

EMOTIONAL CERTAINTY AND HEALTH COMMUNICATIONS

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ABSTRACT

At risk individuals tend to avoid information that might perturb their sense of security. I propose certainty appraisal as an important emotional dimension that affects health message processing and persuasion. Specifically, I suggest that emotions high on certainty appraisal can provide confidence to cope with the insecurity instigated by threatening health communications.

Five studies are proposed to demonstrate the interaction of certainty appraisal with two health message characteristics: vulnerability to threat and response efficacy. Studies 1-3 provide evidence that when a health threat is highly self-relevant uncertainty related emotions impede processing whereas certainty related emotions facilitate it. Study 4-5 show that individuals who are feeling uncertain prefer to attend a high efficacy message as it offers reassurance via useful recommendations.

The findings extend affect regulation theories to involve emotional uncertainty as a state to be “repaired” by avoiding further deterioration or striving for restoration.

DEDICATION

This dissertation is dedicated:
to my mother and father, for their never ending love and support
and
to Gabriel, for making me a better person

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CHAPTER 1

1.1 Introduction

Health messages are usually aimed at increasing awareness of potential risks regarding personal health and therefore can be perceived as being emotionally aversive or threatening. Thus, people tend to employ defensive mechanisms at the face of information that might perturb their perceptions of safety and sense of security (Block and Williams 2000). This considerably undermines the efficacy of health communications as health messages advocating behavioral change are most applicable to those for whom the behavior is personally relevant. The present dissertation examines the impact of discrete incidental emotions on health message effectiveness.

Previous research examines a range of factors which help explain the acceptance and rejection of threatening information. Among these factors are positive and negative framing effects (Block and Keller 1995), temporal framing (Chandran and Menon 2004) and information accessibility (Raghubir and Menon 1998). More recently, attention has shifted towards the impact of emotions on health message processing and persuasion. For example, the impact of fear evoked by threatening health related information on message effectiveness (e.g., fear appeals, Witte and Allen 2000) and the strategies to overcome its impeding effect (Maddux and Rogers 1983) are widely studied.

Furthermore, some research on health communications has comprised the influence of preexisting, or incidental, emotional states on the efficacy of health communications (e.g., Keller, Lipkus, and Rimer 2003). A typical finding is that people in negative emotional states tend to avoid threatening health information whereas positive affective states can facilitate attending to aversive but relevant health information.

The present dissertation adds to this body of research by focusing on discrete incidental emotions, their interaction with message characteristics and their impact of message processing and persuasion.

It is noteworthy that the majority of research in this area has compared positive and negative emotions, and their effects on message processing. However, a growing body of evidence points that not all positive or all negative affective states would exert similar influences on behavior. For example, studies demonstrate distinct influences of similarly valenced emotions on an array of areas such as decision making (Raghunathan and Pham 1999), likelihood estimates (Lerner and Keltner 2001), and extent of information processing (Bodenhausen et al. 1994; Tiedens and Linton 2001).

Extending this stream of research, the present dissertation departs from the valence based approach to emotions, to focus on a more refined dimension of emotions and its relation to health communications.

Specifically, I focus on certainty appraisal (Smith and Ellsworth 1985), an appraisal dimension which differentiates emotions on the basis of high or low certainty and predictability that it conveys about a situation. For example, when people feel angry, they report thinking that the situation is unpleasant and that they are certain and confident about what is happening. In contrast, when they feel anxious, the situation is unpleasant but also uncertain and less predictable.

I propose that emotions high on certainty appraisal can provide the confidence to cope with the insecurity instigated by relevant but threatening health messages. Research shows that high certainty (e.g., anger, pride) associated with an emotion makes one feel

resilient (Lerner and Keltner 2001) or assess that the situation is manageable (Johnson and Stewart 2005). Hence, individuals feeling certain might conclude that they need not refrain from processing an aversive but useful message. On the other hand, extant research finds that individuals feeling uncertainty associated emotions (e.g., anxiety, hope) are motivated to decrease their uncertainty (Raghunathan and Pham 1999). I suggest that the threatening nature of highly relevant health information is likely to be in conflict with uncertainty reduction goals, leading to decreased processing of this information. Thus, I suggest that when a health message is highly self-relevant, uncertainty related emotions will impede processing whereas certainty related emotions will facilitate processing of relevant health messages.

A different mechanism is likely to be at work when the health risk is *not* self relevant and therefore *not* as threatening. I predict that when relevance is low, the projected effect of the message for one's affective state will be less influential (Andrade 2005). Therefore, the message's implications for one's uncertainty related goals will be less relevant. Instead, reminiscent of affect as information, emotions low (high) on certainty appraisal signal insufficient (sufficient) confidence about the surroundings, leading to increased (decreased) processing. These predictions would be in agreement with Tiedens and Linton (2001) findings that certainty related emotions lead to heuristic processing.

Taking these two propositions together, I propose the following : When individuals are at low (high) risk, those who are induced with uncertainty (certainty) related emotions will process a health related message to a higher extent compared to participants who are induced with certainty (uncertainty) related emotions. The first 3 studies directly test this prediction and are assembled together under Chapter 3.

In study 1 participants were induced to feel anger (negative-certain emotion), pride (positive certain emotion), worry (negative-uncertain emotion) or surprise (positive - uncertain emotion). Then they read an article about Chlamydia, a very prevalent STD. Individuals were categorized as high versus low risk according to their past sexual behavior. The dependent measures were: message related thoughts, correct answers to a quiz about the article and a message persuasion intention measure. Across all dependent measures the hypothesis was confirmed. High risk individuals processed the message more and were more persuaded under certainty related emotions while the opposite was true for low risk individuals.

Study 2 replicates the results of study 1. Here, perceived vulnerability was manipulated by conveying either high or low prevalence of the health threat. Further, emotions different from those in study 1 were used (i.e., hope and happiness). Lastly, this study focused on another relevant health issue, Hepatitis C. The procedure and dependent variables were similar to those of study 1. Further, study 2 explores the effect of the certainty appraisal as a continuous variable as well as other relevant appraisals (i.e., pleasantness, situational control and intensity).

Study 3 not only extends the findings to a different health context (i.e., caffeine consumption) but also provides evidence that the demonstrated effects are indeed a function of the threatening nature of health related information. In this study, participants are presented with negative as well as positive information on caffeine consumption. Inducing four negative emotions that range in their certainty appraisal (i.e., fear, sadness, anger, disgust) I show that emotions that are associated with higher certainty increase individuals

recall of negative information as compared to positive information and this effect is reversed for uncertainty related emotions.

Study 4 and Study 5 focus on the relationship between certainty appraisal and response efficacy (i.e., the effectiveness of recommendations advocated in a health message) and are assembled together under Chapter 4. High efficacy information signals that the recommendations in the message are highly likely to avert the health threat, while low efficacy signals that even though one was to follow these recommendations, protection is not guaranteed. These studies demonstrate how efficacy and emotional certainty interact to influence message processing and to provide some evidence regarding the underlying mechanism that may be driving the demonstrated effects. It is predicted that when feeling emotions with a high uncertainty component, individuals will be more willing to attend a high efficacy as it offers reassurance by useful and valid recommendations. This effect is reversed for individuals feeling certainty-related emotions as they are focusing on the long term goal of protection rather than immediate uncertainty reduction. In this case, more processing effort will be extended to low efficacy messages because they pose a challenging task in terms of finding a way to protect oneself (Block and Keller 1995).

Study 4 tests these predictions using two negative emotions: worry and anger. Also in this study, efficacy information is manipulated in a Chlamydia related article. Specifically, the participants in the low (high) efficacy condition read that the prevention recommendations provided in the article can reduce the risk of contracting Chlamydia by 40% (90%). The number of message related thoughts was used as dependent measure and the prediction that when feeling uncertainty (certainty) related emotions, participants process the

high (low) efficacy message to a greater extent compared to the low (high) efficacy message was confirmed.

Study 5 replicates and extends results of Study 4 to a different health context: Hepatitis C. In this study, emotions that vary on both certainty and valence dimensions (i.e., happiness, hope, anger and worry) are included and message persuasion was also measured. In addition, study 5 provides evidence for the processes underlying the demonstrated effects. A mediational analysis demonstrates that individuals feeling uncertainty related emotions, preferred to attend high efficacy messages because they expected these messages to provide a sense of reassurance (i.e., reassurance expectancy).

In sum, findings support the proposition that certainty-related emotions provide confidence to attend relevant but threatening (Studies 1,2,3) or low efficacy (Studies 4,5) information. Whereas, when feeling uncertain emotions, reading threatening or low efficacy information clashes with uncertainty reduction goals, limiting decreasing message processing and persuasion. Furthermore, in an uncertain state, positive health related information (Study 3) or messages that convey high efficacy (Studies 4,5) are preferable as they are expected to provide a sense of reassurance. These findings are in agreement with affect regulation theories and extend them to involve emotional uncertainty as an emotional state to be “repaired”, by avoiding further deterioration or striving for restoration. The implications of this research concern the context in which a health message should be placed as well as its tone that should be used in that context.

Chapter 2 provides a broad theoretical background on emotions and their effect on information processing. Chapters 3 and 4 involve the 5 studies described above as well as review of related research that directs to the specific hypothesis for each study. Chapter 6

provides the overall discussion for this set of studies, limitations and recommendations for future research.

CHAPTER 2

2.1 Emotion Theories

This part of the literature review summarizes an array of approaches widely accepted as a systematic ways to conceptualize emotions.

Dimensions Approach

Dimensions theories of emotion suggest a simple representation of emotional responses across a set of core dimensions: valence (continuum from positive to negative) and arousal (continuum from high to low). These two dimensions are viewed as a circumplex; discrete emotions are systematically placed around the perimeter of a circle, their placement representing the extent these emotions bear reflections of the identified dimensions (Russell 1980). According to these approaches, all feeling states have some valence and arousal level and can be thoroughly represented on this two dimensional circumplex (Bagozzi, Baumgartner, and Pieters 1998).

Mehrabian and Russell's (1974) Pleasure-Arousal-Dominance (PAD) model and Watson and Tellegen's (1985) circumplex model are among the specific approaches that have been most widely applied to the study of consumer behavior. The PAD model incorporates additional dimension of *dominance* to pleasure and arousal. The dominance dimension aims to more finely distinguish between emotions of similar valence and arousal levels, such as the highly negative emotions of shame, fear and anger; it deals with feelings of control vs. lack of control over the person's activities and his/her surroundings. Watson and Tellegen's (1985) circumplex model is a more complex variation using four dimensions of positive affect (high/low), negative affect (high/low), pleasantness (pleasant/unpleasant), and engagement (strong/weak) to distinguish various

emotions. Still, these approaches seem to come short when it comes to capturing the full range of emotions that people experience (Lazarus 1991a).

The dimensional theories of emotion have been widely used in the study of consumer behavior. Among others, they have been applied to the study of advertising (e.g., Holbrook and Batra 1987) and consumer satisfaction (e.g., Mano and Oliver 1993; Westbrook and Oliver 1991). Widely cited, Mano and Oliver (1993) propose a version of a circumplex model. In their approach, valence (continuum from pleasant to unpleasant) and arousal (continuum from quietness to arousal) are used as the main dimensions which set the ground for eight distinct factors that help explain emotional response in a more refined fashion. The combination of the two dimensions yields to dimensions like "elation" (high-arousal and pleasant), "distress" (high-arousal and unpleasant), "calmness" (low-arousal and pleasant) and "boredom" (low-arousal and unpleasant).

Overall, the dimensional approach aims to represent affective responses using a limited array of common dimensions. Although dimensional conceptualizations can be considered among the more influential approaches to emotion in the context of consumer behavior, recently researchers have started pointing out their limitations. A substantial criticism highlights that these accounts of emotion propose an oversimplified account and a limited ability to distinguish between emotions of similar valence and arousal levels and no theoretical explanation of the causes and consequences of discrete emotions (Johnson and Stewart 2005).

2.1.1 Basic Categories Approach

This approach is characterized by an attempt to group emotions based on their similarities. This research strives to identify a limited set of basic emotions that reflect

the common characteristics of others in the same category. For example, Plutchik (1980) proposed eight "primary" emotions consisting of fear, anger, joy, sadness, acceptance, disgust, expectancy, and surprise. According to this approach, from these basic categories, one is used as an exemplar to determine what other emotions should be grouped in that category. Plutchik employs an evolutionary perspective to suggest that these eight emotions are important for adaptation and are functional for survival.

A substantial amount of work on basic emotions categories was based on distinctive facial expressions associated with specific emotions. Drawing from developmental research, these conceptualizations assume that there is a limited set of emotions universally deemed to be associated with a certain facial expression and these expressions are inherent to all humans across cultures. For example, Izard (1977) proposed 10 fundamental emotions: interest, enjoyment, surprise, distress (sadness), anger, disgust, contempt, fear, shame/shyness, and guilt.

