appeals had a negative emotional impact on other related emotions but not on self-related emotions. Hence, motives like 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-
In general, our findings highlight the importance of studying the various roles (e.g., resource, information, motives) that emotions might play in decision-making.

More broadly, these findings speak to the general stream of research (a) examining compatibility effects between message characteristics and individual factors, and (b) positing specific cognitive-based mechanisms underlying the effects including elaboration likelihood, experienced fluency, or 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 as a moderator of the persuasiveness of compatible messages (Petty and Wegener 1998). Our findings introduce valence of emotion as another such moderator. Finally, our results suggest that one consequence of compatibility could be a shift in emotional responses along a specific dimension, which indeed may contribute to the “feeling right” experience often transferred to subsequent evaluations of a product (Cesario, Grant, and Higgins 2004).

In addition, consider the managerial implications of these findings for the placement of marketing communications for example. The finding that people are more likely to process emotionally aversive information when they are in a positive mood suggests that that a health message may be more effective if aired in the context of a situational comedy versus 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, limitations of the current studies merit attention as they afford opportunities for future work. Limits to generalizeability exist, for example, as this research focused on a single disease (hepatitis C), examined only two dimensions of emotions (valence and relatedness, but not arousal for example), and explored the effects of only pure emotional states (not exploring the existence and impact of mixed emotions). Further, although we find evidence of an emotion-based mechanism underlying the effects, the possibility remains that other mechanisms (e.g., involvement, fluency) may be operant as well and thus need further attention. In addition, our current work only focused on messages oriented toward the self or family when contemplating the consequences of an illness, thereby raising the question of what occurs when multiple points of reference are used. For instance, 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 future research. Finally, the current research assessed only self-risk perceptions after imagining the consequences of one’s illness for close others. What remains unknown is how such messages impact risk perceptions for the family? The prospect that the vulnerability of close others may possibly lead to favorable health behaviors is compelling, and opens novel avenues for future research.
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<tr>
<th>Dependent measures</th>
<th>Message referent</th>
<th>Discrete Emotions</th>
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<th>F-values and effect sizes ($\mu^2$) for the predicted 2 (compatible) x 2 (valence) interaction</th>
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<td>Attitude to the <em>NYT</em> article (5-item 1-7 scales; $\alpha = .79$)</td>
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<td>Family</td>
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<td>4.95**</td>
<td>4.69</td>
<td>4.39**</td>
</tr>
<tr>
<td><strong>Depth of Processing Measures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Objective measure: Time spent on reading the <em>NYT</em> article (in minutes)</td>
<td>Self</td>
<td>5.00</td>
<td>3.04</td>
<td>2.75</td>
<td>4.81</td>
</tr>
<tr>
<td></td>
<td>Family</td>
<td>3.54</td>
<td>3.86**</td>
<td>4.94</td>
<td>3.45***</td>
</tr>
<tr>
<td>Subjective measure: Attention paid to the <em>NYT</em> article (1-7 scale)</td>
<td>Self</td>
<td>4.83</td>
<td>4.25</td>
<td>3.10</td>
<td>5.33</td>
</tr>
<tr>
<td></td>
<td>Family</td>
<td>3.36</td>
<td>4.78***</td>
<td>4.39</td>
<td>3.75***</td>
</tr>
<tr>
<td><strong>Quality of Processing Measure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy on a 15-item quiz based on the <em>NYT</em> article read</td>
<td>Self</td>
<td>10.37</td>
<td>9.87</td>
<td>7.75</td>
<td>10.28</td>
</tr>
<tr>
<td></td>
<td>Family</td>
<td>9.18</td>
<td>10.46*</td>
<td>10.00</td>
<td>9.05***</td>
</tr>
</tbody>
</table>

+Shaded boxes are the compatible conditions that are combined within valence in these analyses. Contrasts between compatible versus incompatible cells (averaged across the two self/other-related emotions and two referents) within each valence significant at: *** $p < .01$; ** $p < .05$; * $p < .10$
### TABLE 2
**EXPERIMENT 4: COMPATIBILITY OF EMOTIONS WITH MESSAGE REFERENT**

