The Impact of Emotions on the Persuasiveness of Detection versus Prevention Health Appeals

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Report Summary

Consider a health message about sunscreen that claims “shield yourself with sunscreen and prevent skin cancer.” This is a prevention advocacy. Contrast this with a health message promoting mammograms claiming that “early detection saves lives” and encourages women with risk of breast cancer to take the screening test. This is a detection advocacy. Despite being of interest to healthcare marketers and service providers, scant research has explored the unique psychology that drives the effectiveness of detection advocacies.

In this study, Meng-Hua Hsieh, Chethana Achar, and Nidhi Agrawal investigate the persuasiveness of detection versus prevention advocacy advertising in the health context. Building on the premise that detection actions are seen as gambles – since they involve the risk of finding out if one is ill – the authors theorize and test how contextual factors that affect risk perceptions influence the effectiveness of detection advocacies.

Findings

Across three experiments using three different health advertising contexts, the authors demonstrate that incidental emotions varying on uncertainty and valence influence the effectiveness of detection advocacies. They find that detection advocacies are more effective when individuals are feeling emotions characterized by positive uncertainty (e.g., surprise, hope) or negative certainty (e.g., anger, disgust).

Two different psychological processes drive these effects. Under emotions characterized by higher uncertainty, positive thinking drives message effectiveness, whereas under emotions characterized by higher certainty, increased risk seeking drives persuasion. In contrast, incidental emotions varying on certainty and valence dimensions do not influence the persuasiveness of prevention advocacies.

Managerial implications

The study’s demonstration that some types of health appeals (i.e., detection advocacies), by the nature of the actions they suggest, are differentially susceptible to incidental emotional influences is novel. This research provides actionable insights to managers regarding where and when they should place health advertisements that are detection advocacies. Detection health messages are more persuasive if they are embedded in the context of television shows or situations that induce negative certainty emotions (e.g., disgust), or positive uncertainty emotions (e.g., hope).

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Consider a health message promoting mammograms that claims that “early detection saves lives” and encourages women with risk of breast cancer to take the screening test. This is a detection advocacy, which suggests actions that help early detection of health problems. Compare this with a health message about sunscreen that claims “shield yourself with sunscreen & prevent skin cancer”. This is a prevention advocacy, which suggests actions aimed to prevent a health problem from developing in the future. Health messages, thus, can adopt either prevention or detection advocacies based on the type of actions they encourage (Detweiler et al. 1999; Fielding 1978). Extant consumer research has explored the factors that influence the effectiveness of preventive health messages (Block and Keller 1995; Keller 2006; Passyn and Sujan 2006); however, the unique psychology associated with detection versus prevention advocacies remains underexplored (for an exception, see Rothman and Salovey 1997). Under what conditions are detection appeals persuasive? What psychological mechanisms underlie the effective processing of detection advocacies?

Previous research (Rothman et al. 1993) has identified that perceived risk associated with acting on detection and prevention advocacies varies, and therefore these two types of health messages present outcomes with differing risk perceptions. For example, Rothman and Salovey (1997) theorize that performing a detection behavior, being akin to taking a gamble, is riskier (one could find out about having a severe illness) than performing a prevention behavior (one can maintain healthy status). Given this difference in perceived risk of complying with the message, the effectiveness of detection and prevention advocacies might vary by contextual factors that affect responses to risk. The current research identifies one such contextual factor that drives effectiveness of detection and prevention advocacies: incidental emotional state. By integrating the research on specific emotions with that on health messaging, this research
identifies a type of health message (i.e., detection advocacies) that may be particularly susceptible to the influence of incidental emotions of specific characteristics.

Two characteristics or appraisal dimensions associated with specific emotions are relevant to the current inquiry on the persuasiveness of detection (vs. prevention) advocacies. Risk perceptions are associated with appraisals of certainty/uncertainty (Lerner and Keltner 2000; Raghunathan and Pham 1999; Slovic 1987). Because detection advocacies suggest actions that may be construed as being risky, the appraisal dimension of certainty (certainty vs. uncertainty) is likely to drive the perceptions of likelihood of the relevant health outcomes. Furthermore, because of the aversive nature of risk perceptions arising from health messages (Keller, Lipkus, and Rimer 2003), the appraisal dimension of pleasantness or valence (positive vs. negative) is also relevant in responding to detection advocacies. Thus, we suggest that certainty/uncertainty and valence appraisals moderate the effectiveness of detection appeals. In contrast, prevention actions are perceived as solutions for potential risks, therefore prevention advocacies are not aversive and their effectiveness should not be susceptible to the influence of certainty/uncertainty or valence appraisals.

Furthermore, for detection advocacies, the risky nature of detection actions allows us to identify two psychological mechanisms through which incidental emotions influence message processing and persuasion: (1) Under emotions characterized by uncertainty, persuasion is driven by positive thinking (Folkman and Moskowitz 2000; Lazarus 1999), such that a positive emotion (e.g., hope) leads to greater positive thinking and, thus, persuasion than a negative emotion (e.g., anxiety), and (2) under emotions characterized by certainty, persuasion is driven by risk seeking (Lerner and Keltner 2001), such that a negative emotion (e.g., disgust) leads to greater risk seeking and, thus, persuasion than a positive emotion (e.g., happiness; see table 1).
This research contributes to the literature on health messaging by demonstrating how certain types of health messages (i.e., detection advocacies) are differentially susceptible to the influence of incidental emotions characterized by some appraisal dimensions. We argue that because of the differences in perceived gambles involved in the actions they advocate, the persuasiveness of detection—but not prevention—advocacies is affected by incidental emotions that vary in certainty and valence. In addition, we contribute to the growing body of work that explores when and how discrete emotions influence persuasion (Agrawal, Han, and Duhachek 2013; Garg, Inman, and Mittal 2005). We identify two processes that drive the persuasiveness of detection advocacies: positive thinking and risk seeking. Furthermore, we show that specific
emotions determine which of these two mechanisms (positive thinking under uncertain emotions and risk seeking under certain emotions) drives persuasion. In the following sections, we present a review of the relevant literature on health care advocacies and specific emotions, leading to theorizing of the hypotheses tested in the reported studies.

CONCEPTUAL BACKGROUND

Detection and Prevention Health Care Advocacies

While both prevention and detection advocacies are types of messages that encourage consumers to engage in healthy behaviors, the two types of messages differ in perceptions elicited by the recommended actions. Research has shown that individuals perceive detection behaviors as a gamble because they involve the risk of finding out whether they are ill (Kirscht 1983; Rothman et al. 1999). For example, complying with a message promoting mammography can be construed as a gamble because getting a mammography involves the chance that one might get diagnosed with breast cancer. In this case, the likelihood of a diagnosis for cancer presents an undesirable, dreaded outcome. In contrast, prevention behaviors can maintain one’s current health state and have little, if any, shortcomings. For example, complying with a health message promoting sunscreen is considered protection from future risks. In this case, the use of sunscreen is likely to reduce the risk of an undesirable outcome. This notable difference between the two types of health care advocacies leads to the question, How might this conceptual difference in the perceived riskiness of detection (vs. prevention) behaviors systematically affect persuasion?
Risk Perceptions and Persuasion. The risk or perception of one’s susceptibility to negative outcomes conveyed in health messages is a major factor in predicting the effectiveness of such messages (Block and Williams 2002; Menon, Block, and Ramanathan 2002; Raghubir and Menon 1998). In case of prevention and detection behaviors, risk perceptions are formed through the construal of advocated actions as gambles (i.e., high risk in case of detection) or nongambles (i.e., low risk in case of prevention; Rothman et al. 1993). Based on this premise, prior research has applied prospect theory (Kahneman and Tversky 1979) to predict that detection (vs. prevention) actions are attractive when outcomes are framed as losses (vs. gains). For example, loss framing is effective for promoting detection behaviors, such as mammography (Banks et al. 1995; Ferrer et al. 2012), while gain-framed messages are effective for promoting prevention behaviors, such as regular physical exercise (Jones, Sinclair, and Courneya 2003), especially among individuals with a high need for cognition (Rothman et al. 1999). Message framing and consumers’ implicit theories about whether things are fixed or changeable moderate consumers’ responses to prevention and detection advocacies by altering their frame sensitivity (Mathur et al. 2013).