These theories mainly argue that any experience of emotion is the result of the particular pattern of responses across these various basic emotions. In other words, more complex emotions are the result of mixtures of these "primary" emotions. Thus, in any given situation it is possible to describe emotional response by measuring the extent to which each of the basic emotions is experienced (Richins 1997). However, as for the mechanisms by which second order emotions like pride, guilt, jealousy or envy are evoked, these theories are not very informative.

Lastly, Johnson and Stewart (2005) point out that not all emotions are communicated through nonverbal articulation or have a universal facial expression (e.g., hope).

These theories have received criticism for excessively limiting range of concepts to describe the complicated phenomenon of subjective emotional experiences.

Furthermore, the focus of these approaches has usually been the communication of present emotions. It is not surprising that they have also been critiqued for merely labeling but not theoretically explaining the occurrence of emotions (Roseman 1984).

Furthermore, the authors suggest that some of the subjective experiences of emotion are culturally bound and therefore not easily defined by a combination of universal basic emotions.

2.1.2 Cognitive Appraisal Approach

Fundamental limitations of the theoretical approaches summarized above are increasingly highlighted in the recent years. Many researchers have acknowledged the lack of an overarching theory capable of thoroughly depicting the intricate phenomenon of emotional response (e.g., Roseman 1984; Johnson and Stewart 2005). The common weakness of these conceptualizations is that although they systematically relate and categorize a wide array of emotional responses, they do not bring an explanation to the mechanism as to *why* certain situations and experiences lead to specific emotional responses. Their shortcomings render these theories merely descriptive of emotional responses in terms of their relation to other emotions and their interpersonal communication. Similarly, consumer behavior researchers have noted that although these theories have found acceptance in the field of marketing, these theories fail to rigorously explain the nature of emotional response in consumption contexts (Bagozzi et al. 1999).

Recognizing these limitations, emotion researchers have directed attention to cognitive appraisal theories which bring rigorous clarifications to theoretical and practical difficulties in the study of emotions (e.g., Ekman and Davidson 1994; Bagozzi et al. 1999). This more flexible conceptualization enables cognitive appraisal approach to represent emotions at a more refined level. Rather than enforcing dimensions of valence and arousal on a wide range of emotions, this theory acknowledges different dimensions on which emotions can be further differentiated. Many empirical findings support this more fine-grained conceptualization. Some of these findings are summarized below in order to demonstrate diverging effects of similarly valenced emotions on consumer decision-making.

2.2 Cognitive Appraisal Influences on Judgment and Decision Making

As the dimensions approach has been the main approach to the study of emotions, the constructs of arousal and especially valence have been widely studied. The underlying assumption of these approaches and therefore empirical studies was that all negative and all positive emotions would lead to similar effects on judgment and decision-making.

Recently, this trend has been changing and it is increasingly recognized that the “information conveyed by emotions goes beyond their valence or intensity” (Pham 2004). An increasing number of research findings suggest that different emotions with similar valences (and levels of arousal) lead to different outcomes. In this section, some relevant studies that demonstrate these diverging effects are summarized.

In accordance with the cognitive appraisal findings, Keltner et al. (1993) demonstrate sadness and anger lead to different causal attributions such that sad

individuals make situational attributions while angry individuals were more likely to attribute events to human factors. For example, for the incident of missing a flight, sad individuals would make attributions to the traffic while angry individuals made attributions to the cab driver.

Dissimilar effects of negative emotions on risk perceptions also demonstrate interesting findings. Lerner and Keltner (2001) observed that, even though fear and anger are both high-arousal negative emotions, fear tends to trigger risk-aversion, whereas anger tends to trigger risk-seeking. Fear and anger had opposite effects on cognitive appraisals and on optimistic risk estimates. The study found that both happy and angry individuals consistently made relatively optimistic judgments and choices where fear lead to more pessimistic estimates.

Furthermore, different motivational effects of negative emotions have also been found in the literature. Specifically, Raghunathan and Pham (1999) observed that anxious individuals tend to prefer low-risk/low-reward options, whereas sad individuals tend to prefer high-risk/high-reward options—a seeming reversal of the high-arousal/high-risk pattern observed elsewhere. The authors argued that this is because anxiety, which is typically associated with situations of high uncertainty, activates a goal of risk and uncertainty minimization, whereas sadness, which is typically experienced in response to the loss of a source of reward, activates a goal of reward maximization. As a further inquiry to the mechanism underlying these findings, Raghunathan, Pham, and Corfman (2006) demonstrate that anxiety and sadness prompt distinct implicit goals during the decision-making process and when their source is salient the goals they trigger

may seem irrelevant to the task at hand and therefore the different goals triggered by different affective states are no more influential.

In their “Different Affect–Different Effect” (DADE) model, Raghunathan and Corfman (2004) predict different effects of two negatively valenced emotions: sadness and anxiety. Specifically, they demonstrate that sadness leads to seeking pleasurable stimuli while anxiety leads to becoming more attentive. The authors argue that in previous demonstrations of sadness leading to greater attentiveness could be due to confounded effects or due to procedures that evoke sadness are also likely to have evoked anxiety.

Studies in a consumption context have also yielded similar results; providing further support that the dimensions of valence and arousal are inadequate for explaining how emotions impact consumer decision-making processes. For example, Yi and Baumgartner (2004) study on post-purchase coping response to negative outcomes demonstrated that emotions such as anger, regret, worry and disappointment led to distinct types of coping even though they are of similar valence. Anger, for example, led to confrontive coping while regret led to acceptance. Emotions of worry associated with high control led to strategic problem solving while worry associated with low control led to mental disengagement. In addition, Rucker and Petty (2004) conducted a study on selecting a vacation spot and found that respondents who are induced with anger, which is an emotion accompanied by a state of readiness to act, chose the more active vacation spot. On the other hand, respondents who were induced with sadness, which is accompanied by a state of deactivation, preferred the more passive vacation spot.

Lastly, Lerner, Small and Loewenstein (2004) further demonstrate that differing emotions can lead to contrary decisions when the judgment or choice at hand involves real monetary outcomes. According to this research, the feelings of disgust and sadness have opposite effects on economic decisions like selling prices of objects and endowment effect.

2.3 Principal Cognitive Appraisal Dimensions

According to appraisal theories, emotions result from cognitive activities such as processing, or evaluating personally relevant information (e.g., Ortony, Clore, and Collins 1988; Smith and Ellsworth 1985). In a sense, appraisal is the process by which the individual makes meaning of his surroundings. This often involves evaluation and judgment about a situation on different dimensions.

Appraisal theories use principal assessments of situations and the environment to explain which specific emotions are elicited by those events. These theories assume that the emotion is elicited by the personal denotation given to a situation and therefore it is not necessarily bounded by the objective assessment of the situation by others (Lazarus 1991a). Therefore, the prediction depends on the association between the individual's subjective meaning of what is happening and the emotion being elicited.

Antecedents to the process of appraisal are these perceptions of the personally relevant information, individual expectations as well as the person's goals related to the situation at hand. Every individual has his/her own personal perspective and previous experience as they get in a situation, as well as diverging expectations. Taking this into consideration, differing appraisals of the situation at hand are naturally expected. Consequently, different people often experience widely varying emotional reactions to

similar objects and events. Since evaluations of underlying causes or aspects of situations will determine which emotional responses are elicited by those events, the individual's knowledge is key, since it will define one's expectations and beliefs about a situation, as well as its relevance (Johnson and Stewart 2005). Another point worth mentioning is that appraisal does not necessarily require conscious cognitive effort, but it may take place automatically (Lazarus 1991a).

As previously mentioned, the long-time focus of emotion studies has been on valence and arousal. However, recent studies have demonstrated the diverging effects of emotions with the same valence and arousal level on a variety of judgmental and behavioral outcomes (e.g., Lerner and Keltner 2000; Raganathan and Pham 1999; Tiedens and Linton 2001; Yi and Baumgartner 2004). These diverging effects suggest that emotions can be distinguished at finer levels than merely valence and arousal. Researchers agree that cognitive appraisal theories would be helpful in explaining these differences, due to their potential to address many of the reasons for the various avenues of emotional elicitation and experience (Bagozzi, Gopinath, and Nyer 1999; Ruth, Brunel, and Otnes 2002; Tiedens and Linton 2001). According to these studies, each emotion is defined by central dimensions, which characterize its core meaning or theme (Lazarus 1991b; Smith and Ellsworth 1985)

Many dimensions have been suggested for explaining diverging experiences of emotions. Widely cited, Smith and Ellsworth (1985) identified six cognitive dimensions that define the patterns of appraisal underlying different emotions: certainty, pleasantness, attentional activity, control, anticipated effort, and responsibility.

Although these conceptualizations are established independently (e.g., Ortony, Clore and Collins 1988; Roseman 1984; Smith and Ellsworth 1985; Weiner 1985; Scherer 1988) they seem to be in agreement with each other especially when it comes to several recurrent themes. Dimensions of pleasantness-unpleasantness, certainty, and agency can be found in almost all analyses of cognitive appraisal. In the following sections, these main dimensions that have been found to distinguish emotions will be discussed.

2.3.1 Pleasantness

The most commonly studied dimension of emotional experience is clearly the pleasantness dimension. Pleasantness accounts for the majority of variance explained in attempts to categorize emotions (Ruth, Brunel and Otnes 2002; Smith and Ellsworth 1985). This dimension has been conceptualized as a fundamental evaluation of whether the situation or one's environment is congruent or incongruent in terms of desired personal outcomes (Johnson and Stewart 2005; Roseman, Spindel, and Jose 1990). Pleasantness is sometimes referred to as outcome desirability or goal congruence and it is associated with valence. It refers to the cognitive appraisal of whether the outcome of a situation is good or bad (positive or negative) with respect to personal outcomes.

Parallel with this conceptualization, some theorists argue that the positive or negative evaluation of a stimulus is actually a function of its consistency (or inconsistency) with achieving one's goals. This basic evaluation of goal congruence is sometimes referred to as motive consistency (Roseman, Spindel, and Jose 1990) and it basically involves an assessment of whether the situation is helpful towards or deterring from achievement of personally relevant goals is facilitated or hindered in the current situation (Lazarus 1991b; Ortony, Clore, and Collins 1988; Roseman 1984; Smith and

Ellsworth 1985 1987; Smithetal 1993). The appraised direction of goal congruence determines the valence of emotional response and differentiates positive and negative emotions.

Johnson and Stewart (2005) highlight the ability of an appraisal approach to better explain mixed emotions arising from a particular situation. The authors suggest that a situation can bear different aspects that would be assessed differently in terms of congruence with one's goals; consequently, it is possible that one situation can elicit positive and negative emotional responses at the same time.

Smith and Ellsworth (1985) report that as clear and strong the pleasantness dimension is, it does not help us much in making further differentiations when only the pleasant or only the unpleasant emotions are considered. Thus, appraisal outcomes along the other dimensions need to be taken into account.

2.3.2 Agency

Another cognitive appraisal that has been commonly suggested by researchers is agency. Agency could be conceptualized as the perception of responsibility and control (Smith and Ellsworth 1985) that the individual believes he/she (or others) have over the present situation. The control over the situation could be attributed to oneself, to another person or to the situation itself without responsibility on a person (Ortony, Clore and Collins 1988; Smith and Ellsworth 1985). Causal inferences play a substantial role in the appraisal of agency (Folkes 1988). Different attributions are related to discrete emotions even if they were to elicit emotions of the same valence. This could be explained by the fact that the base of this dimension of appraisal could be traced back to in attribution theory (Weiner 1985). These theories suggest distinct emotional responses elicited by

different attributions people may make about the cause of an event. Different perceptions of responsibility seem to elicit discrete emotions. For example, an attribution of responsibility to the self might arouse guilt while attribution of a situation to a social other would arouse anger. On the other hand, if the responsibility is not attributed to anyone, an emotion such as frustration may occur instead. Furthermore, although both are found to be positively valenced emotions, when it surprise is defined by its attributions of responsibility to other persons whereas proud is defined by an appraisal which involves self-attribution (Smith and Ellsworth 1985).

2.3.3 Certainty

The extent of certainty one has about a situation exerts a strong influence on the emotional experience of the individual. The certainty appraisal of a situation has been conceptualized as the extent to which the outcome of a situation is perceived to be known with confidence or the degree to which future events seem predictable and comprehensible versus unpredictable and incomprehensible (Lerner and Keltner 2000; Smith and Ellsworth 1985; Roseman 1984). In other words, some emotional experiences are associated with feeling certain, thinking that one knows what is happening in the current situation, or with a feeling of confidence to accurately predict what will happen in future situations. Among other dimensions, certainty has been deemed quite important in the determination of emotional reactions (e.g., Tiedens and Linton 2001).