<table>
<thead>
<tr>
<th>Dependent measures</th>
<th>Independent Self-view</th>
<th>Interdependent Self-view</th>
<th>Interaction F-values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Self-focused appeal</td>
<td>Family-focused appeal</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-risk probability estimate (101-point scale)</td>
<td>20.96 (24.02)</td>
<td>7.44** (10.51)</td>
<td>22.19* (22.35)</td>
</tr>
<tr>
<td></td>
<td>13.57 (17.12)</td>
<td>22.19* (22.35)</td>
<td></td>
</tr>
<tr>
<td>Attitudes and intentions index (level of concern and intentions to get tested; $r = .79$)</td>
<td>3.93 (2.05)</td>
<td>2.96** (1.67)</td>
<td>3.89** (1.27)</td>
</tr>
<tr>
<td></td>
<td>2.64 (1.59)</td>
<td>3.89** (1.27)</td>
<td></td>
</tr>
<tr>
<td>Change in Emotions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deterioration in self-related emotions (before-after on two 7-point scales indices; larger number = more negative emotion)</td>
<td>3.27*** (1.33)</td>
<td>1.23 (1.31)</td>
<td>2.16 (1.14)</td>
</tr>
<tr>
<td>Deterioration in other-related emotions (before-after on two 7-point scales indices; larger number = more negative emotion)</td>
<td>2.35 (1.37)</td>
<td>.91 (90)</td>
<td>2.52** (1.59)</td>
</tr>
</tbody>
</table>

**Notes.** – The contrasts compare two message referents within each type of self-view.

Cell sizes vary from 22-27.

The interaction between focus and self-view was significant in regressions when self-view was entered as a continuous variable on deterioration in self-related emotions ($F(1, 94) = 2.86, p < .10$); and deterioration in other-related emotions ($F(1, 94) = 5.54, p < .05$).

Decrease in happiness (before minus after exposure to ad) and increase in sadness (after minus before exposure to ad) were added to compute a “deterioration in self-related emotions” index (Higgins, Shah, and Friedman 1997). Similarly, a “deterioration in other-related emotions” index was computed by adding the decrease in peacefulness and increase in agitation.

** $p < .05$.
*** $p < .01$. 
APPENDIX A
EXAMPLES OF HEALTH MESSAGES THAT USE FAMILY- AND SELF-REFERENTS
There is bad news and good about a hidden viral epidemic: Hepatitis C

The virus that causes AIDS, H.I.V., is hardly the only virus that can invade the body and wreak havoc for years without the person even knowing it is there. Another insidious and perplexing organism, already present in more than 3.5 million Americans, is the virus that causes hepatitis C. When it first infects a person, it may produce no discernible symptoms. But while still in hiding, it can disrupt vital functions of the liver, and in the long run it may severely damage the liver, causing cirrhosis, organ failure and even cancer.

Although most Americans are far more familiar with hepatitis A, transmitted through contaminated food and water, and hepatitis B, transmitted through infected blood and semen, it is the more recently identified hepatitis C, transmitted mainly through blood, that is responsible for more deaths than the other two versions combined.

As with H.I.V., no treatment exists that is certain to squelch the virus permanently. Even when treated with a virus-suppressing drug soon after it is acquired, the hepatitis C virus is likely to result in a chronic liver infection. Organ damage caused by the virus is one of the leading reasons for needing a liver transplant. The virus is rarely responsible for the failure of the transplant but nearly always invades the new liver, sometimes within a few weeks, and damages it.

With nearly 1.5 percent of the population already infected with hepatitis C virus, the eventual effects of chronic infection make it a growing and costly problem for public health as well as the individual.

That is the bad news about hepatitis C. The good news is that though there is no vaccine to prevent it, recent measures have greatly reduced the risk of infection, and there are steps everyone can take to protect against it.

Preventing Hepatitis C

Hepatitis C is not spread through casual contact, sneezes or coughs, food or water. In the past, the main route of infection was through transfusions of contaminated blood and blood products. But since May 1990, when screening of blood supplies for the virus began, there has been a sharp decline in the risk of infection from transfusions. In 1981, 10 percent to 13 percent of transfusions resulted in transmission of hepatitis C; by 1992, the risk was down to less than 1 percent—three cases per 10,000 units of transfused blood. Now, intravenous drug use with unclean needles is the most common known mode of transmission.