In summary, a small stream of research has examined the persuasiveness of detection versus prevention appeals and has identified a few message- and individual-level moderators. However, the influence of contextual or incidental factors on the persuasiveness of detection (vs. prevention) advocacies remains underexplored in both the consumer behavior and health messaging literature. Given that detection (vs. prevention) behaviors are considered risky gambles, we identify specific incidental emotions varying on certainty/uncertainty as contextual factors that influence the persuasiveness of detection (vs. prevention) appeals. We first present a
brief review of specific emotions and their influence on message processing, and then we theoretically develop the psychological mechanisms relevant to our study.

Specific Emotions and Risk Processing

Despite the progress in understanding the appraisal-driven influence of emotions (for a review, see So et al. 2015), scant research has identified what types of messages are more or less susceptible to emotional influences and what processes drive this susceptibility. Specifically, we are interested in understanding how one feature of health messages—that is, the perceived gamble associated with complying—increases the susceptibility of a message to emotional influences. Each discrete emotion is characterized by a profile of cognitive appraisals that individuals form when interpreting their surroundings (Lambie and Marcel 2002; Smith and Ellsworth 1985). The appraisal-tendency framework (Lerner and Keltner 2000) elucidates how incidental emotions affect the processing of subsequent unrelated messages by activating associated cognitive predispositions in processing the message (Cavanaugh, Bettman, and Luce 2015; De Hooge, Breugelmans, and Zeelenberg 2008; Han, Lerner, and Keltner 2007; Keltner and Lerner 2010; Maheswaran and Chen 2006; Salerno, Laran, and Janiszewski 2015; Winterich and Haws 2011).

As discussed previously, individuals perceive detection behaviors as risky but prevention behaviors as less risky (Rothman et al. 1999). This conceptual difference is critical to the current inquiry because perception of risk is associated with appraisals of certainty provided by specific emotions (Lerner and Keltner 2001). Emotions can be associated with appraisals of high certainty (e.g., disgust, anger, happiness, pride) or high uncertainty (e.g., anxiety, fear, hope,
surprise; Smith and Ellsworth 1985). Prior research has connected emotional certainty with risk-seeking propensity, optimistic risk assessment, and control (Lerner and Keltner 2000, 2001; Raghunathan and Pham 1999); therefore, we theorize that the appraisal dimension of certainty/uncertainty can influence how consumers evaluate and respond to advocacies that suggest detection actions.

However, the dimension of certainty alone may not be sufficient to influence the processing of detection advocacies that allude to risks. Because information about one’s health risk is aversive, valence of the emotional state (i.e., positive or negative) plays a key role in the processing of health risk information (Keller et al. 2003) by providing expectations of pleasantness (or unpleasantness) of a likely event. We expect this effect of certainty and subsequent moderation by valence to apply to the effectiveness of detection advocacies only, because detection actions are perceived as risky. In contrast, we do not expect the appraisals of certainty and valence to influence the effectiveness of prevention advocacies, because prevention actions are not perceived as risky. Formally stated:

**H1**: Incidental emotions varying on certainty and valence dimensions will influence the persuasiveness of detection advocacies, but not prevention advocacies.

While incidental emotions differently influence persuasion of detection (vs. prevention) advocacies, the psychological processes underlying this influence may vary depending on the specific combination of appraisals associated with the given emotion. We argue that increased message effectiveness under appraisal of high uncertainty is driven by individuals’ use of positive thinking while, under high certainty, appraisal is driven by increased risk seeking.
High Uncertainty Emotions and Positive Thinking in Detection Advocacies

Positive thinking refers to strategies that individuals take to look at things in a favorable light and interpret them positively (Duhachek 2005; Folkman and Moskowitz 2000). Positive thinking improves an individual’s outlook on any negative stressors that may arise, including a possible threat to their health, and increases their likelihood of complying with a health advocacy because of their expectations of a positive outcome.

We posit that the appraisal of uncertainty provided by an incidental emotion leads individuals to take action to ensure subsequent good health, but only if the threat of health uncertainty is buffered through positive valence, such that positive thinking is enhanced in the presence of a positive (vs. negative) emotion. One such positive uncertain emotion is hope, which arises when individuals encounter goal-congruent outcomes that are uncertain but possible to achieve (MacInnis and De Mello 2005). Lazarus (1999) infers from Folkman and colleagues’ (Folkman 1997; Folkman et al. 1997) research that hope facilitates coping and helps individuals take actions to achieve favorable outcomes rather than waiting passively for favorable outcomes to occur. Hopeful individuals anticipate a desired outcome, even when they are in a stressful situation (Baumgartner, Pieters, and Bagozzi 2008; Ortony, Clore, and Collins 1988). Similarly, the experience of surprise, another positive uncertainty emotion, causes people to attend to the situation at hand (Smith and Ellsworth 1985). Surprised individuals see the desirable side of unexpected experiences (Lerner and Keltner 2000) and think positively, so they believe that the results of their actions will likely be favorable.
In contrast, experience of high uncertainty in the presence of a negative valence (i.e., unpleasantness) is threatening and may reduce intentions to perform the detection action. Lerner and Keltner (2000) show that when feeling fearful, a negative emotional state associated with high uncertainty, individuals make relatively pessimistic judgments about the future. Thus, when individuals evaluate detection advocacies, those who feel positive emotions with high uncertainty (e.g., hopeful) will engage in positive thinking and expect a more favorable outcome than those who feel negative emotions associated with high uncertainty (e.g., anxiety) and consequently are more likely to get tested. Formally stated:

**H2a**: For detection advocacies, individuals who feel high uncertainty emotions will be more persuaded by a positive than a negative emotion.

**H2b**: For detection advocacies, positive thinking will mediate persuasion under high uncertainty emotions.

Because a favorable view of an uncertain situation drives positive thinking, individuals will not evoke the mechanism when processing detection advocacies under the influence of emotions characterized by high certainty. Under emotions of high certainty, we propose that another mechanism—namely, increased risk seeking—drives how individuals process the information provided in the detection advocacy.

High Certainty Emotions and Risk Seeking in Detection Advocacies

Individuals feeling a high certainty negative emotion (e.g., anger), compared with a high
uncertainty negative emotion (e.g., fear), make riskier choices and are likely to evaluate risks more favorably in loss (vs. gain) scenarios (Lerner and Keltner 2001). Similarly, Raghunathan and Pham (1999) show that those who were made to feel a negative emotion with high certainty (sadness) were more likely to seek rewards by making high-risk/high-reward choices than those primed with a negative emotion of high uncertainty (anxiety). These findings are consistent with prospect theory (Kahneman and Tversky 1979), which predicts that under expectations of a high likelihood loss, individuals make risky bets.

As discussed previously, complying with a detection advocacy for a mammography is akin to a gamble, as getting tested comes with the chance of receiving a diagnosis of having breast cancer. If a consumer processes the mammography ad under a high certainty emotion of negative valence, her expectations are of an undesirable outcome (i.e., having cancer). This is a scenario with unfavorable expectations, which will make the consumer relatively more risk seeking and, thus, more likely to get the mammogram test. With this reasoning, we posit that appraisals of high certainty lead to increased risk seeking in the presence of negative valence (e.g., disgust, anger), and therefore individuals are more likely to engage in risky detection behaviors.