The dimension of certainty discriminates among emotions which are related to more clearly known outcomes and emotions which are related to outcomes which are unknown or less predictable to the individual. In addition, certainty-related emotions seem to signal a higher certainty and confidence about surroundings while uncertainty-

related emotions signal lower levels of confidence (Tiedens and Linton 2001). An emotion can be high or low on the certainty dimension regardless of its valence. For example, high levels of uncertainty are most strongly associated with the emotions of hope, surprise, fear, worry, and, to some extent, sadness, while high levels of certainty are strongly related to the emotions such as anger, disgust, happiness, and pride (Roseman 1984; Smith and Ellsworth 1985).

2.4 Influence of Affect on Message Processing

The effects of positive versus negative emotions on information processing have been widely studied. Multiple theoretical accounts have been proposed to explain the influence of affect on judgment.

A well established account is the affect-as-information theory. Affective responses are taken as sources of information and people inspect their feelings to see “how they feel” about a situation. Specifically, negative affect convey the information that the environment is potentially threatening, whereas positive affect signal that the environment is safe. People infer the extent of effort that they need to put in the given situation from these different signals. Consequently, their judgments are affected by this information that their affective state signals, make their judgments accordingly, usually resulting in a mood-congruent judgment, a phenomenon known as the “how-do-I feel-about-it?” heuristic (Schwarz 1990; Schwarz and Clore 1996).

This effect has been evident in information processing studies. According to this account, negative moods convey the information that something is not right or missing, which motivates people to be more alert and attentive, leading to higher message

elaboration. On the other hand, positive moods signal that the situation is acceptable and safe and therefore there is no need for higher elaboration. Many empirical findings consistently support the affect-as-information theory. People in a positive mood engage in non-analytic, top-down, creative processing styles, and people in a negative mood engage in analytic, effortful processing (e.g., Bless et al. 1990; Bodenhausen et al. 1994)

For example, happy (compared to unhappy) persons are less likely make an in-depth evaluation of the arguments contained in a message and therefore less inclined to discriminate between strong and weak arguments (Bless et al. 1992; Mackie and Worth 1989). In sum, in agreement with these approaches, Schwarz's (2002) concept of *cognitive tuning* suggests that negative affective states are interpreted as a requirement for increased vigilance and effort, while positive affective states are interpreted as calling for less effort and allowing more ease.

Affect regulation theories, on the other hand, involve a motivational impact of affective states on judgment and behavior. This motivational influence of affect is driven by the anticipated discrepancy between one's current affective state and his/her possible affective state as a result of the behavior. While affective evaluation theories like affect as information is in effect when the upcoming stimulus does not have a salient expected effect on one's emotional state, affect regulation is more likely to impact behavior when the stimulus is perceived as it might alter one's current affective state (Cohen, Pham and Andrade 2007; Andrade 2005).

Undesired states motivate people to act and change their situation to a more desirable one. A strive to change calls for a vigilant evaluation of different aspects and analysis of the details of the situation as well as projected outcomes of any action.

Starting from a basic hedonistic assumption that a positive affective state is the target (but see Erber et al. 2001; Cohen and Andrade 2004 for exceptions), many theorists predict that people in negative affective states will engage in proactive behavior in anticipation of the expected mood-lifting consequences of that behavior (e.g., the negative state relief model; Cialdini, Darby, and Vincent 1973; mood management theory; Zillmann 1988). Correspondingly, people in a positive mood will refrain from action in anticipation of the mood-threatening consequences of behavior (e.g., mood-maintenance hypothesis; Clark and Isen 1982; hedonic contingency hypothesis; Petty and Wegener 1994).

Hence, a person in a negative affective state needs to focus on the situation and its features. Consistently, being in a negative affective state is associated with a narrowed focus of attention in an attempt to improve the currently undesired state (Clark and Isen 1982; Forgas 1991), promoting bottom-up, analytic processing. The people become more vigilant and careful and tend to revise their current state of mind or routine behavior which in turn deters top-down approaches. On the other hand, the people in a positive mood are already in their desired state and the maintenance of this state does not require as much effort and therefore those in a good mood may spend less effort in an attempt to protect their current affective state (Clark and Isen 1982; Isen 1984), increasing non-analytic and top-down processes. Affect regulation predicts that people in negative affective states will engage in the behavior if they believe that the behavior will be uplifting their mood (e.g., Negative state relief model, Cialdini, Darby, and Vincent 1973; Mood management theory, Zillmann 1988).

Manucia et al. (1984) provides support for an upward affect regulation strategy. The authors demonstrated that individuals in a negative mood engage in a variety of

behaviors in order to lift their affect upward. Participants only engaged in behaviors if they believed that it had the potential to have an upward effect on their affective state. Specifically, in the “mood freeze” condition participants were led to believe that their mood is “frozen” (i.e., mood is unchangeable) and therefore the prosocial behavior would not help mood repair, engaged in the behavior much less than those in the “non-frozen” (i.e., mood is changeable) negative mood condition.

Petty and Wegener (1994) suggest that the individuals in a positive mood will be pickier about the stimuli to which they will attend. According to the hedonic contingency framework, people in a positive mood are more sensitive than people in negative or neutral moods to the mood-changing consequences of their actions since any stimuli would be more likely to distract the person and uplift a negative mood, hence individuals who are in a positive mood will be more careful with their choices since they perceive that any stimulus would have the potential to hurt their mood. Therefore, people in a positive mood (compared to a negative mood) will be more likely to scrutinize messages which they think have the potential to be mood lifting and they will also be more likely to avoid the messages that have the potential to be depressing.

In a similar line of argument, mood-as-resource hypotheses (Raghunathan and Trope 2002; Trope and Pomerantz 1998) suggest that the long term benefits of useful information and reaching a positive affect are competing goals. Accordingly, if performance is crucial and the benefits of negative information are essential, then the individual would use positive affect as a resource for effectively buffering the mood hurting influence of negative information. More specifically, the findings demonstrate that when information is highly self-relevant, those in a positive mood were more likely

to recall negative information as well as more willing to see it. Heavy consumers of caffeine in a positive (versus negative) mood recalled more pieces of negative information (compared to positive information) about caffeine consumption. Positive mood did not have this effect on light consumers of caffeine. On the other hand, in a negative mood state, individuals lack the resources needed for coping with the affective consequences of negative information. Thus, individuals in a negative affective state avoid negative information that might deteriorate their mood.

In the next chapter, three studies demonstrate the effect of certainty appraisal on effectiveness of health messages. Furthermore, certainty appraisal's interaction with individual's vulnerability to threat and negative versus positive health information are also demonstrated.

CHAPTER 3

3.1 Certainty Appraisal and Processing Of Health Related Information: Studies 1-3

It is well established that individuals engage in deeper and more extensive processing when the information is self relevant (Petty and Cacioppo 1986; Eagly and Chaiken 1993). However, a growing extent of research suggests that in certain situations higher self relevance may impede or bias information processing. For instance, when people are motivated to arrive at particular conclusions, as may be the case when the topic is personally relevant, message processing may be biased in support of that desired conclusion (Kunda 1990). This effect is particularly significant when the information is threatening for the individual. Liberman and Chaiken (1992) demonstrate that high caffeine consumers defensively reject information linking fibrocystic disease to caffeine consumption, whereas low caffeine consumers were more persuaded by this information. Along the same lines, research on fear appeals shows that a threatening messages instigates psychological defense strategies to resist the message (for a review see Witte and Allen 2000). Individuals avoid risk information and persist on their evaluations of low vulnerability to adverse health outcomes, especially when it is most relevant to them. (e.g., Raghurir and Menon 1998).

People tend to employ defensive mechanisms at the face of information that might perturb their perceptions of safety and sense of security (Leventhal 1970). Consequently, efficacy of health communications are undermined as high risk individuals who are the target of most campaigns are most likely to reject or ignore health communications (Block and Williams 2000). Extant research examines a range of factors which help explain the acceptance and rejection of threatening information.

Among these factors are positive and negative framing effects (Block and Keller 1995), temporal framing (Chandran and Menon 2004) and information accessibility (Raghubir and Menon 1998). Also emphasized is the impact of emotions on health message processing and persuasion. For example, extensive research has examined the impact of fear evoked by threatening health related information on message effectiveness (e.g., fear appeals, Witte and Allen 2000) and the strategies to overcome its impeding effect (Maddux and Rogers 1983). Kahn and Luce (2003) find that compliance with messages for getting a mammogram was lessened due to the anticipated affective consequences of receiving false positive test results.

More recently, research on health communications has comprised the influence of preexisting, or incidental, emotional states on the efficacy of health communications. Keller, Lipkus, and Rimer (2003) demonstrate that positive and negative affective states interact with message framing (loss vs. gain) to influence message persuasion related to breast cancer. Another related study shows that compatibility between the individual's affective state with the health message focus (i.e., self/other relatedness) influences processing and self risk assessments (Agrawal, Menon, and Aaker 2007). The present dissertation adds to this body of research by focusing on discrete incidental emotions, their interaction with message characteristics and their impact of message processing and persuasion.

3.2 Health Communications and the Impact of Emotional States

Health messages are usually aimed at increasing awareness of potential risks regarding personal health and therefore can be perceived as being emotionally aversive or

threatening. As a result, in accordance with mood repair (e.g., Zillmann 1988; Andrade 2005), people in a negative mood tend to avoid threatening health information to prevent further deterioration of their affective state. Positive affective states, on the other hand, can create increased interest in aversive but relevant health information. For example, Reed and Aspinwall (1998) find that individuals who are feeling positively about themselves in an irrelevant domain (e.g., positive feedback on their kindness) are more attentive and adaptive towards risk information, especially if it is relevant to them. These findings are also compatible with the proposition that people in a positive mood avoid negative stimuli that is incompatible with their mood only if it is nonessential. In other words, if negative information is urgent or essential (i.e., when real loss is possible), people in a positive mood expend cognitive effort to process this information with no discernible disadvantage (Isen et al. 1987).

Mood-as-resource hypotheses (Raghunathan and Trope (2002) suggest that in the face of valenced information about a health threat, the long term benefits of information and positive affect act as competing goals. If the benefits of negative information are essential, as in the case of high risk individuals, then positive affect acts as a resource for buffering the mood hurting influence of negative information. However, under negative affect, individuals lack the confidence necessary to deal with threatening information. Consequently, the authors find that high risk individuals (i.e., heavy consumers of caffeine) who were in a positive mood were more likely to recall information which was useful but threatening (e.g., caffeine causes ulcers), while those in a negative mood recalled information which reassured them of positive consequences of

caffeine consumption (e.g., caffeine is good for the heart). The authors suggest that positive mood provides a buffer or a resource to handle negative but useful information.

Evidently, positive versus negative emotions have been central to the research on the effect of incidental emotions on health message effectiveness. Less attention has been given to the effects of discrete emotions which are similarly valenced however differ in other dimensions (for exceptions please see Agrawal, Menon and Aaker 2007; Passyn and Sujana 2006). Hence, questions remain as to what type of emotions influence health message effectiveness and what message characteristics might interact with discrete emotions to determine health message rejection or acceptance.

Present dissertation contributes to this stream of research by emphasizing an alternative classification of emotions. Specifically, I focus on certainty appraisal (Smith and Ellsworth 1985; Roseman 1984), a dimension which differentiates emotions on the basis of high (e.g., pride) or low certainty and predictability (e.g., hope) which they convey about a situation. In Chapter 3, three studies demonstrate the effect of certainty appraisal on effectiveness of health messages. Furthermore, certainty appraisal's interaction with individual's vulnerability to threat and negative versus positive health information are also demonstrated.

3.3 Cognitive Appraisal Framework: Certainty Appraisal

Appraisal theories suggest that emotions result from cognitive activities such as processing, or evaluating personally relevant information (e.g., Ortony, Clore, and Collins 1988; Smith and Ellsworth 1985) and that they can be finely classified “beyond valence” (Lerner and Keltner 2000). Appraisal theories use principal assessments of

situations and the environment to explain which specific emotions are elicited by those events (please see Chapter 2 for more on appraisal theories). Cognitive appraisal has been pointed out as a useful avenue to differentiate the wide array emotions (Ruth, Brunel and Otnes 2002; Bagozzi, Gopinath and Nyer 1999; Johnson and Stewart 2005).