Needle exchange programs could in theory reduce the likelihood of this infection. But since May 1990, when screening of blood supplies for the virus began, there has been a sharp decline in the risk of infection from transfusions. In 1981, 10 percent to 13 percent of transfusions resulted in transmission of hepatitis C; by 1992, the risk was down to less than 1 percent—three cases per 10,000 units of transfused blood. Now, intravenous drug use with unclean needles is the most common known mode of transmission.

About one case in 20 can be traced to infection through sexual intercourse with a virus carrier, exposure to contaminated saliva or other forms of intimate contact with an infected person. Those known to be infected should always practice safe sex; that is, use a latex condom. The risk of acquiring hepatitis C is highest in people with multiple sex partners. Other protective measures to be taken by an infected person include never sharing a toothbrush or razor with another person, taking care to bandage all open cuts carefully and never donating blood, plasma, body organs or sperm.

In about 40 percent of cases, the source of the infection is unknown. Some experts believe that a fair portion of these cases may result from activities like tattooing, body-piercing and even manicures, says Dr. John D. Hamilton, an infectious disease specialist at Duke University Medical Center in Durham, N.C. Anyone pursuing such activities should be sure the practitioner follows strict hygienic measures. If the equipment is previously unused or sterilized at high temperatures or by bathing it in special sterilizing fluids, there is no danger of acquiring the virus.

Pregnant women who are infected with hepatitis C sometimes pass the infection to their fetuses, but it is not known to be transmitted through breast milk. A few cases among health care workers have resulted from being accidentally jabbed by a needle.

Many people become carriers of hepatitis C do not know it until years later, when perhaps a routine medical examination shows an abnormality on a blood test for liver function. In fact, most cases of hepatitis C acquired outside of a medical procedure are initially “silent,” causing no symptoms to warn of the viral invasion. Therefore, anyone who is at high risk of acquiring this disease should be tested for it regularly and, if found to be infected, take proper precautions to prevent its spread.

Treatment

Each year, as many as 180,000 new cases of hepatitis C are diagnosed in this country. If the infection causes immediate symptoms, they are likely to resemble the flu: loss of appetite, nausea, extreme fatigue, fever and abdominal pain. Severe cases result in jaundice, a yellowing of the skin and eyes that results from malfunction of the liver. But more often than not, hepatitis C is first discovered in its chronic, symptom-free state through a routine liver-function test.

Dr. Ala I. Sharara, Dr. Christine M. Hunt and Dr. Hamilton at Duke recently reviewed hundreds of studies of hepatitis C. They reported that while no drug was known to eradicate the virus, treatment with certain interferons, immune system substances that interfere with viruses, can suppress virus replication and reduce and delay liver damage. The only treatments for chronic hepatitis C that have been approved by the Food and Drug Administration involve injections of interferon. The injections are typically administered three times a week for six months.

The newest product, interferon-alpha 2a recombinant, a prescription drug sold as Roferon-A by Hoffmann-La Roche and approved for marketing this month, can be administered for a year. Long-term therapy, as well as higher doses of the drug, is more effective at completely suppressing the infection and delaying relapse. Patients under 35 and those who have not yet developed cirrhosis of the liver have the best response to interferon.

Side effects of therapy are not inconsequential, however. They typically include flu-like symptoms: fatigue, muscle aches, headache, fever and chills, nausea and vomiting, or diarrhea, as well as skin irritation at the site of the injection. Some people also experience depression, irritability, insomnia or anxiety. All such effects disappear when the treatment is discontinued. Relapses can be treated with another round of interferon.

Anyone with any form of hepatitis is advised to abstain from alcohol, which can aggravate the virus-induced liver damage.

Dr. Sharara and colleagues noted that a vaccine against hepatitis C was not likely to be available in the foreseeable future, in part because the virus has many genetic variants and is forever changing genetically. The current goals, therefore, are to prevent infection and to find treatments that are less toxic and better able to eliminate the virus.
REFERENCES


Kahn, Barbara, E. and Mary Frances Luce (2003), “Understanding High-Stakes Consumer Decisions: Mammography Adherence Following False-Alarm Test Results,” *Marketing Science, 22* (Summer), 393-410.