In contrast, experiencing a high certainty emotion with positive valence (e.g., pride, happiness) may cause individuals to form a favorable expectation and not want to gamble by engaging in detection behaviors. Prior research has shown that those experiencing happiness (a positive emotion associated with certainty) expend efforts to maintain their good fortune (Lazarus 1999). Similarly, prideful individuals resist processing information inconsistent with their preference (Agrawal et al. 2013). Thus, happiness and pride, two positive certainty emotions, lead to certain expectations of a positive outcome (i.e., good health), making
individuals less likely to take risks and, therefore, less likely to comply with a detection advocacy.

In summary, we expect that individuals in an emotional state associated with certainty will have greater intentions to comply with a detection advocacy when the valence is negative (vs. positive), driven by increased tendencies to pursue risky courses of action. Formally stated:

**H3a:** For detection advocacies, individuals who feel high certainty emotions will be more persuaded by a negative than a positive emotion.

**H3b:** For detection advocacies, risk seeking will mediate persuasion under high certainty emotions.

In the following studies, we tested the hypotheses by contrasting the effect of emotions varying on certainty and valence dimensions. For this purpose, we strategically selected seven discrete emotions: disgust, anger, pride, happiness (high certainty emotions), anxiety, surprise, and hope (high uncertainty emotions). Among these, disgust, anger, and anxiety are negative emotions, whereas pride, happiness, surprise, and hope are positive emotions. In study 1, we used four emotions to manipulate emotional certainty and valence and to compare their influence on detection (vs. prevention) advocacies in a dental health context among a panel of online participants. In study 2, we conceptually replicated study 1 using a different set of four emotions to manipulate emotional certainty and valence in a skin health context among undergraduate student participants. In study 3, we used a high blood pressure health message to test all hypotheses, including the two mediation mechanisms (positive thinking and risk seeking),
among a sample of online participants. These studies provide converging evidence of the influence of incidental emotions on the effectiveness of detection (vs. prevention) appeals.

**STUDY 1: DENTAL HEALTH MESSAGE**

The objective of study 1 was to test hypotheses 1, 2a, and 3a. For this purpose, we designed an experiment that initially induced one of four discrete emotional states—selected to vary on the valence and certainty dimensions—and subsequently manipulated the nature of the health message (prevention or detection) provided to the participants. We tested for persuasiveness of the message processed under the influence of the respective emotional state by measuring subsequent intentions to behave in compliance with the message. This three-factor study design allows us to compare across individuals’ processing of detection (vs. prevention) advocacies under the influence of emotions varying on these two appraisal dimensions.

**Method**

*Participants, Design, and Procedure*. Three hundred ninety-three participants ($M_{age} = 40.23$, 58% female) recruited from Amazon Mechanical Turk participated in a two-part experiment, in which they were randomly assigned to one of the eight conditions: 2 (positive emotion vs. negative emotion) $\times$ 2 (emotional certainty vs. emotional uncertainty) $\times$ 2 (prevention advocacy vs. detection advocacy). In the first part of the study, participants were asked to recall a life event they had experienced that made them feel one of four emotions. In the second part, participants read information about either a mouth rinse that could help them prevent plaque buildup or a disclosing rinse that could detect areas of plaque buildup (adapted...
from Rothman et al. 1999). Participants indicated their intention of using the advocated dental rinse and responded to demographics questions and confound checks.

*Emotion Manipulation.* We selected four emotions shown to differ on the dimensions of pleasant/unpleasant and certain/uncertain (Smith and Ellsworth 1985) and used an established emotional recall task to induce specific emotions (Robinson and Clore 2001). Participants were asked to think of a life event that they had experienced that made them feel *proud* (positive emotion associated with certainty), *angry* (negative emotion associated with certainty), *surprised* (positive emotion associated with uncertainty), or *anxious* (negative emotion associated with uncertainty). Participants read the following instructional statement: “We would like you to recall a particular incident in your life. Please take a few minutes to think of a life event you have experienced which made you feel proud (surprised, angry, or anxious). Picture this life event in your mind. Please try to remember as vividly as you can what this past proud (surprised, angry, or anxious) life event was like: Think of what happened to make you feel proud (surprised, angry, or anxious), and what it felt like to be proud (surprised, angry, or anxious) in this particular life event.” They were provided space to describe the life event that made them feel one of these emotions in as much detail as they could.

*Nature of Advocacy.* Consumers can use “mouth” rinses to prevent plaque buildup and “disclosing” rinses to detect areas of plaque buildup. Therefore, to keep the product form consistent across conditions, we used a mouth rinse for the prevention advocacy and a disclosing rinse for the detection advocacy, adapted from Rothman et al. (1999) and Mathur et al. (2013). Participants were told that they would read a pamphlet about dental health and tooth decay. We
designed two health care messages promoting the use of a dental rinse, adapted from Rothman et al. (1999) and Mathur et al. (2013). Each pamphlet had the same title (“Facts on dental plaque and tooth decay”) and the same picture of healthy teeth but differed in the nature of advocacy. Participants in all the conditions read the same basic information about tooth decay and plaque. Next, they read information about either (1) a mouth rinse that could help prevent plaque accumulation (prevention advocacy condition) or (2) a disclosing rinse that could help detect areas of plaque accumulation (detection advocacy condition). In the prevention (detection) advocacy, participants read that “people who use a mouth (disclosing) rinse are taking advantage of a safe and effective way to prevent (detect areas of) plaque buildup and development (the onset) of tooth decay. By using a mouth (disclosing) rinse, you will significantly increase your chances of maintaining healthy teeth and preventing (detecting areas of) plaque buildup and development (the onset) of tooth decay”.

**Persuasion.** We measured the persuasiveness of the health care advocacy by asking participants to rate their intentions of getting tested for tooth decay on a 7-point scale (1 = will definitely not, 7 = will definitely). Participants were asked to respond to the questions “How likely are you to use the oral rinse in the future?” and “How likely are you to get more information on the advantages of using this oral rinse?” with responses ranging from very unlikely (1) to very likely (7), and “How often do you actually intend to use the oral rinse in the future?” with responses ranging from never (1) to very often (7). We averaged these items to form an index of persuasion (α = .69).
Results

*Emotion Manipulation Checks.* In a pretest (N = 51), we asked participants to recall a life event that made them feel one of four emotions: proud, angry, surprised, or anxious. They then responded to two statements that measured certainty appraisal: “How certain were you about what was happening in this situation?” with responses ranging from *not at all certain* (1) to *extremely certain* (11), and “How well could you predict what was going to happen in this situation?” with responses ranging from *not at all* (1) to *extremely well* (11) (r = .64, adapted from Smith and Ellsworth 1985). A 2 (certainty of emotion) × 2 (valence of emotion) analysis of variance (ANOVA) on certainty appraisal revealed a significant main effect of emotional certainty, such that participants who were induced to feel proud or angry had higher ratings of certainty than those who were induced to feel surprised or anxious (\(M_{\text{certain}} = 8.38, M_{\text{uncertain}} = 6.97; F(1, 47) = 4.29, p < .05\)). A main effect of emotional valence was also significant (\(M_{\text{positive}} = 8.93, M_{\text{negative}} = 6.42; F(1, 47) = 13.48, p < .05\)). The interaction was not significant, thus validating our manipulations. In addition, as a manipulation check of emotional valence, participants indicated how unpleasant (reverse scored) it was to be in this situation on a scale anchored by *not at all* (1) and *extremely* (11). A two-way ANOVA on the pleasant appraisal revealed a significant main effect of valence, such that participants who were induced to feel proud or surprised had higher ratings of pleasantness than those who were induced to feel angry or anxious (\(M_{\text{positive}} = 9.39, M_{\text{negative}} = 4.34; F(1, 47) = 35.51, p < .05\)). A main effect of certainty was also significant (\(M_{\text{certain}} = 5.98, M_{\text{uncertain}} = 7.75; F(1, 47) = 4.37, p < .05\)). The interaction was not significant; thus, the emotional valence manipulation was successful.
Nature of Advocacy Check. After collecting the main dependent variables, we asked participants to indicate their agreement/disagreement with two statements: “The product helps prevent dental plaque and tooth decay” and “The product helps detect dental plaque and tooth decay,” with possible responses ranging from strongly disagree (1) to strongly agree (7). We subtracted the level of participants’ agreement with the extent to which the advocacy highlighted detection from the extent to which the advocacy highlighted prevention. Higher scores reflect a greater prevention-focused advocacy. A three-way ANOVA using nature of advocacy, certainty, and valence as factors on this index revealed that participants who read a health message about a mouth rinse (prevention advocacy) thought the product was used to help prevent rather than detect dental plaque and tooth decay ($M_{\text{prevention}} = 3.31$, $M_{\text{detection}} = -1.10$; $F(1, 385) = 280.71, p < .001$). Other than this main effect of nature of advocacy, no other effects were significant.