The focus of this research is certainty appraisal of emotions, a prominent cognitive evaluation that has been found to differentiate emotions reliably across numerous studies (e.g., Ellsworth and Smith 1985; Tiedens and Linton 2001; Tesser 1990). Certainty appraisal is the degree to which future events seem predictable and comprehensible versus unpredictable and incomprehensible to the individual. For example, when people feel angry, they report thinking that the situation is unpleasant and that they are certain and confident about what is happening. In contrast, when they feel fear, the situation again seems unpleasant but also uncertain and less predictable. Certainty is a particularly appealing emotional dimension for the study of health message processing because 1) it affects extent of information processing (Tiedens and Linton 2001), 2) it affects risk perceptions (Lerner and Keltner 2000), 3) emotions low on certainty appraisals activate uncertainty reduction goals (Raghunathan and Pham 1999) whereas 4) health related information usually conveys risk related information which maybe threatening to one's sense of certainty and confidence.

Extant research provides evidence for evaluative and motivational effects of certainty appraisal. Tiedens and Linton (2001) suggest that certainty associated with an emotion leads to appraisal congruent evaluations of subsequent situations and that the resulting experience of feeling certain or uncertain affects processing. Specifically, emotions low (versus high) on certainty appraisal signal uncertainty and insufficient

confidence about the task at hand, thus leading to more thorough processing of information. The authors find that emotional states associated with uncertainty (e.g., hopeful, fear) lead to in-depth message processing while emotional states high on certainty appraisal (e.g., anger or happy) lead to more heuristic processing.

Some studies report findings suggestive of a motivational impact of certainty appraisal. Specifically, individuals who are feeling emotions associated with uncertainty become motivated to decrease their uncertainty and restore confidence. Previous research shows that individuals feeling emotions low on certainty appraisals, like anxiety, hope or fear, engage in a variety of strategies to decrease their uncertainty: making risk averse preferences and decisions (Raghunathan and Pham 1999; Raghunathan, Pham, and Corfman 2006), engaging in biased (motivated) information processing (de Mello, MacInnis and Stewart 2007), or attending to information that they know is going to be reassuring (Nabi 2002), respectively.

Certainty, on the other hand, can provide the confidence to process threatening information. Emotions high on certainty appraisal create low self risk perceptions and in turn motivate risk seeking decisions (e.g., Lerner and Tiedens 2006; Lerner and Keltner 2000, 2001). Furthermore, although in a different paradigm, research on self certainty reveals that feeling certain about one's self-attributes, promotes confidence and autonomy, even when these attributes are negative (Baumgardner 1990). Also, individuals induced with emotions associated with certainty become more assured that they can accomplish upcoming tasks (Tiedens and Linton 2001). In sum, certainty associated with an emotional experience can make one feel resilient to threat posed by the

health information or feel that it is rather manageable, and therefore they need not refrain from processing the message.

It is proposed that uncertainty related emotions will impede processing of relevant health risk information as they are obstructive for the uncertainty reduction motive. On the contrary, certainty related emotions will facilitate processing of threat information as these emotions provide the confidence and certainty to handle threatening information.

When the message is not self relevant, the predicted effect is in line with Tiedens and Linton (2001) findings, reminiscent of affect-as-information mechanism. Specifically, the uncertainty-associated emotions which signal insufficient certainty will lead to deeper processing while certainty-associated emotions will signal sufficient confidence and no need for elaboration, thus decreasing message processing.

3.4 Certainty Appraisal and Health Messages

Processing relevant but threatening health information involves two competing goals: on one hand are the informational benefits of the message for protecting one's health in the long run, on the other hand is the immediate aversive emotional impact of such information (Reed and Aspinwall 1998; Raghunathan and Trope 2002). Since they convey risk information on potential aversive outcomes, health related messages often make the reader feel less confident and insecure about their health (Menon, Block and Ramanathan 2002). When the health information is self relevant, its informational benefit is higher as well as its exacerbating effect for the person's sense of security. Consequently, attending to threatening health information will be at odds with the

uncertainty reduction motives activated by uncertainty associated emotions. In other words, individuals feeling uncertainty emotions will evade relevant health information in order to minimize further uncertainty.

In contrast, when uncertainty reduction is not an immediate goal, the individual can focus on long term health goals. In other words, emotions with high certainty appraisal can provide the individual with the necessary confidence to handle threatening but useful information. When feeling confident, the individual will not refrain from reading health information.

Emotions associated with high certainty appraisal signal the possibility of goal attainment and provide confidence that a given outcome will be achieved in the future, whereas uncertainty is associated with ambiguity about goal achievement (Bagozzi, Baumgartner and Pieters 1998; Johnson and Stewart 2005). Perhaps, high certainty appraisal may increase one's confidence that effective protection is possible and therefore alleviate the defensive avoidance of threatening messages. Further, even though not directly related to emotional influence, some findings in the area of health communications provide support for the proposed effect of confidence in increasing the effectiveness of threatening appeals. For example, research on efficacy information (i.e., the extent to which protection recommendations can avert health risk) suggests that individuals who feel confident that they can protect themselves are more open to accepting messages that convey high threat.

Taken together, these findings suggest that emotions which signal certainty and confidence might facilitate the processing of threatening messages. Hence, emotions high on certainty appraisal will lead to higher processing of self relevant health messages

while emotions low on certainty will avoid this information as it is likely to lead to further uncertainty.

A different mechanism of emotional influence would be at work when the health related information is not particularly threatening. When the health risk is not relevant for the individual, it will have a limited projected effect on individual's affective state. Previous work suggests that when an upcoming message does not have an anticipated influence, a direct, affect-congruent evaluation, in line with affect as information mechanism, is expected (Cohen, Pham and Andrade 2007). "Affect as information" hypothesis posits that people use their affective states as direct information about their surroundings (Bless et al. 1996; Schwarz 1990; Schwarz and Clore 1983). According to this account people may use their sense of certainty as information about their surroundings. Feeling uncertain may suggest to the individual that he or she does not have adequate information or that the situation is complex. Thus, the individual will need to rely on more thoughtful processes to achieve confidence and a sense of accuracy (Tiedens and Linton 2001). In accordance with this account, the uncertainty-associated emotions which signal a lack of sufficient certainty and confidence in the situation will trigger increased message processing. Emotions high on certainty will signal sufficient conviction and no need for much elaboration, thus decreasing the extent of message processing.

The two accounts of specific affective influence summarized above leads to the following hypothesis:

H1: When individuals are at low (high) risk, those who are induced with uncertainty (certainty) related emotions will process the health message to a higher extent compared to participants who are induced with certainty (uncertainty) related emotions.

3.5 Study 1: Certain vs. Uncertain Emotions and Threatening Information

In study 1, the relationship between uncertainty (vs. certainty) associated emotions and health message effectiveness is examined. I expect that, regardless of their valence, emotions high (vs. low) on certainty appraisal will decrease message effectiveness when the health threat has low relevance to the individual. In contrast, individuals for whom the health risk is relevant will process and be persuaded by the message. Thus, a 2 (positive vs. negative emotion) x 2 (certainty vs. uncertainty emotion) x 2 (high vs. low risk status) between-subjects design was used.

Procedure

Ninety seven undergraduate students (53 females, 44 males) participated in the study for exchange of extra credit.

Emotion Induction. The emotion induction procedure was adapted from Tiedens and Linton (2001), the participants were told that they would participate in two unrelated studies. The "first study" involved building a database on emotional experiences and required writing about an emotional event. The directions indicated that the researcher was interested in emotions and memory and this study required participants to write about an autobiographical emotional event which made them feel angry/worried/surprised/proud (please see Appendix A for emotion manipulation instructions). This selection of emotions was based on previous research which has demonstrated their

associations with high or low certainty appraisal (Smith and Ellsworth 1985, Tesser 1990). Specifically, anger (negative-certain emotion), pride (positive certain emotion), worry (negative-uncertain emotion) and surprise (positive -uncertain emotion) were induced. Following their descriptions, participants answered a series of questions to assess emotional intensity as well as certainty and pleasantness appraisals associated with these affective states.

Article on Chlamydia. Once the participants were done with the “first part”, they were invited to move on the next study, supposedly unrelated and which involved reading an article on Chlamydia, a sexually transmitted disease. Chlamydia is the most frequently reported bacterial STD in the United States (CDC 2006). An estimated 2.8 million Americans are infected with Chlamydia each year. The direct costs of \$249 million (Chesson et al 2004) indicate the pressing need for interventions and preventive efforts. Particularly at risk are sexually active young adults under the age of 25 (CDC 2006) which makes this article relevant to sexually active college students.

The message was assembled based on the information provided on the CDC website about Chlamydia. The prevalence, contraction, symptoms, consequences, side effects of treatments and prevention methods of Chlamydial infection were covered (Please see Appendix B for the article).

After reading the article, the participants were asked to list the pieces of information they can remember and their thoughts related to the article. They were administered a 10-question quiz about the article, responded to questions regarding their thoughts about the message and intention to follow the recommendations. Lastly,

participants answered questions related to their experience and prior knowledge about Chlamydia and questions on their sexual activities in order to assess their risk status.

Independent Measures

Risk Status. Students were divided into low and high risk groups based on the number of sexual partners they have had in the previous year. Given the distribution of the responses, as close to a median split as possible was used to break participants into low versus high-risk groups. 69% of respondents fell into the low-risk group ($M=1.73$, $range=1-2$), and the remaining 31% fell into the high-risk group ($M=3.89$, $range=3-7$). A manipulation check queried participants on the extent of risk they perceived “How much risk do you think you are under for contracting Chlamydia, a sexually transmitted disease?” (seven point scale). As expected, low-risk participants rated themselves at less risk than the high-risk participants ($M_{high\ risk}=4.07$, $SE=0.30$, $M_{low\ risk}=2.50$, $SE=0.20$, $F(1, 93) = 18.95$, $p < .0001$).

Manipulation Checks

Intensity. The participants rated the extent to which they felt the target emotions (Scale 1-11). The 2 (valence) x 2 (certainty) ANOVA on the extent to which the target emotions was experienced yielded no significant effects (all $p > .1$)

Certainty Appraisal. The certainty appraisal measure consisted of three items querying 1) the extent to which they understand what was happening in the situation 2) how certain they were about the situation 3) how well they could predict what was going to happen in the described situation (Scale 1-11; Smith and Ellsworth 1985) were averaged to a single measure (Cronbach’s $\alpha = 0.86$)

A 2 (valence) X 2 (certainty) ANOVA revealed a main effect for the emotions in the certainty and uncertainty conditions, $F(1, 93) = 9.45, p < .0001$. Participants who were induced to feel surprise ($M = 5.45, SE = 0.32$) and worry ($M = 4.79, SE = 0.25$) had lower ratings of certainty appraisal than did those who were induced to feel anger ($M = 7.58, SE = 0.25$) and pride ($M = 8.48, SE = 0.25$).

The main effect for valence was also significant, $F(1, 93) = 6.05, p < .005$. On average, positive emotions were associated with higher certainty ($M=4.64, SE=0.21$) than negative emotions ($M=3.90, SE=0.18$). The interaction between valence and certainty was not significant, $F= 0.02, p > .6$.

Pleasantness Appraisal. The pleasantness appraisal measure consisted of two items asking how pleasurable and enjoyable (Scale 1-11) the described situation was. These items were averaged to a single measure (Cronbach's alpha = 0.94).

The 2 (valence) x 2 (certainty) ANOVA on the pleasantness appraisal yielded only a main effect for the valence of the emotions, $F= 272.39, p < .0001$. Surprise ($M = 9.18, SE = 0.39$) and pride ($M = 9.75, SE = 0.30$) resulted in higher ratings on the pleasantness measure than did worry ($M = 4.15, SE = 0.31$) and anger ($M = 3.87, SE = 0.30$).

Certainty did not have a main effect ($p > .7$) and the two way interaction was not significant ($p > .2$).

Outcome Measures

Message Related Thoughts. The extent of message processing was measured by the number of relevant thoughts that recipients generated after viewing the message (Greenwald 1968; Wright 1980). Cognitive response theory indicates that upon receiving

a message, individuals relate the conveyed information to their extant beliefs (Eagly and Chaiken 1993). Cognitive responses signify not only arguments recalled from the message but also the participants' generated thoughts and feelings as a reaction to the message. The number of cognitive responses has been used as an indicator of the depth of message processing in previous research (e.g., Maheswaran and Meyers-Levy 1990, Block and Keller 1995).

Two judges coded the thought listings. The pieces of thoughts or information that participants listed were coded as "relevant" or "irrelevant" to the message. Information that was conveyed in the health message such as "If you had Chlamydia, you would be more at risk to get HIV" or thoughts evoked that are related to the message like "I felt like I should do something about STDs." were coded as "relevant"; while phrases like "I'm a horrible speller" were coded as "irrelevant". The total message recall score was the sum of "relevant" pieces of recalled information and thoughts. Initial intercoder reliability was 97% and differences were settled through discussion.

Quiz Score. In order to measure the participants' accuracy in processing the article, the participants answered 10 true-false questions about the message. The number of correct answers was recorded as the total quiz score. (Please see Appendix C for the quiz questions).