Participants also indicated their involvement in the study on a 7-point scale. In addition, participants indicated the number of cavities they recalled having had filled. These measures were not affected by the independent variables, so we do not discuss these measures further.

Persuasion. A three-way ANOVA using the index of persuasion as the outcome variable indicated only a significant three-way interaction among emotional valence, emotional certainty, and advocacy ($F(1, 385) = 5.82, p < .05$). Further probing revealed that the interaction between certainty and valence dimensions was significant only in the detection ($F(1, 385) = 8.10, p < .01$), but not the prevention ($p > .47$) advocacy condition. Planned contrasts indicated that after viewing a detection advocacy that promoted use of a disclosing rinse, participants who felt angry (negative emotions associated with high certainty) were more persuaded by the advocacy than
those who felt proud (positive emotion associated with high certainty; \( M_{\text{Pos-Certain}} = 4.51, \text{SD}_{\text{Pos-Certain}} = 1.37, M_{\text{Neg-Certain}} = 4.98, \text{SD}_{\text{Neg-Certain}} = 1.07; F(1, 385) = 3.77, p = .05 \)). Conversely, for a detection advocacy, participants who felt surprised (positive emotion associated with high uncertainty) were more persuaded by the advocacy than those who felt anxious (negative emotion associated with high uncertainty; \( M_{\text{Pos-Uncertain}} = 5.15, \text{SD}_{\text{Pos-Uncertain}} = 1.17, M_{\text{Neg-Uncertain}} = 4.67, \text{SD}_{\text{Neg-Uncertain}} = 1.16; F(1, 385) = 4.00, p < .05 \)). In contrast, persuasion of the prevention advocacy that promoted use of a mouth rinse did not vary depending on the combinations of positive or negative valence or whether the emotion was associated with high certainty or high uncertainty (\( M_{\text{Pos-Certain}} = 4.94, \text{SD}_{\text{Pos-Certain}} = 1.25, M_{\text{Neg-Certain}} = 4.98, \text{SD}_{\text{Neg-Certain}} = 1.10, p > .84 \); \( M_{\text{Pos-Uncertain}} = 5.02, \text{SD}_{\text{Pos-Uncertain}} = 1.21, M_{\text{Neg-Uncertain}} = 5.27, \text{SD}_{\text{Neg-Uncertain}} = 1.19, p > .30 \)). Figure 1 plots these results.
FIGURE 1
STUDY 1: MEAN RATINGS OF PERSUASION BY THE NATURE OF ADVOCACY AND CERTAINTY MODERATED BY VALENCE
Discussion

These results show that inducing emotional states varying on certainty and valence dimensions influenced the subsequent effectiveness of a detection, but not prevention, advocacy. This provides support for hypothesis 1 by showing a significant interaction effect of valence and certainty on the persuasiveness of the detection advocacy, as well as a null effect of the four emotions on the persuasiveness of the prevention advocacy. Furthermore, study 1 demonstrated the effectiveness of specific combinations of the valence and certainty dimensions as detailed in hypotheses 2a and 3a. Specifically, individuals induced to feel a negative certainty emotion or a positive uncertainty emotion were relatively more persuaded by the detection advocacy. We aimed to replicate this effect in study 2.

**STUDY 2: SKIN LOTION MESSAGE**

Study 2 was intended to be a conceptual replication of study 1, also testing for hypotheses 1, 2a, and 3a. To test for the generalizability of the results found in study 1 under a different context and emotional states, we used a different product (a skin lotion) and contrasted across a new set of discrete emotions to manipulate emotional valence and emotional certainty. In study 1, we used somewhat different products (i.e., a mouth rinse and a disclosing rinse) in a consistent product form to promote detection (vs. prevention) behaviors. To eliminate any product-induced variance in message effectiveness, in study 2, we held the product constant and varied only the nature of advocacy.
Method

Participants, Design, and Procedure. One hundred thirteen students participated in a two-part experiment ($M_{age} = 21.24$, 41% female). Similar to study 1, participants were randomly assigned to one of the eight conditions: 2 (positive emotion vs. negative emotion) × 2 (emotional certainty vs. emotional uncertainty) × 2 (prevention advocacy vs. detection advocacy). In the first step of the study, participants were asked to recall a life event they had experienced that made them feel a certain emotion. Next, participants read information about either a skin care product that could help prevent skin cancer or a product that could detect skin cancer. Participants were asked to complete a quiz based on the message they read and to respond to demographics questions and confound checks.

Emotion Manipulation. We selected four emotions from the appraisal literature, which indicates that these emotions differ on the dimensions of pleasant/unpleasant and certain/uncertain (Smith and Ellsworth 1985). Participants were asked to think of a life event that they had experienced that made them feel happy (positive emotion associated with certainty), disgusted (negative emotion associated with certainty), hopeful (positive emotion associated with uncertainty), or anxious (negative emotion associated with uncertainty). The manipulation was structurally identical to that used in study 1.

Nature of Advocacy. Adapting the message stimuli from Cox, Cox, and Mantel (2010), we designed two health care messages promoting the use of skin lotion. To keep the product form and type consistent for greater experimental control, we framed a skin lotion as helping to prevent skin cancer for the prevention advocacy or as helping to detect skin cancer for the detection advocacy (Cox et al. 2010). The two versions of the message differed only in the nature
of the advocacy (prevention vs. detection; see appendix). On the first page of the pamphlet, we manipulated the nature of the advocacy (either prevention or detection advocacy). Participants in the prevention (detection) advocacy condition read that “people who use this lotion are taking advantage of a safe and effective way to prevent (detect areas of) unhealthy skin and the early development of skin cancer cells. By using this lotion, you will significantly increase your chances of preventing (detecting areas of) unhealthy skin and the early development of skin cancer.” On the second page of the pamphlet, all participants read the same basic information about skin cancer (“Skin cancer is the most common type of cancer in the United States”; Skin Cancer Foundation 2014; see appendix).

**Persuasion.** We measured the persuasiveness of the health care advocacy messages by asking participants to answer 10 true/false questions based on the pamphlet they read about facts on skin cancer (Menon et al. 2002). We coded participants’ answers to the 10 questions (1 = correct answer, 0 = incorrect answer) and calculated the number of correct answers as the total quiz score.

**Results**

**Nature of Advocacy Check.** To check whether the health advocacy material read by participants promoted a product to help prevent or detect skin cancer, participants indicated their agreement/disagreement with two statements (“The product helps prevent skin cancer” and “The product helps detect skin cancer”), with responses ranging from strongly disagree (1) to strongly agree (7). We subtracted the level of a participant’s agreement with the extent to which the
advocacy highlighted detection from the extent to which the advocacy highlighted prevention. Higher scores reflect a greater prevention-focused advocacy. A three-way ANOVA on this index revealed that participants who read the prevention advocacy health message believed the product was used to help prevent rather than detect skin cancer ($M_{\text{prevention}} = 2.62, M_{\text{detection}} = -0.77; F(1, 105) = 46.03, p < .001$). Other than this main effect of nature of advocacy, no other effects were significant. Thus, the advocacy manipulation was successful.

Participants were also asked to rate the readability of the health message (“readability” and “comprehension”; $r = .78$) on a 7-point scale from very low (1) to very high (7). They also indicated their involvement in the study (“involved,” “motivated,” and “interested”; $\alpha = .92$) on a 7-point scale. In addition, participants indicated their familiarity with skin cancer on a scale from not at all familiar (1) to very familiar (7) and how often they used sunscreen in the past year and how often they spent time outdoors on a scale from never (1) to very often (7). These measures are not affected by the independent variables, so we do not discuss them further.

Persuasion. A three-way ANOVA on participants’ quiz scores revealed a significant three-way interaction among emotional certainty, emotional valence, and prevention versus detection advocacies ($F(1, 105) = 4.83, p < .05$). The two-way interaction between emotional certainty and emotional valence was also significant ($F(1, 105) = 7.22, p < .05$). Further probing revealed that the interaction between certainty and valence dimensions was significant only in the detection ($F(1, 105) = 13.52, p < .001$), but not the prevention ($p > .58$), advocacy condition. Planned contrasts indicated that after viewing a detection advocacy, participants who felt disgusted (negative emotion associated with high certainty) had higher quiz scores than those who felt happy (positive emotion associated with high certainty; $M_{\text{Pos-Certain}} = 6.50, M_{\text{Neg-Certain}} =$
8.44; $F(1, 105) = 6.61, p < .05$). Conversely, after viewing a detection advocacy, participants who felt hopeful (positive emotion associated with high uncertainty) scored higher than those who felt anxious (negative emotion associated with high uncertainty; $M_{\text{Pos-Uncertain}} = 8.88$, $M_{\text{Neg-Uncertain}} = 7.40$; $F(1, 105) = 5.11, p < .05$). For the prevention advocacy, participants had equal quiz scores regardless of whether they experienced positive or negative emotion or whether the emotion was associated with high certainty or high uncertainty ($M_{\text{Pos-Certain}} = 7.54$, $M_{\text{Neg-Certain}} = 8.26, p > .26$; $M_{\text{Pos-Uncertain}} = 7.55$, $M_{\text{Neg-Uncertain}} = 7.93, p > .60$; see table 2). These results provide further support for hypotheses 1, 2a, and 3a.

**TABLE 2**

STUDY 2: MEAN RATINGS OF QUIZ SCORES BY THE NATURE OF ADVOCACY AND EMOTIONAL CERTAINTY UNDER POSITIVE AND NEGATIVE EMOTIONS

<table>
<thead>
<tr>
<th></th>
<th>Certainty Emotion</th>
<th>Uncertainty Emotion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive emotion</td>
<td>Negative emotion</td>
</tr>
<tr>
<td>Detection Advocacy</td>
<td>6.50 (2.56)</td>
<td>8.44 (1.42)</td>
</tr>
<tr>
<td>Prevention Advocacy</td>
<td>7.54 (1.61)</td>
<td>8.26 (1.69)</td>
</tr>
</tbody>
</table>

Note. —Standard deviations are in parentheses. Detection advocacy means within a certainty or uncertainty block with different superscripts are significantly different from each other at the 95% confidence interval. Prevention advocacy means were not significantly different from each other.

Discussion

Study 2, using a skin care product and holding product form and type constant across both advocacies, replicates study 1’s findings and provides further evidence in support of
hypotheses 1, 2a, and 3a. Consistent with our predictions, this study demonstrated that emotional certainty and emotional valence jointly influence the persuasiveness of detection advocacy but not prevention advocacy, such that negative emotions associated with high certainty and positive emotions associated with high uncertainty are effective for promoting detection behaviors, while no such differences emerge for prevention behaviors.

**STUDY 3: BLOOD PRESSURE MESSAGE: DUAL MEDIATION BY POSITIVE THINKING AND RISK SEEKING**

So far, we have provided evidence for the basic effect of the interaction between valence and certainty appraisals of incidental emotions on persuasiveness of detection (vs. prevention) advocacies. We theorized that this effect on detection advocacies was driven by two processes: (1) positive thinking, which, under emotional uncertainty, is increased by positive rather than negative valence, and (2) risk seeking, which, under emotional certainty, is bolstered by negative rather than positive valence. The objective of study 3 was to capture evidence of these two processes and replicate the previous effect in a different health context. For this purpose, we designed a three-factor study similar to the previous two experiments using a blood pressure message and, in addition, collected measures of the hypothesized processes to be subjected to mediation analyses.

The construct of positive thinking refers to participants’ likelihood to take a favorable view of past or future events (Duhachek 2005; Folkman and Moskowitz 2000). We operationalized this in study 3 by asking the participants to indicate how likely they are to look at the bright or positive side of an event. Under emotional uncertainty, a positive valence is more
likely to enhance the use of positive thinking strategies about outcomes of detection behaviors than a negative valence. However, positive thinking is not expected to mediate the effectiveness of health messages under emotions characterized by high certainty.

The construct of risk seeking captures individuals’ consideration of a risky course of action, which, in this case, is the detection (but not prevention) behavior. Slovic and Peters (2006) suggest that individuals’ engagement in risk can occur in two ways: risk as analysis or risk as affect. Risk as analysis refers to a logical, deliberative approach for assessing risk, whereas risk as affect refers to intuitive reactions to danger. In the case of detection behaviors, individuals are likely to approach the risk of detection deliberatively because both the detection and the disease are a potential future occurrence and not an immediate threat (Witte 1994; Zaleskiewicz 2001). In this study, analytical risk seeking is likely to manifest in the form of using the detection message to learn more about the gamble involved in the detection action. If participants engaged in analytical risk seeking in the current context, they would learn more from the detection message, resulting in a greater likelihood to engage in the risky detection behavior.

To measure analytical risk seeking, we asked participants to indicate how much they learned from the message and whether they thought it was useful (Menon et al. 2002).

As we predict that positive thinking and risk seeking will occur in response to the riskiness of detection actions, we expect these measures to differ only for the detection (but not the prevention) advocacy. Furthermore, we expect these processes to jointly mediate different paths to the persuasiveness of detection advocacies; in the case of emotions characterized by uncertainty (certainty), positive thinking (risk seeking) should mediate the path to persuasion.
Method

Participants, Design, and Procedure. Two hundred sixty participants recruited from Amazon Mechanical Turk participated in a two-part experiment ($M_{age} = 36.62$, 59% female). First, participants were asked to recall a life event that they had experienced that made them feel a certain emotion. Next, participants read information about either a supplement that could help prevent high blood pressure or a supplement that could detect high blood pressure. Participants indicated their intention of getting tested for high blood pressure, evaluated the message, and responded to demographics questions and confound checks.

Emotion Manipulation. We used the same four emotions differing on the dimensions of pleasant/unpleasant and certain/uncertain as in study 2. Participants were asked to think of a life event that they had experienced that made them feel happy (positive emotion associated with certainty), disgusted (negative emotion associated with certainty), hopeful (positive emotion associated with uncertainty), or anxious (negative emotion associated with uncertainty).

Nature of Advocacy. Participants were told that they would read a pamphlet about high blood pressure. We designed two health care messages promoting an antioxidant supplement using methodology from Cox et al. (2010). For experimental control, we held product form and type consistent, by developing a message about a supplement that was presented as helping to prevent or detect high blood pressure. The two versions of the message differed only in the purpose of the product (prevention vs. detection), which we manipulated on the first page. Participants in the prevention (detection) advocacy condition read that “people who take this
antioxidant supplement are taking advantage of a safe and effective way to prevent (detect) high blood pressure, also called hypertension, and the early development of heart disease. By taking this supplement, you will significantly increase your chances of preventing (detecting) high blood pressure and the early development of heart disease.” On the second page of the pamphlet, all participants read the same basic information about high blood pressure (based on information from Centers for Disease Control and Prevention [2015]).