Persuasion and Intention Index. In order to measure message effectiveness, the participants indicated their agreement with the following statements regarding the influence of the message and their behavioral intentions to comply with the recommendations of the message (Scale 1-7)

1. The article convinced me that Chlamydial infection can lead to serious health problems.

2. Chlamydial infection is NOT an important issue that I should think about. (R)
3. The information in the article is NOT convincing. (R)
4. The article was important in persuading me to use protection before having any type of sexual intercourse.
5. I will follow the recommendations in the article.

These items were combined to create a single index of message persuasion and intention (Cronbach's alpha = 0.83).

Other Measures. The questionnaire ended with a number of possible covariates: extent of prior knowledge of Chlamydia, experience with Chlamydia (i.e., whether themselves, partners or any friends had ever been diagnosed with Chlamydia), whether they were ever tested for Chlamydia, the familiarity of information conveyed in the message, how often they use condoms, total number of sexual partners, and gender. Separate ANCOVAs were conducted using each of these potential covariates. None of these yielded significant effects ($p > .1$) except for a significant effect of condom use on the persuasion and intention measure ($F(1, 89) = 9.14, p < .005$). Therefore, condom use was included as a covariate for this measure throughout the analyses.

Results

Three separate 2 (valence) x 2 (certainty) x 2 (risk group) ANOVAs were conducted for each of the dependent measures (i.e., thought listings, persuasion and intention, and quiz). The ANOVA on the number of message relevant thoughts yielded only a significant interaction of certainty and risk status $F(1, 89) = 9.54, p < .005$. Follow up contrasts revealed that the effects were in the hypothesized directions. For low risk individuals, uncertainty related emotions led to higher number of thought listings (M

certainty = 4.36, $M_{\text{uncertainty}} = 5.32$; $F(1, 89) = 4.35, p < .05$), but for high risk individuals, certainty lead to increased number of thoughts ($M_{\text{certainty}} = 5.55, M_{\text{uncertainty}} = 3.77$; $F(1, 89) = 5.39, p < .05$). Results of the three-way ANCOVA for the message persuasion and attitude index showed a similar pattern; only the interaction of certainty and risk status was significant $F(1, 89) = 11.10, p = .001$. Frequency of condom use (Scale 1-Never, 7-Always) had a significant effect on this measure and therefore was used as a covariate in the analysis $F(1, 89) = 9.14, p < .005$. High risk individuals were persuaded more when they were feeling emotions high on certainty appraisal ($M_{\text{certainty}} = 6.18, M_{\text{uncertainty}} = 5.07$; $F(1, 89) = 8.14, p = .005$) while the opposite was true for low risk individuals, although this difference was only nearly significant ($M_{\text{certainty}} = 5.64, M_{\text{uncertainty}} = 6.07$; $F(1, 89) = 2.99, p < .09$). The quiz score results yielded the same interactions ($F(1, 89) = 4.50, p < .05$); the follow up results were in the same direction as well, for low risk individuals ($M_{\text{certainty}} = 4.47, M_{\text{uncertainty}} = 5.16$; $F(1, 89) = 3.56, p < .06$), for high risk individuals however this difference was not significant, ($M_{\text{certainty}} = 4.57, M_{\text{uncertainty}} = 3.90, F(1, 89) = 1.41, p < .1$).

A 2 (risk status) x 2 (emotion: certainty vs. uncertainty related) MANOVA was conducted using all three dependent variables: number of thoughts generated by the message, accuracy in the quiz, message persuasion and intention to follow recommendations in the article $F(1, 93) = 8.37, p < .0001$. Lastly, 2 (risk status) x 2 (certainty appraisal: certainty vs. uncertainty related) x 2 (valence: positive vs. negative) MANOVA was not significant, $F(1, 93) = 0.48, p > .6$, suggesting that the effect of certainty appraisal was not different for positive and negative emotions.

Figure 1: Study 1. Mean number of thoughts related to the message for low and high risk individuals

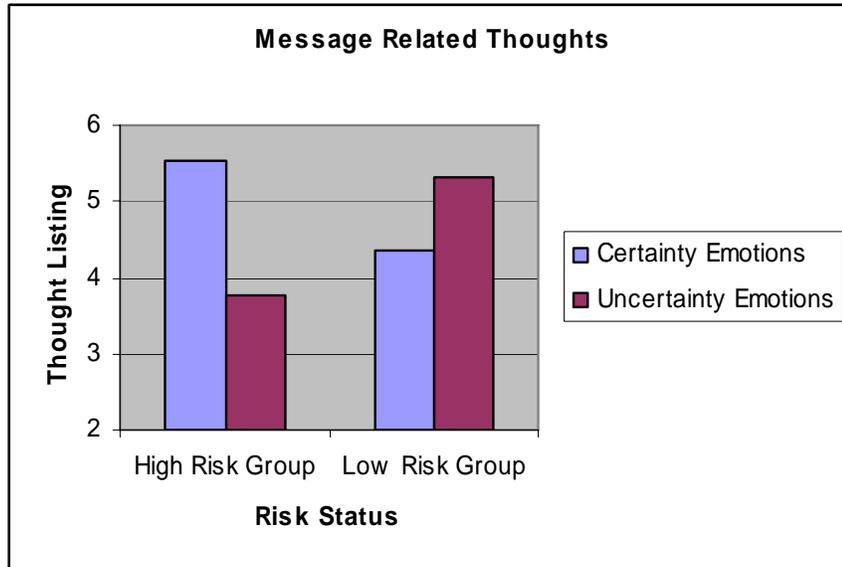


Figure 2: Study 1. Mean quiz score for low and high risk individuals

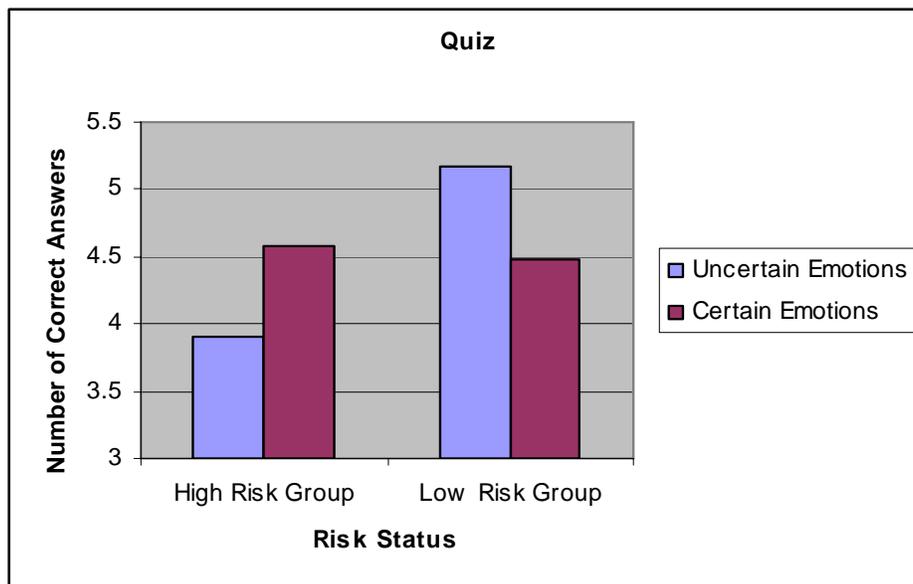


Figure 3: Study 1. Mean persuasion and intention index for low and high risk individuals

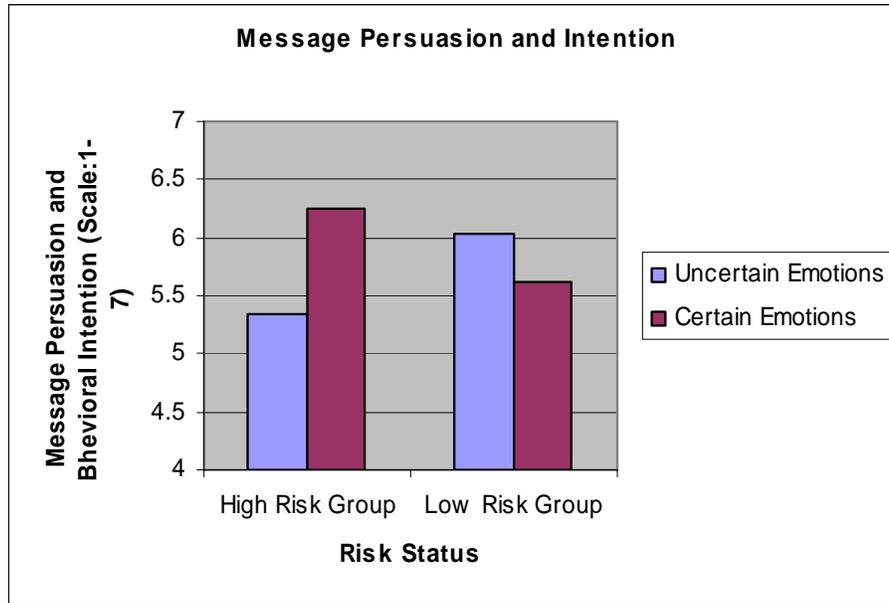


Table 1: Mean values for all dependent variables by each discrete emotion

| Dependent Variables Independent Variables | | Message Related Thoughts | | Quiz Score | | Persuasion and Intention | |
|--|----------|--------------------------|------|------------|------|--------------------------|------|
| | | Mean Value | SE | Mean Value | SE | Mean Value | SE |
| Risk Status | Emotion | Mean Value | SE | Mean Value | SE | Mean Value | SE |
| Low Risk | Surprise | 5.00 | 0.59 | 5.08 | 0.44 | 6.00 | 0.30 |
| | Pride | 3.45 | 0.45 | 4.60 | 0.34 | 5.64 | 0.23 |
| | Worry | 5.58 | 0.47 | 5.21 | 0.35 | 6.06 | 0.24 |
| | Anger | 5.00 | 0.51 | 4.31 | 0.38 | 5.61 | 0.26 |
| High Risk | Surprise | 3.75 | 1.01 | 4.25 | 0.76 | 4.70 | 0.52 |
| | Pride | 5.88 | 0.72 | 4.50 | 0.53 | 6.15 | 0.37 |
| | Worry | 4.00 | 0.77 | 3.71 | 0.57 | 5.71 | 0.39 |
| | Anger | 5.55 | 0.61 | 4.64 | 0.46 | 6.31 | 0.31 |

Discussion

The results are consistent with the proposed effect that emotions associated with high certainty appraisal increased processing of health related information. In contrast, the induction of an uncertain emotion in high risk participants reduced message processing. These participants avoided a deeper processing of the message, perhaps with the reservations that the risk information is likely to further increase their uncertainty. Furthermore, certainty emotions presumably provided the confidence needed to handle the information regarding the health risks conveyed in the message, leading high risk individuals to focus on the relevant health message.

This effect was reversed in the low risk condition. It was hypothesized that in the low risk condition, since the health message is not likely to affect one's certainty about his or her health, certainty appraisal would affect message processing in accordance with affect information hypothesis (Schwarz 1990). From an affect as information point of view, uncertainty emotions signal increased risk perception (Lerner and Keltner 2000) as demonstrated in study 1, hence increase health message scrutiny. Certainty emotions on the other hand, decrease perceived risk and signal that there is no need to process the message in depth.

One limitation of study 1 is the potential confounds associated with relevance, such as familiarity with the information presented in the message, possible emotional reactions and greater coping resources for the risk information on the subject may have affected message recall and attitude towards the health issue. Study 2 addresses this potential limitation.

3.6 Study 2 : Certainty Appraisal as a Continuous Measure

The purpose of Study 2 is to replicate the results of Study 1 using a different operationalization of risk status, different certain and uncertain emotions, and also a different health issue, Hepatitis C. Hepatitis C affects four million people in the United States; it causes 8,000 to 10,000 deaths and accounts for approximately 2000 liver transplantations done each year. This disease can be contracted through a range of behaviors common to most college students such as sharing personal grooming products, getting tattoos and piercing, getting professional manicures and sex. In spite of its relevance to the student population, information on its transmission, symptoms and prevention are relatively less known. Focusing on Hepatitis C was advantageous since a) its limited familiarity allows an effective vulnerability manipulation b) helps minimize possible confounding effects of high relevance (previously held beliefs, extent of knowledge).

Previous research shows that making contraction of a disease seem easier increases self risk assessments (Menon, Block and Ramanathan 2002). In this study, perceptions of vulnerability to Hepatitis C were manipulated by reporting high (vs. low) prevalence of the disease. To examine the relationship between levels of risk perception, levels of certainty appraisals and depth of processing, I varied perceived risk by using numerical values of Hepatitis C prevalence in the US adult population. In the high risk manipulation condition the individuals viewed introductions to the Hepatitis C article, which involved information indicating that Hepatitis C is a highly pervasive disease:

“one in 15 adults test positive for Hepatitis C” In the low risk manipulation condition, the introduction conveyed that “one in 350 adults test positive for Hepatitis C”..