**Persuasion.** We measured the persuasiveness of the health care advocacy by asking participants to rate their intentions of getting tested for high blood pressure on a 7-point scale (1 = *will definitely not*, 7 = *will definitely*) and their concern about high blood pressure (1 = not at all concerned, 7 = very concerned). We averaged these items to form an index of persuasion ($r = .54$, $p < .001$).

**Positive Thinking and Risk Seeking.** We assessed participants’ use of positive thinking by measuring two items (“Try to look at the bright side of things” and “Try to make the best of the situation”), with responses ranging from not at all like me (1) to very much like me (7) (Duhachek 2005). We averaged these items to form a positive thinking index ($r = .72$, $p < .001$). We assessed participant’s likelihood to seek information about the risky behavior by measuring their use of the advocacy through how much they learned from the message (1 = didn't learn anything, 7 = learned a lot), whether the message was useful (1 = not useful to me, 7 = very useful to me), and whether the message was interesting (1 = not interesting, 7 = very interesting) on 7-point scales (Apanovitch, McCarthy, and Salovey 2003; Menon et al. 2002). We averaged these items to form a learning index ($\alpha = .87$).
Results

Emotional Certainty and Valence Appraisal Checks. To check the emotion manipulation, we conducted a pretest (N = 61), which induced participants to feel one of four emotional states: happiness, disgust, hope, or anxiety. They then responded to two statements that measure certainty appraisal: “How certain were you about what was happening in this situation?” with responses ranging from *not at all certain* (1) to *extremely certain* (7), and “How well could you predict what was going to happen in this situation?” with responses ranging from *not at all* (1) to *extremely well* (7) (*r* = .62). A 2 (certainty of emotion) × 2 (valence of emotion) ANOVA on certainty appraisal revealed a significant main effect of emotional certainty, such that participants who were induced to feel happy or disgusted had higher ratings of certainty than those who were induced to feel hopeful or anxious (*M*<sub>certain</sub> = 5.31, *M*<sub>uncertain</sub> = 4.53; *F*(1, 57) = 4.08, *p* < .05). A main effect of emotional valence was also significant (*M*<sub>positive</sub> = 5.62, *M*<sub>negative</sub> = 4.22; *F*(1, 57) = 13.50, *p* < .05). The two-way interaction was not significant, thus validating the manipulation. In addition, participants indicated how unpleasant (reverse scored) it was to be in this situation on a scale ranging from *not at all* (1) to *extremely* (7). A two-way ANOVA on this measure revealed that participants who were induced to feel happy or hopeful had higher ratings of pleasantness than those who were induced to feel disgusted or anxious (*M*<sub>positive</sub> = 5.22, *M*<sub>negative</sub> = 2.28; *F*(1, 57) = 34.85, *p* < .05). No other effects were significant. Thus, the valence of emotion manipulation was successful.
Nature of Advocacy Check. To check whether the health advocacy material read by participants promoted a product to help prevent or detect high blood pressure, participants indicated their agreement/disagreement with two statements (“The product helps prevent high blood pressure” and “The product helps detect high blood pressure”), with responses ranging from strongly disagree (1) to strongly agree (7). We subtracted the level of a participant’s agreement with the extent to which the advocacy highlighted detection from the extent to which the advocacy highlighted prevention. Higher scores reflect a greater prevention-focused advocacy. A three-way ANOVA revealed a significant two-way interaction between emotional valence and emotional certainty ($F(1, 252) = 9.58, p < .01$). More important, the three-way ANOVA on this index revealed that participants who read the prevention advocacy health message believe the product was used to help prevent rather than detect high blood pressure ($M_{\text{prevention}} = 3.32, M_{\text{detection}} = -1.21; F(1, 252) = 193.64, p < .001$); no other effects were significant. Thus, the advocacy manipulation was successful.

We also asked participants to rate the readability of the health message ("readability" and "comprehension"; $r = .85$) on a 7-point scale from very low (1) to very high (7). They also indicated their involvement in the study ("involved," “motivated,” and “interested”; $\alpha = .92$) on a 7-point scale. In addition, participants indicated how often they visited a doctor for routine examinations, from never (1) to very often (7). These measures are not affected by the independent variables, so we do not discuss them further.

Persuasion. We performed a three-way ANOVA using participants’ persuasion as the dependent variable. Emotional valence, emotional certainty, advocacy, and the two- and three-
way interactions among these three factors served as the independent variables. The results revealed only a significant three-way interaction among emotional certainty, emotional valence, and prevention versus detection advocacies \( F(1, 252) = 4.04, p < .05 \). As predicted, the interaction between certainty and valence dimensions was significant only in the detection \( F(1, 252) = 6.40, p = .01 \), but not the prevention \( p > .65 \), advocacy condition. Planned contrasts indicated that after viewing a detection advocacy, participants who felt disgusted (negative, certain emotion) were more persuaded by the detection advocacy than those who felt happy (positive, certain emotion; \( M_{\text{Pos-Certain}} = 4.47, M_{\text{Neg-Certain}} = 5.09; F(1, 252) = 3.23, p = .07 \)). Conversely, participants who felt hopeful (positive, uncertain emotion) were more persuaded by the detection advocacy than those who felt anxious (negative, uncertain emotion; \( M_{\text{Pos-Uncertain}} = 5.19, M_{\text{Neg-Uncertain}} = 4.47; F(1, 252) = 2.89, p = .09 \)). In contrast, persuasion of the prevention advocacy did not vary depending on the combinations of positive or negative valence or whether the emotion was associated with high certainty or high uncertainty \( M_{\text{Pos-Certain}} = 4.91, M_{\text{Neg-Certain}} = 5.14, p > .53; M_{\text{Pos-Uncertain}} = 4.77, M_{\text{Neg-Uncertain}} = 5.21, p > .24 \); see table 3). These results conceptually replicate the findings of study 1 and study 2 and provide further support for hypotheses 1, 2a, and 3a.

**TABLE 3**

**STUDY 3: MEAN RATINGS BY THE NATURE OF ADVOCACY AND EMOTIONAL CERTAINTY UNDER POSITIVE AND NEGATIVE EMOTIONS**

<table>
<thead>
<tr>
<th></th>
<th>Certainty Emotion</th>
<th>Uncertainty Emotion</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Positive emotion</td>
<td>Negative emotion</td>
</tr>
<tr>
<td><strong>Detection Advocacy</strong></td>
<td>4.47 (1.53)( ^a )</td>
<td>5.09 (1.55)( ^b )</td>
</tr>
<tr>
<td><strong>Prevention Advocacy</strong></td>
<td>4.91 (1.75)</td>
<td>5.14 (1.33)</td>
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**Mean Ratings of Positive Thinking**

<table>
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<th>Prevention Advocacy</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>4.97 (1.26)a</td>
<td>5.16 (1.30)</td>
</tr>
<tr>
<td></td>
<td>5.06 (1.22)a</td>
<td>5.20 (1.26)</td>
</tr>
<tr>
<td></td>
<td>5.31 (0.93)b</td>
<td>5.45 (0.99)</td>
</tr>
<tr>
<td></td>
<td>4.53 (1.26)a</td>
<td>5.85 (1.00)</td>
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</table>

**Mean Ratings of Risk Seeking**

<table>
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<th>Detection Advocacy</th>
<th>Prevention Advocacy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4.38 (1.38)a</td>
<td>5.06 (1.81)</td>
</tr>
<tr>
<td></td>
<td>5.22 (1.28)b</td>
<td>4.77 (1.67)</td>
</tr>
<tr>
<td></td>
<td>5.14 (1.50)a</td>
<td>4.80 (1.43)</td>
</tr>
<tr>
<td></td>
<td>4.82 (1.27)a</td>
<td>5.31 (1.27)</td>
</tr>
</tbody>
</table>

Note.—Standard deviations are in parentheses. Detection advocacy means with different superscripts within a certainty or uncertainty block are significantly different from each other at the 95% confidence interval. Prevention advocacy means were not significantly different from each other within a block.

Positive Thinking. We performed a three-way ANOVA using participants’ positive thinking as the dependent variable. Emotional valence, emotional certainty, advocacy, and the two- and three-way interactions among these three factors served as the independent variables. The results revealed a significant three-way interaction among emotional certainty, emotional valence, and nature of advocacy \((F(1, 252) = 4.30, p < .05)\) and a significant main effect of advocacy \((F(1, 252) = 8.99, p < .01)\). As predicted, the interaction between certainty and valence dimensions was significant only in the detection \((F(1, 252) = 4.03, p < .05)\), but not the prevention \((p > .35)\), advocacy condition. Planned contrasts indicated that after viewing a detection advocacy, participants who felt hopeful (positive emotion associated with high uncertainty) tended to think more positively than those who felt anxious (negative emotion associated with high uncertainty); \(M_{\text{Pos-Uncertain}} = 5.31, M_{\text{Neg-Uncertain}} = 4.53, F(1, 252) = 5.57, p < .05\). In contrast, when viewing a detection advocacy, participants who felt disgusted (negative emotion associated with high certainty) and those who felt happy (positive emotion associated with high certainty) were equally likely to engage in positive thinking \((M_{\text{Pos-Certain}} = 4.97, M_{\text{Neg-}}\)
Certain = 5.06, $p > .73$). After viewing a prevention advocacy, participants were equally likely to think positively regardless of whether they experienced positive or negative emotion or whether the emotion was associated with high certainty or high uncertainty ($M_{\text{Pos-Certain}} = 5.16, M_{\text{Neg-Certain}} = 5.20, p > .90; M_{\text{Pos-Uncertain}} = 5.45, M_{\text{Neg-Uncertain}} = 5.85, p > .17$). This suggests that processing a detection (vs. prevention) advocacy under appraisals of uncertainty (vs. certainty) leads to greater positive thinking when participants feel certain of a positive (vs. negative) outcome. Table 3 reports the condition-wise means of this analysis.

*Risk Seeking - Learning*. As discussed previously, risk seeking was measured through learning. We performed a three-way ANOVA using participants’ learning as the dependent variable. Emotional valence, emotional certainty, advocacy, and the two- and three-way interactions among these three factors served as the independent variables. The results revealed only a significant three-way interaction among emotional certainty, emotional valence, and nature of advocacy ($F(1, 252) = 7.09, p < .01$). As predicted, the interaction between certainty and valence dimensions was significant only in the detection ($F(1, 252) = 5.89, p < .05$), but not the prevention ($p > .11$), advocacy condition. Planned contrasts indicated that after viewing a detection advocacy, participants who felt disgusted (negative emotion associated with high certainty) learned more from the message than those who felt happy (positive emotion associated with high certainty; $M_{\text{Neg-Certain}} = 5.22, M_{\text{Pos-Certain}} = 4.38, F(1, 252) = 6.42, p = .01$). In contrast, participants who felt hopeful (positive emotion associated with high uncertainty) and those who felt anxious (negative emotion associated with high uncertainty) learned equally from the detection advocacy ($M_{\text{Pos-Uncertain}} = 5.14, M_{\text{Neg-Uncertain}} = 4.82, p > .43$). After viewing a prevention advocacy, participants did not vary significantly in their estimation of learning from the message,
regardless of whether they experienced positive or negative valence or whether the emotion was associated with high certainty or high uncertainty ($M_{\text{Pos-Certain}} = 5.06$, $M_{\text{Neg-Certain}} = 4.77$, $p > .42$; $M_{\text{Pos-Uncertain}} = 4.80$, $M_{\text{Neg-Uncertain}} = 5.31$; $p > .15$). This suggests that processing a detection (vs. prevention) advocacy under appraisals of certainty (vs. uncertainty) leads to greater learning from the message when participants feel certain of a negative (vs. positive) outcome. Table 3 reports the condition-wise means of this analysis.

**Dual Mediation Analyses.** We performed a moderated mediation analysis using PROCESS Model 12 (Hayes 2013) to examine whether positive thinking (learning from message) mediated the effect of the high uncertainty (certainty) emotion on the effectiveness of detection versus prevention advocacy and whether valence moderated these mediational paths. To test this, we specified nature of advocacy as the predictor variable, certainty of emotion as the first moderating variable, valence of emotion as the second moderating variable, positive thinking and learning from message as the two mediators, and evaluation as the dependent variable in model 12.

A bootstrap analysis, based on 1000 bootstrap samples, showed that positive thinking ($\beta = -.17$, 95% CI = -.59 to -.02) and learning from message ($\beta = -.88$, 95% CI = -1.65 to -.26) both mediated the three-way interaction among emotional valence, emotional certainty, and advocacy. In the detection advocacy condition, the path from emotional valence to evaluation through positive thinking was significant under high uncertainty emotion ($\beta = .11$, 95% CI = .01 to .31) but not under high certainty emotion ($\beta = -.01$, 95% CI = -.12 to .07). In the prevention advocacy condition, the path through positive thinking was not significant, regardless of whether the emotion was associated with high certainty ($\beta = -.00$, 95% CI = -.13 to .10) or high
uncertainty ($\beta = -.06, 95\% CI = -.20 \text{ to } .01$). These results show that positive thinking mediated the effect of emotional valence on persuasiveness of detection advocacy when emotion was associated with high uncertainty but not when emotion was associated with high certainty. These results provide support for hypothesis 2b.

Similarly, in the detection advocacy condition, the path from emotional valence to evaluation through learning from message was significant for high certainty emotion ($\beta = -.38, 95\% CI = -.66 \text{ to } -.12$) but not for high uncertainty emotion ($\beta = .14, 95\% CI = -.21 \text{ to } .51$). In the prevention advocacy condition, the mediation through learning from message was not significant, regardless of whether the emotion was associated with high certainty ($\beta = .13, 95\% CI = -.25 \text{ to } .50$) or high uncertainty ($\beta = -.23, 95\% CI = -.58 \text{ to } .06$). These results show that learning from message mediated the effect of emotional valence on persuasiveness of detection advocacy when emotion had a strong sense of certainty but not when emotion had a strong sense of uncertainty. These results provide support for hypothesis 3b.

Discussion

Using a high blood pressure health context, study 3 tested hypotheses 1–3. As in studies 1 and 2, incidental emotions varying on certainty and valence had no effect on the persuasiveness of prevention advocacies. However, in the case of detection advocacies, when emotion was associated with uncertainty, positive thinking drove the persuasion, while risk seeking drove persuasion when emotion was associated with certainty. Individuals who felt positive (vs. negative) emotions associated with high uncertainty were more likely to engage in positive thinking and to seek the desirable outcome of engaging in a detection action instead of focusing
on the risk, and thus they were more persuaded by the detection advocacy. Individuals who felt negative (vs. positive) emotions associated with high certainty were more risk seeking and sought to learn from the message about detection actions, and thus they were more persuaded by the detection advocacy.