Generalizability was further increased by using emotions different from those used in study 1, but still associated with high versus low appraisals of certainty. Two positive emotions: hope-uncertain emotion and happiness-certain emotion. Their certainty appraisals have been demonstrated in previous research (Smith and Ellsworth 1985, Tiedens and Linton 2001)

Like in study 1, it is predicted that, when the perceived risk is low, participants who are induced with the uncertain emotion (i.e., hope) will be more likely to process and be persuaded by the message compared to participants who are induced with the certain emotion (i.e., happiness). While when the participant thinks the risk of contracting Hepatitis C is high, the certain emotion (i.e., happiness) which signals confidence, will lead to higher message effectiveness. Formally,

H2: In the low (high) perceived vulnerability condition, the participants who are induced with uncertainty related emotions will be more (less) likely to scrutinize the message compared to participants who are induced with certainty related emotions.

Method

A 2 (certainty emotion -happiness vs. uncertainty emotion - hope) X 2 (low vs. high risk) between participants factorial design was employed. One hundred and fifteen undergraduate students participated in this study for extra credit (60 females, 55 males).

The procedure was similar to Study 1, which involved 2 “unrelated” studies; the first one served as emotion manipulation and the second study featured an article on Hepatitis C.

Emotion Induction. Two positive emotions, happiness (high certainty appraisal) and hope (low certainty appraisal) were induced using the procedure explained in study 1.

Perceived Risk Manipulation Prior to viewing the article, participants read a short introduction. Participants in the high (low) vulnerability condition read the following introduction phrase: “In this second study, you will read an article on Hepatitis C. This article was adapted from a research report published in a medical journal in 2007. According to the latest reports on the prevalence of Hepatitis C, as many as ONE in 15 (350) adults test positive for Hepatitis C.”

Article on Hepatitis C. This introduction was followed by the article which was identical for both conditions. The message was assembled based on the information provided on the CDC website about Hepatitis C. The prevalence, contraction, symptoms, long term outcomes, side effects of treatments and prevention methods from Hepatitis C were covered (Please see Appendix D for the article on Hepatitis C). After reading the article the participants were instructed to list the thoughts that crossed their minds as they read the article. The questionnaires following the thought listings involved a quiz related to the article (Please see Appendix E for the quiz questions), questions related to persuasion and behavioral intentions pertaining to Hepatitis C, other questions about the participant’s current behaviors that might put them at risk for Hepatitis C.

At the end of the session, all participants are provided with a debriefing form that explains that the prevalence information provided in the messages was fictitious and actually Hepatitis affects 4 million people in the United States. They also receive an apology for the use of deception explanation of why it was necessary. Further, the participants are offered a chance to ask any questions to the experimenter. They

informed that they have the right to have the data obtained from the research destroyed instead of used for data analysis (please see Appendix F for the debriefing form).

Cognitive Appraisal Checks

Certainty Appraisal. A one-way ANOVA 2 (certainty emotion-happy vs. uncertainty emotion-hope) on certainty appraisal score (Cronbach's alpha = 0.84) revealed that participants who were induced to feel hope ($M = 6.74$, $SE = 0.20$) had lower ratings of certainty than did those who were induced to feel happy ($M = 8.87$, $SE = 0.21$), $F(1, 113) = 51.59$, $p < .0001$

Pleasantness Appraisal. A one-way ANOVA 2 (certainty emotion-happy vs. uncertainty emotion-hope) on the pleasantness appraisal (Cronbach's alpha = 0.98) yielded a significant main effect, $F(1, 113) = 104.66$, $p < .001$. Happiness was rated higher on pleasantness appraisal ($M = 10.58$, $SE = 0.32$) than hope ($M = 6.08$, $SE = 0.31$).

Situational Control. Participants also rated the extent to which they thought they had the ability to control what was happening in the situation (eleven point scale). Happiness resulted in higher ratings on the control measure ($M = 8.03$, $SE = 0.41$) than hope ($M = 6.23$, $SE = 0.39$), $F(1, 113) = 10.21$, $p < .005$.

Intensity. The participants also rated what extent they felt the target emotions (eleven point scale). The 2 (certainty emotion-happy vs. uncertainty emotion-hope) ANOVA showed that emotional intensity was higher for individuals in the happy condition compared to the individuals in the hopeful condition. ($M_{\text{hopeful}} = 8.92$, $SE = 0.20$; ($M_{\text{happy}} = 10.64$, $SE = 0.21$), $F(1, 113) = 36.70$, $p < .001$.

Risk Manipulation Checks

Perceived Risk. The manipulation of perceived risk for contracting Hepatitis C (*vulnerability*) was checked by three questions. The first check was an open ended question asking their likelihood of getting Hepatitis C. As expected, high risk condition participants ($M=21.3$, $SE=2.26$) felt that they were under higher risk compared to the respondents in the low risk condition ($M=12.2$, $SE=2.28$), $F(113,1)=8.02$, $p<.01$.

The Likert scale check was “How much risk do you think you are under for contracting Hepatitis C?” (seven point scale) and lead to similar results ($M_{High\ risk}=2.59$, $SE=0.17$, $M_{Low\ risk}=2.07$, $SE=0.18$), $F(113,1)=4.37$, $p<.05$).

Lastly, a recognition measure was used to make sure that participants were aware of and paid attention to the statements containing risk information "one in 15 (350) people". They were asked to choose the correct response in a multiple choice question (choices were: One in 350, One in 200, One in 100, One in 50, One in 15 or none of the above). 79 out of 115 respondents were able to respond correctly to the question (69%).

Perceived Severity. Although I made no predictions regarding perceived severity of Hepatitis C, the vulnerability manipulation might influence these measures (Rogers 1983). Hence, perceived severity was also measured to make sure they do not differ across the risk manipulation conditions. A three-item scale that asked participants to rate the extent to which Hepatitis C is frightening, dangerous, and severe (Meyerowitz and Chaiken 1987) was collapsed to a single measure (Cronbach's $\alpha=0.87$). There were no significant differences in perceived severity between the high and low risk conditions ($F(113,1)=0.19$, $p>.6$).

Outcome Measures:

Message Related Thoughts. The extent of message processing was measured using the same procedure as Study 1. The number of items in the relevant category was recorded as the message related thoughts. The total score was the sum of relevant pieces of recalled information and thoughts. Initial intercoder reliability was 95% and differences were settled through discussion.

Total quiz score. In order to measure the accuracy of participants' processing of the article, the participants were asked a total of 11 true-false questions about Hepatitis C. The number of questions which they have answered correctly was recorded as the total quiz score (Please see Appendix E for the quiz questions).

Persuasion and Intention. In order to measure message effectiveness, the participants indicated their agreement with the following statements regarding the influence of the message. (Seven point scale)

1. The article convinced me that Hepatitis C infection poses a serious health risk.
2. I should contact my healthcare provider to test for Hepatitis C infection.
3. Hepatitis C infection is an important issue that I should think about. (R)
4. The information in the article was convincing.
5. I will follow the recommendations in the article.

These items were combined to create a single measure of persuasion and intention (Cronbach's alpha =0.70).

Other Measures

The questionnaire ended with a number of possible covariates: extent of prior knowledge of Hepatitis C, experience they had with Hepatitis C (i.e., whether themselves or any friends had ever been diagnosed with Hepatitis C), whether they were ever tested for Hepatitis C, how often they use condoms, total number of sexual partners, how often they share personal grooming products with other people, how many times they have gotten tattoos or piercings, how often they get a professional manicure or pedicure, age and their gender. ANCOVAs were conducted using each of these potential covariates.

For the persuasion and intentions measure, how often they share personal grooming products with other people ($F=7.33, p<.01$), how many times they have gotten tattoos ($F=4.96, p<.05$) or piercings, how often they get a professional manicure or pedicure ($F=6.59, p<.05$) yielded significant effects and therefore were used as covariates for persuasion and intentions.

Results

A 2 (risk manipulation: high vs. low) x 2 (emotion: certainty-related (happy) vs. uncertainty-related (hope)) MANOVA using three dependent variables: message related thoughts, quiz score and persuasion and intention index, yielded a significant interaction of $F(1,111) = 6.98, p = .0002$. Two individual 2 (vulnerability: high vs. low) x 2 (emotion: happy (certainty) vs. hope (uncertainty)) ANOVA (message related thoughts and quiz score) and an ANCOVA (Persuasion and Intention) were conducted separately for the dependent measures.

The interactions between emotional certainty and risk status manipulation were significant for all three dependent variables. As hypothesized, for the individuals in the high perceived risk condition, certainty (compared to uncertainty) related emotions led to

more thought listings, higher quiz scores and higher persuasion and intention compared to uncertainty emotions. Table 2 reports the least square means for uncertainty vs. certainty cells and the p-values of the follow up contrasts. The asterisk next to least square means value of uncertainty emotion conditions indicate the significance of the contrast that compares the uncertainty vs. certainty emotion cells under the stated risk condition. None of these analyses yielded main effects of emotion or risk status manipulation.

Table 2: Study 2 results summary * $p < .1$; ** $p < .05$; *** $p < .01$

| Outcome Measure | High Risk Group | | Low Risk Group | | Interaction F-value | Interaction P-value |
|--------------------------------|-------------------|---------------------|-------------------|---------------------|---------------------|---------------------|
| | Certainty Emotion | Uncertainty Emotion | Certainty Emotion | Uncertainty Emotion | | |
| Message Related Thoughts | 7.08 (0.69) | 4.79 (0.65)** | 5.19 (0.62) | 6.82 (0.66)** | 8.97*** | 0.0034 |
| Quiz Score | 8.15 (0.33) | 7.17 (0.32)** | 7.38 (0.30) | 8.07 (0.32)* | 6.92*** | 0.0097 |
| Persuasion and Intention Index | 4.59 (0.19) | 4.09 (0.18)* | 3.89 (0.18) | 4.55 (0.19)** | 8.87 *** | 0.0036 |

Figure 4: Study 2. Mean number of thoughts related to the message for low and high risk individuals

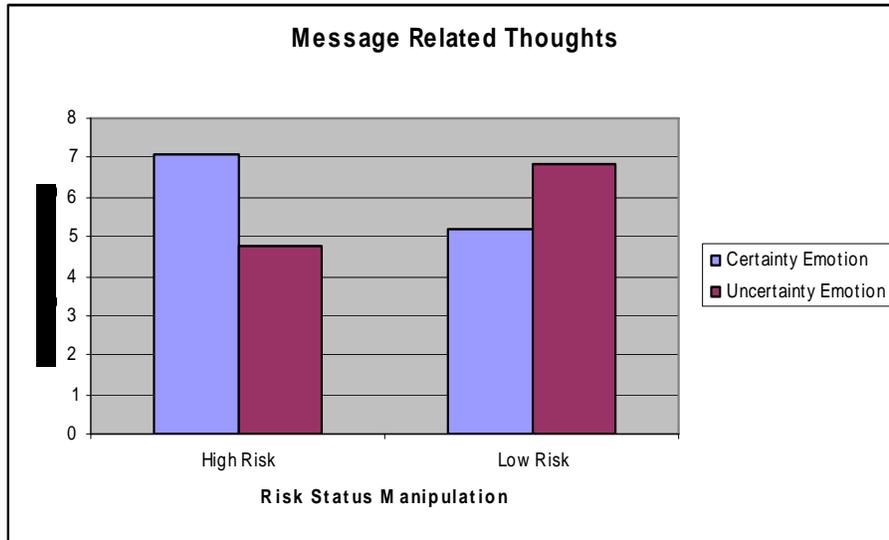


Figure 5: Study 2. Mean number of correct answers to message quiz for low and high risk individuals.