**GENERAL DISCUSSION**

This investigation identifies the differential susceptibility of detection (vs. prevention) advocacies to the influence of incidental emotions varying on certainty and valence appraisals. We drew from the premise that complying with detection (vs. prevention) advocacies conveys greater perceptions of risk. The studies reported here used three different health scenarios (i.e., dental health, skin care, and blood pressure) to provide converging support for our theorizing that persuasiveness of detection advocacies is influenced by the appraisal dimensions of emotional certainty and emotional valence, such that detection advocacy is more persuasive when individuals feel positive uncertainty emotions (e.g., surprise, hope) or negative certainty emotions (e.g., anger, disgust). However, different processes drive these effects. When the incidental emotion is characterized by high uncertainty, positive thinking is bolstered by positive (vs. negative) valence, such that higher positive thinking increases the persuasiveness of the detection advocacy. When the incidental emotion is characterized by high certainty, risk seeking is increased by negative (vs. positive) valence, and in turn risk seeking increases the persuasiveness of the detection advocacy. In contrast, incidental emotions varying on certainty and valence dimensions do not moderate the persuasiveness of prevention advocacies.
Theoretical Contributions

*Health Messaging.* Prior research has examined the psychology of processing health messages that suggest prevention actions (Block and Keller 1995; Keller 2006). While extant literature distinguishes between prevention and detection advocacies, limited work has delved into the processes underlying persuasion of the two types of health messages (for a meta-analysis, see Keller and Lehmann 2008). This demarcation is theoretically significant because consumers’ perceptions of risk involving detection and prevention actions vary (Rothman et al. 1999). Of the small stream of research on factors that determine the effectiveness of detection advocacies, most work has focused on the role of message framing (Mathur et al. 2013; Rothman et al. 1999; Rothman and Salovey 1997). Our research sheds light on the role of an incidental factor—specific emotions—in individuals’ processing of prevention and detection advocacies. We show that specific emotions (i.e., anger, disgust, surprise, and hope) can enhance the effectiveness of detection advocacies, but not prevention advocacies. The study’s demonstration that some types of health appeals (i.e., detection advocacies), by the nature of the actions they suggest, are differentially susceptible to incidental emotional influences is novel.

*Incidental Emotions.* Prior research on emotions indicates that incidental emotions influence the processing of health messages (Agrawal, Menon, and Aaker 2007; Morales, Wu, and Fitzsimons 2012). The current research differs from that work by showing that the same emotions do not have a blanket influence on all types of health messages; rather, their influence is dependent on specific appraisal dimensions and message types. We focus on the differential influence of the certainty dimension of incidental emotions on individuals’ processing of
detection and prevention advocacies. We established this link from prior work that suggests the association of risk with emotional certainty appraisals (Lerner and Keltner 2000; Raghunathan and Pham 1999). Integrating this with the premise that individuals perceive detection (vs. prevention) behaviors as risky, we identify two emotion-driven psychological processes that enhance the effectiveness of detection, but not prevention, advocacies.

The two processes we identify and test in this research are activated by emotional certainty/uncertainty and moderated by valence in two ways: (1) positive thinking under incidental emotions characterized by uncertainty, such that positive valence (e.g., hope) causes greater positive thinking than negative valence (e.g., anxiety), thus leading to increased message effectiveness, and (2) risk seeking under incidental emotions characterized by certainty, such that negative valence (e.g., disgust) causes greater risk seeking than positive valence (e.g., happiness), thus leading to increased message effectiveness. We present incidental emotions as novel antecedents to the persuasion of detection advocacies and demonstrate two underlying processes under different appraisal dimensions of certainty and uncertainty.

Our findings are consistent with prior work on incidental emotions; Morales et al. (2012) find that disgust (a negative, certain emotion) added to a fear appeal leads to greater persuasiveness than a fear appeal alone. In their study, message effectiveness is driven by a different psychological mechanism than that in the current research: taking immediate actions. In addition, our finding that individuals learn more from the health message under emotional certainty complements prior research. Tiedens and Linton (2001) show that individuals attend to the quality of an argument rather than the expertise of the message source under uncertainty. In the context of their studies, however, emotional certainty serves as a heuristic and reduces elaborate processing of non-risky information. In contrast, in our setting, the message (i.e.,
detection advocacy) presents information about risk, which allows us to identify a condition in which emotional certainty provides expectations of health outcomes and leads to higher information seeking about a risk under unfavorable (i.e., negative valence) expectations. Thus, we present a novel risk-driven path through which emotional certainty (vs. uncertainty) leads to elaborate processing.

Limitations and Future Research

One challenge with the current research was capturing individuals’ risk-seeking behavior as activated by emotional certainty. In the studies, two types of risks overlap: the risk of learning about a severe illness and the risk of the disease itself. Because of this intertwined nature of risk of detection and risk of disease, we were unable to measure participants’ risk-seeking propensity using self-reported intentions to engage in risky behaviors related to the disease. So, using the risk-as-analysis view (Slovic and Peters 2006), we operationalized risk seeking by measuring participants’ use of the detection advocacy to learn more about the risky action. Further research could tap into alternative ways to measure emotion-driven risk seeking that drives persuasion.

In addition, although our research shows that the persuasiveness of prevention advocacies does not depend on incidental emotions varying on certainty and valence dimensions, further research could examine whether incidental emotions varying on other dimensions such as control, anticipated effort (Smith and Ellsworth 1985), and self-accountability (Passyn and Sujan 2006) might influence the persuasiveness of prevention advocacies. Passyn and Sujan (2006) demonstrate that high self-accountability emotions increase compliance of prevention behaviors. Research could also explore how emotional certainty and valence may interact with other
consumer characteristics, such as regulatory focus (Higgins 1997, 1998), to jointly influence the persuasiveness of prevention and detection advocacy.

Managerial Implications

This research provides managerial implications for where marketers should place health advertisements. Individuals are persuaded more by health messages that encourage detection behaviors when they are in negative certainty emotions or positive uncertainty emotions. This finding implies that detection health messages may be more persuasive if they are embedded in the context of television shows that induce disgust, such as a crime drama, or shows that induce hope, such as *The Biggest Loser*. The effects documented herein may help health care providers increase patients’ intentions to get tested. Doctors may be able to keep patients hopeful by telling them about successful cases or high procedure success rates. Alternatively, they could show patients disgusting information to enhance patients’ compliance with detection behaviors. Another implication of our research is the possibility of enhancing individuals’ health care compliance of detection behaviors by showing them negative certainty emotion appeals, such as disgust appeals, or positive uncertainty emotion appeals, such as hope appeals.
APPENDIX

STUDY 2: STIMULI

Detection Advocacy Condition:

PAGE 1 of PAMPHLET

A lotion can detect skin cancer.

People who use this lotion are taking advantage of a safe and effective way to detect areas of unhealthy skin and the early development of skin cancer cells. By using this lotion, you will significantly increase your chances of detecting areas of unhealthy skin and the early development of skin cancer. The sooner you use this lotion, the better you can significantly improve your chances of living a long, healthy life.

Remember that you stand to gain important skin health benefits by using this lotion.

It is important for you to read the accompanying pamphlet and inform yourself about skin cancer.

Please read the important information in this pamphlet.

Prevention Advocacy Condition:

PAGE 1 of PAMPHLET

A lotion can prevent skin cancer.

People who use this lotion are taking advantage of a safe and effective way to prevent unhealthy skin and the early development of skin cancer cells. By using this lotion, you will significantly increase your chances of preventing unhealthy skin and the early development of skin cancer. The sooner you use this lotion, the better you can significantly improve your chances of living a long, healthy life.

Remember that you stand to gain important skin health benefits by using this lotion.

It is important for you to read the accompanying pamphlet and inform yourself about skin cancer.

Please read the important information in this pamphlet.

On the next page, you will read about facts on skin cancer.
Skin cancer is the most common type of cancer in the United States. Every year, more than two million people are diagnosed with skin cancer. One in five Americans will develop skin cancer in the course of a lifetime. Both men and women can be diagnosed with skin cancer. Each year there are more new cases of skin cancer than the combined incidence of cancers of the breast, prostate, lung and colon. Over the past three decades, more people have had skin cancer than all other cancers combined.

Exposure to ultraviolet (UV) radiation is a major risk factor for most skin cancers. Sunlight is the main source of UV rays. Tanning lamps and beds are also sources of UV rays. UV rays damage the DNA of skin cells. Skin cancers start when this damage affects the DNA of genes that control skin cell growth.

Important warning signs of skin cancer include

- A sore that doesn’t heal
- Any change on your skin, especially in the size or color of a mole, growth, or spot, or a new growth
- A change in sensation, such as itchiness, tenderness, or pain

(Note: Page 2 of pamphlet was the same for both detection and prevention advocacy conditions.)
REFERENCES