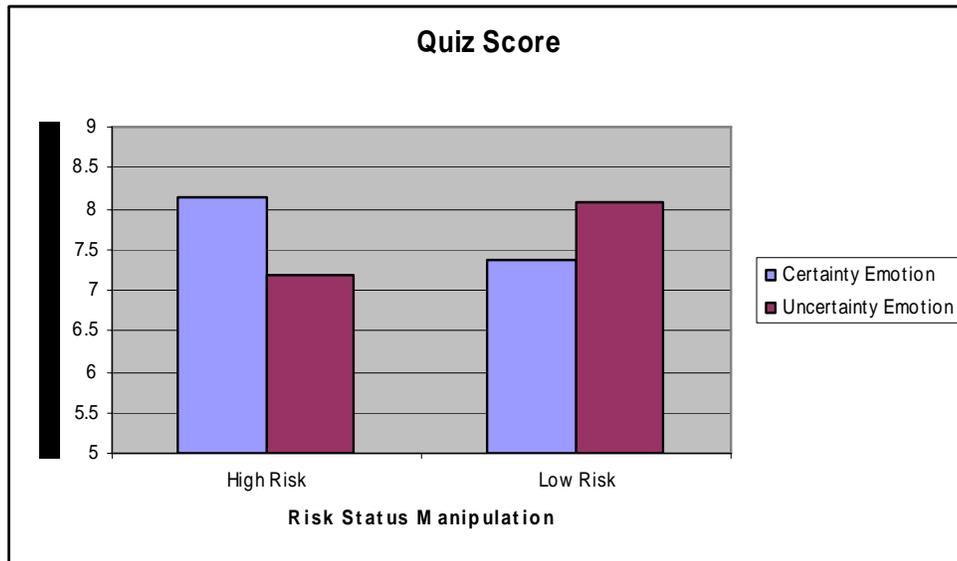
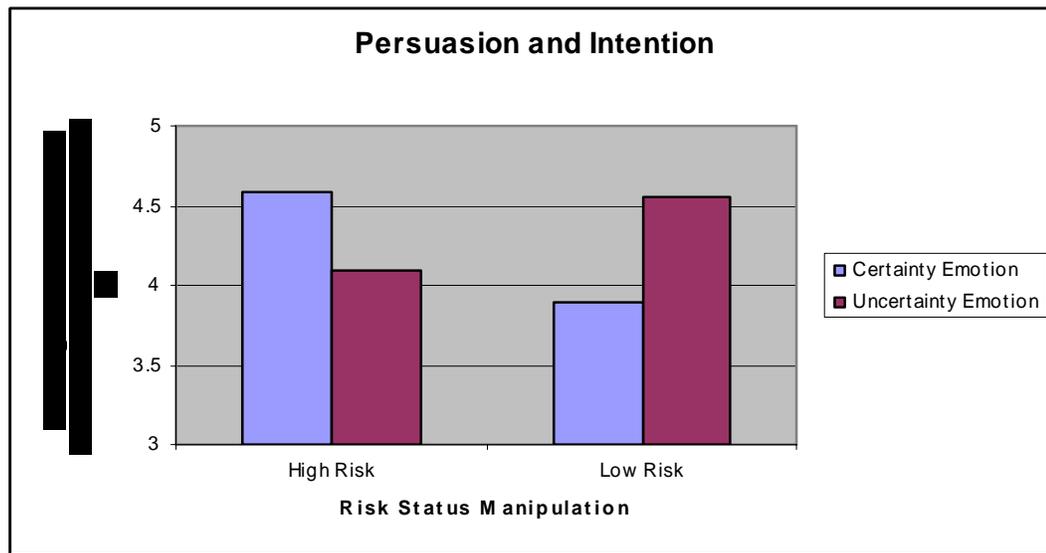


Figure 6: Study 2. Mean persuasion and intention for low and high risk individuals.



The emotions of hope and happiness differ on a number of appraisals including pleasantness (i.e., assessment of positivity and pleasantness), certainty (i.e., evaluation of certainty and confidence), control (i.e., evaluation of perceived personal control over the situation) and intensity (i.e. the strength with which the emotion is felt). Often times, emotions differ on multiple dimensions. Measures of cognitive appraisals may be useful in fleshing out which distinctions account for the effects of discrete emotions on judgment (Lerner and Keltner 2001). Hence, in order to gather some insight as to what characteristics of these emotions might be driving the effects, I examined how each of these composite measures interacted with risk status.

The 2 (High vs. Low Vulnerability – coded as 1, 0) X Composite Certainty Appraisal regression, using the number of thought listings as the dependent variable, revealed a significant interaction (β -estimate=0.90 (0.33), $t(111) = 2.74, p < .01$). As expected, in the low risk condition, the number of message related thoughts increased as

certainty appraisal decreased (β -estimate=-0.51 (0.26), $t(111)=-1.93$, $p<.06$). In other words, as long as the health message was not relevant to the individual, the more uncertainty signaled by the emotion, the more individuals had processed the message. These results are in the same direction with previous findings on certainty appraisal (Tiedens and Linton 2001) and are suggestive of affect as information mechanism (Cohen, Pham and Andrade 2007).

This trend was reversed for individuals in the high risk condition. When health information was relevant, the number of message related thoughts increased with certainty (β -estimate=0.38 (0.20), $t(111)=1.94$, $p<.06$). In other words, when the perceived risk was high, the more confident the person felt, the more he/she processed the message. Perhaps, in line with affect regulation motives, when the message was threatening, its projected impact on the person's affective state became a more relevant concern (Andrade 2004). Hence, in the high risk condition, while individuals feeling uncertain avoid the threatening message to minimize further uncertainty, those who are already feeling confident can focus on the relevant and useful but potentially disturbing health information.

None of the remaining appraisal measures (pleasantness, control) or the extent of emotional intensity interacted significantly with risk status ($p>.3$, $p>.9$, $p>.7$, respectively). The regressions using quiz score measure supported the effect of certainty appraisal. Certainty appraisals interacted with risk status in the same direction ($p<.03$), while pleasantness ($p>.4$), control ($p>.4$) and intensity ($p>.8$) did not. However, none of these interactions were significant for the dependent measure of persuasion and intention (all $p>.2$).

Discussion

Study 2 replicates the results of Study 1 and enhances the generalizability of the results by 1) using a different operationalization of risk status, 2) different certain and uncertain emotions, and 3) a different health issue.

More evidence on the proposed relationship between risk information and certainty appraisal of emotions is presented. Risk status (i.e., the individuals' vulnerability to the threat), interacts with certainty appraisal such that low (high) risk individuals process the message more when they are feeling emotions low (high) on certainty appraisal. These findings provide support for the proposition that certainty-related emotions provide confidence to attend to relevant but threatening information. Whereas, when feeling uncertain emotions, this relevant health information clashes with uncertainty reduction goals, thus depth of processing is limited.

On the other hand, for low risk individuals the message is less consequential. In accord with affect-as-information hypothesis, certainty-associated emotions signal the individual that sufficient confidence is reached and therefore no further processing is necessary while uncertainty-associated emotions signal a necessity of further effort to reach sufficient confidence (Tiedens and Linton 2001). Consequently, in the low risk condition, individuals induced with certainty-related (compared to uncertainty-related) emotions scrutinized the message to a lesser extent.

Results also show that hope and happiness differ on a number of dimensions like pleasantness, perceived control and emotional intensity. This provided an opportunity to present more evidence for the influence of certainty appraisals on message processing.

Post hoc analysis on processing measures (i.e., message related thoughts, quiz score) revealed that in the high risk condition message processing increased with certainty whereas in the low risk condition, people processed the information less as they felt more certain. These findings provide further support for the proposed effect that emotions high on certainty appraisal provide confidence to handle threatening information. They are also in agreement with affect regulation theories that suggest emotions high on uncertainty will activate uncertainty reduction

On the other hand, when the information is not particularly threatening (low relevance condition) high certainty appraisal signals that sufficient certainty has been reached and there is no need for in-depth processing, in agreement with affect as information theories (Bless et al. 1996)

3.7 Study 3 : Positive Health Information and Certainty

Studies 1 and 2 provide evidence that uncertainty emotions activate goals to reduce uncertainty and lead to decreased processing of threatening and relevant information. Certainty related emotions, in contrast, signal confidence and certainty. In turn enable increased processing of threatening information.

Study 3 not only extends the findings to a different health context but also provides evidence that demonstrated effects are indeed a function of the threatening nature of health related information. If the relevant health information was to provide the assurance that uncertainty reduction goals entail, then the effect I find in the high relevance conditions should reverse.

In this study, participants are presented with negative as well as positive information in an essay on caffeine consumption adapted from Raghunathan and Trope (2002). For high caffeine consumers (vs. low consumers), the negative information would be more threatening, whereas positive information would be reassuring. If uncertainty emotions motivate people toward uncertainty reduction, they will not only refrain from threatening information but also will be more likely to gravitate towards reassuring information to restore their certainty. Also, if one feels sufficient confidence, she will attend threatening but useful information rather than positive information which would not be as helpful for protecting herself in the future.

Therefore, it is predicted that when information is relevant, the more certain the person feels, the more he/she will be able to focus on negative but useful information rather than directing his/her attendance toward positive and reassuring information. Therefore, high caffeine consumers feeling certainty related emotions will be able to divert their attention to negative aspects of caffeine consumption. In contrast, uncertainty related emotions will turn their focus away from negative information and towards positive information.

Four negative emotions which range in their certainty appraisal were used in the study: fear, sadness, anger, and disgust. Past research shows that fear is associated with uncertainty (e.g., Lerner and Keltner 2001) and disgust and anger are associated with certainty. Sadness is associated with moderate to low certainty, presumably because certainty is not central for this emotion (Tiedens and Linton 2001; Smith and Ellsworth 1985). Hence, in this study, sadness is used as a moderate-certainty appraisal.

H3: **a)** High caffeine consumers who are feeling angry and disgusted will recall a higher number of negative items compared to positive items. **b)** This trend will be reversed for fearful high caffeine consumers. **c)** Sadness will either show a similar trend to fear or lead to no significant differences between positive and negative recall. **d)** For low caffeine consumers, there will be no significant differences between positive and negative recall.

Method

Participants were 116 undergraduate students who took part in the study to receive course credit. They were randomly assigned to one of four emotion conditions. 2 (fear vs. sadness vs. anger vs. disgust) x 2 (high vs. low relevance) between participants design was used.

Procedure. The cover story was similar to the one used in Agrawal et al. (2007) study. The participants were given the task to evaluate an online travel and lifestyle magazine, named “Live and Uncut” targeted at young adults in the US. In order to evaluate the quality and potential popularity of the magazine, the participants were asked to examine the cover page and two feature articles.

On the cover page was a scenic view from Venice, Italy, as well as headlines for the stories included in this sample issue: (e.g., “Italy's City on Water: Beyond Gondolas, The Grand Canal and St. Marks”, “Are you ready for Spring?”) (Please see Appendix H for the magazine cover).

The first article involved an emotions quiz. This article started with the following statement: “Does emotion help us remember? That's not an easy question to answer, as emotional events can be profoundly multifaceted. It seems that, as a general rule, we remember emotionally charged events better than others. The quiz you are

about to take is designed to provide insight as to how you evaluate emotional situations and how emotional situations map onto your memory. For this purpose, we need you to recall an incident that made you feel very scared/ sad/ angry/disgusted. Please take at least five minutes to visualize this incident as vividly as you can.”

Participants were then instructed to describe this incident in detail. Following this writing task, the participants received the manipulation check questions. Specifically, they were asked about their certainty concerning the situation, which emotions they were feeling, the extent to which they felt the target emotion and other relevant emotions.

The next screen said “Thank you!! As we evaluate your responses, please continue browsing other articles in this issue of “Live and Uncut” and presented the second feature article titled “Caffeine: Friend or Foe?”. This article on caffeine consumption, adapted from the Raghunathan and Trope (2002) study. It consisted of approximately 500 words and was structured into six paragraphs. The first paragraph contained five neutral pieces of information and was followed by five paragraphs that each consisted of one positive and one negative piece of information. This set of five positive, five neutral, and five negative pieces of information had been pretested to establish their valences, as well as the fact that the statements do not contradict with each other.

Dependent variable: Message Recall. In the recall task, participants were asked to recount the pieces of information that they could remember from the essay. The number of correctly recalled positive, negative, and neutral items served as the dependent variable.

After the recall task, participants evaluated the magazine on seven-item Likert scales consisting of items such as “I would be willing to buy this magazine”, “I think this magazine has the potential to be popular among young adults in the United States” I think the essay was well written.”

Caffeine Consumption. Following the magazine evaluation, participants were asked about their caffeine consumption. Participants were given a three-item questionnaire that elicited their per-day consumption of coffee, tea, and caffeine containing soda and their subjective assessment their caffeine consumption. Participants indicated their consumption of coffee, tea, and soda by selecting the appropriate number of cups/cans of each (ranging from 0 to 10) that they consumed per day. The average total score on these three items ($M=4.81$, $SE=1.68$) was used to categorize participants into two risk groups (high and low risk individuals), according to a median split on level of caffeine consumption.

Results

Certainty Appraisal. (*Chronbach's alpha* =: 0.80) The certainty appraisal was measured using the same items as in the previous studies. A one way 4 (Emotion) ANOVA was significant, $F(1,115) = 7.06$, $p < .001$. As expected, fear was rated lowest on the certainty appraisal ($M_{\text{fear}} = 4.42$, $SE = 0.47$), followed by sadness ($M_{\text{sadness}} = 5.47$, $SE = 0.57$), anger ($M_{\text{anger}} = 6.32$, $SE = 0.44$), finally disgust was rated highest on the certainty appraisal ($M_{\text{disgust}} = 7.10$, $SE = 0.38$).

To assess preference of positive items over negative ones, first standardized scores for positive and negative items were formulated. A difference score calculated by subtraction the standardized positive item recall from the standardized negative item recall served as the measure of inclination toward positive rather than negative information.

A 2 (high vs. low risk group) x 4 (Emotion) ANOVA revealed a significant interaction between risk group and emotion condition, $F(1,112) = 3.79, p < .05$. Follow up analysis revealed that for low risk individuals the emotional condition did not have a significant effect on the standardized difference score between positive and negative recall, $F(1,112) = 1.79, p > .1$.

A difference score was calculated by subtracting the standardized positive item recall from the standardized negative item recall served as the measure of inclination toward positive rather than negative information. For high risk individuals, the effect of emotional condition on the standardized difference score was significant $F(1,112) = 15.25, p < .0001$, but it was not for low risk individuals ($p > .1$) (H3d supported).

Individual t-tests showed that positive information had a recall advantage under the uncertainty related emotion (i.e., fear) condition ($M_{\text{positive}} = 2.85, M_{\text{negative}} = 1.85, t(12) = 3.95, p < .002$, H3a supported). This effect is reversed for the certainty related emotions disgust ($M_{\text{positive}} = 1.32, M_{\text{negative}} = 2.50, t(16) = -5.27, p = .0001$) and anger ($M_{\text{positive}} = 1.30, M_{\text{negative}} = 1.95, t(19) = 3.11, p < .006$, H3b supported). Lastly, individuals feeling sad (moderate certainty), recalled more positive information ($M = 1.50$) as compared to negative information ($M = 1.80$), but this difference was not significant ($p > .3$) (H3c supported)

Table 3a: Study 3. Mean recall of positive and negative items in high risk individuals

| Emotion | Mean Positive Recall | Mean Negative Recall | DF | t-value | p-value |
|---|-----------------------------|-----------------------------|-----------|----------------|----------------|
| Fear (Low Certainty) | 2.85 (0.25) | 1.85 (0.28) | 12 | 3.95 | 0.0019 |
| Sadness (Moderate / Low Certainty) | 1.80 (0.29) | 1.50 (0.32) | 13 | 0.90 | 0.3938 |
| Disgust (High Certainty) | 1.32 (0.19) | 2.50 (0.22) | 16 | -5.27 | 0.0001 |
| Anger (High Certainty) | 1.30 (0.20) | 1.95 (0.23) | 19 | -3.11 | 0.0057 |

Table 3b: Study 3. Mean recall of positive and negative items in low risk individuals

| Emotion | Mean Positive Recall | Mean Negative Recall | DF | t-value | p-value |
|---|-----------------------------|-----------------------------|-----------|----------------|----------------|
| Fear (Low Certainty) | 2.12 (0.25) | 1.71 (0.27) | 16 | 2.13 | 0.0486 |
| Sadness (Moderate / Low Certainty) | 1.50 (0.33) | 1.70 (0.35) | 11 | -0.51 | 0.6193 |
| Disgust (High Certainty) | 1.74 (0.22) | 2.09 (0.23) | 16 | -1.28 | 0.213 |
| Anger (High Certainty) | 1.43 (0.28) | 1.64 (0.30) | 13 | -1.00 | 0.3356 |

Figure 7a: Study 3. Mean recall of positive and negative items in the low risk group

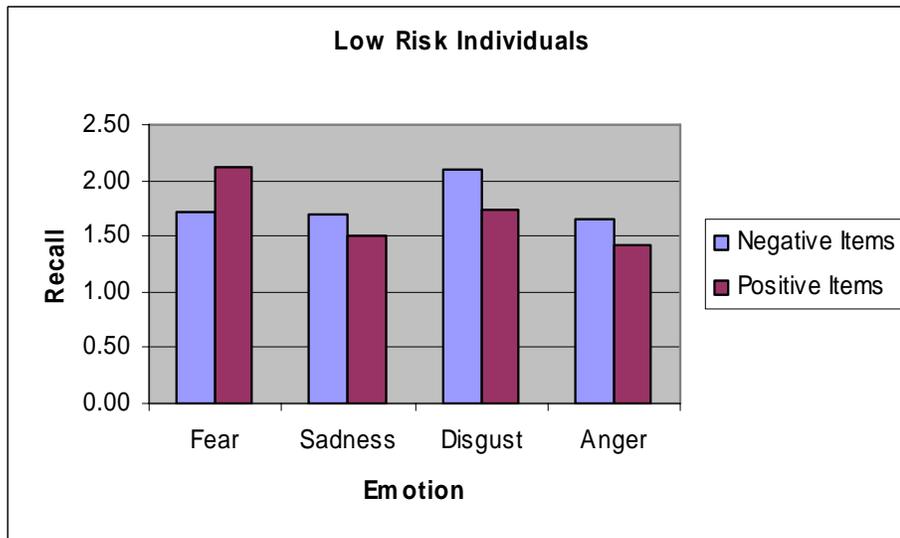
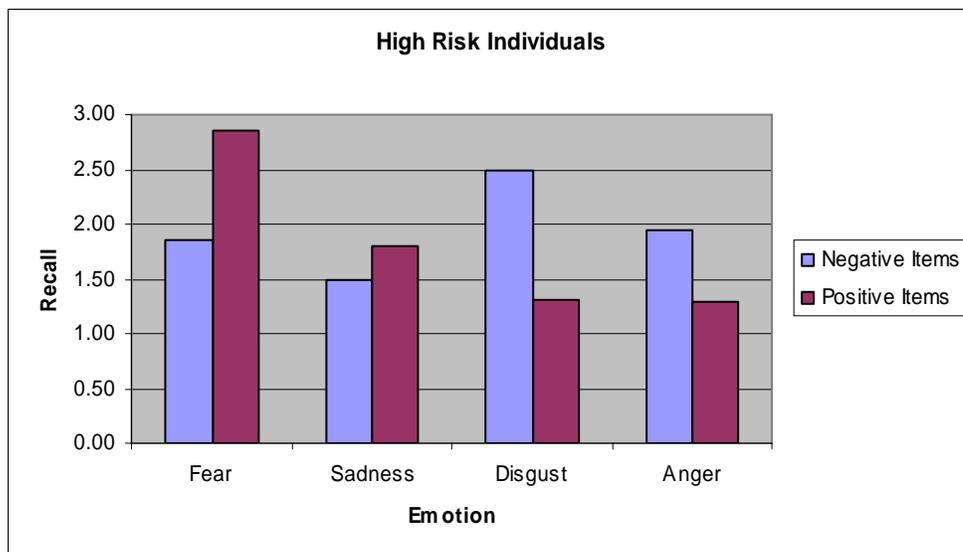


Figure 7b: Study 3. Mean recall of positive and negative items in the high risk group



Discussion

This study provides further evidence that the certainty appraisal components of emotions affect risk information process. This study extends previous findings which involved threatening information to reassuring positive information. For high caffeine consumers, uncertain emotions lead to a higher recall of positive information about caffeine consumption whereas certainty related emotions lead to higher recall of negative (compared to positive) information. When certainty appraisal is moderate, on the other hand, no significant differences between positive and negative recall were detected. Overall, the results show that recall advantage negative information over positive information increased with certainty appraisal, supporting the proposition that uncertainty emotions impede processing risk information while certainty emotions facilitate it. Uncertainty related emotions motivate people not only to avoid threatening information but also to seek reassuring information, while certainty emotions provide the confidence to deal with negative information. The non significant effects for low risk individuals are in the same direction with the effect demonstrated in the high risk condition. This might be because even though they might fall under the mean value some participants may still feel like they are not largely clear of the risks of caffeine and therefore feel like the caffeine message is still relevant to some extent – therefore leading to a similar but not as strong effects on high consumers of caffeine.

CHAPTER 4

4.1 Certainty Appraisal and Response Efficacy: Study 5 and Study 4

The studies in the second section aim to provide further support for the proposition that emotional certainty provides the confidence to attend potentially useful but less reassuring health information. On the other hand, when discrete emotions signal uncertainty, a less desirable state (Eagly and Chaiken 1993), activates emotional regulation motives to reduce uncertainty and gain reassurance at the expense of health information. These studies aim to demonstrate the proposed effects of certainty related and uncertainty related emotions using a different set of message characteristics.

Specifically, Study 4 and Study 5 focus on response efficacy, which is the effectiveness of health recommendations advocated in a health message. High efficacy information signals that the recommendations in the message are highly likely to avert the health threat, while low efficacy signals that even though one was to follow these recommendations, protection is not guaranteed.

The objective of these studies is to understand the relationship between high versus low efficacy information and certainty appraisal. Specifically, they aim to demonstrate how efficacy and emotional certainty interact to influence message processing (Study 4, Study 5) and to provide some evidence regarding the underlying mechanisms which may be driving the demonstrated effects (Study 5).

Even though perceived efficacy of protection methods (i.e., response efficacy) is a substantial part of health communications (Witte and Allen 2000), it has rarely been the focus of the existing works on emotions and health communications. Some exceptions

exist, including the research on fear appeals that often finds that high efficacy information boosts the effectiveness of highly threatening messages (Maddux and Rogers 1983).

4.2 Protection Motivation Theory

The role of efficacy information in health communications is foremost emphasized by Protection Motivation Theory (PMT, Rogers 1975 1983). According to PMT, health messages drive the person to assess communication variables separately. It aims to pinpoint the precise aspects of a health message that influence message effectiveness. To this end, PMT specifies distinct categories of information (1) the severity of the health threat, (2) one's vulnerability to this threat, (3) how efficacious the alternative advocated behavior is at averting the threat.

Severity of the threat is manifested in the description of the adverse health outcomes and to what extent they are perceived as scary and dangerous (e.g., "Chlamydia leads to infertility") while vulnerability is one's susceptibility to the threat, in other words, the likelihood of being affected by the health threat (e.g., "Individuals under 25 are at particularly high risk for infection; as many as one in ten young adults test positive for Chlamydia").

Efficacy, or response efficacy, to be specific, on the other hand, involves perceived effectiveness of the recommendations provided to avert the threat (e.g., "Condoms effectively prevent Chlamydia contraction"). Thus, efficacy information comprises the individual's assessment regarding the success of the response in preventing the threat. Highly efficacious recommendations are more likely to prevent an aversive threat (e.g., If you use condoms, there is a 99% likelihood that you will prevent

pregnancy”) while low efficacious recommendations are less likely to do so.

Consequently, high efficacy messages reassure the individual that there are efficacious ways to protect one’s self whereas low efficacy information convey ambiguity about the outcomes of recommendations advocated in the health message.

4.3 Efficacy and Information Processing

Past research has studied the effects of efficacy on extent of processing. Some studies suggest that conditions of low efficacy leads to more in-depth processing in comparison to high efficacy. Specifically, low efficacy conveys ambiguity as to the instrumentality of the behaviors in producing the desired outcome. Individuals who are motivated to find a solution (i.e., a way to protect themselves) to health threat face the challenge of making an assessment of the tradeoffs and deciding whether to comply with the message. This challenging task calls for more effort –and therefore increased message processing- when the individual is motivated to protect himself from the health threat in the long run (Gleicher and Petty 1992; Block and Keller 1995). Hence, if one’s central goal is self protection in the long run, she/he would be more likely to process a low efficacy message in comparison to a high efficacy message.

In this research, it is proposed that emotions which signal certainty about the situation will provide the necessary confidence to focus on the long term goal of protecting himself in spite of the adverse immediate effects of the health message. In other words, individuals who are feeling certain (compared to uncertain) will be rather indifferent to the consequences of high efficacy messages (e.g., reassurance) and low efficacy messages (i.e., further uncertainty), and thus can focus on this task to assure long

term health benefit. Taken together, these arguments would suggest that, under certainty related emotions, individuals should process low efficacy health messages to a greater extent than high efficacy messages.

On the other hand, emotions which are associated with uncertainty trigger goals of uncertainty reduction (Raghunathan and Pham 1999; Raghunathan, Pham, and Corfman 2006). In this case, suggestive of an affect regulation framework, high and low efficacy information will serve as cues about the affective consequences of the health message. Specifically, low efficacy signals unpredictability about the effectiveness of recommendations, therefore potentially hampering to the goal of uncertainty reduction. On the contrary, high efficacy, suggesting highly effective methods and therefore predictable outcomes, likely provides the sought for assurance (Nabi 2002). Consequently, when feeling emotions with a high uncertainty component, individuals will attend the message if it offers reassurance by useful and valid recommendations. Therefore, participants who are induced with uncertainty related emotions will process a high efficacy message more in comparison to low efficacy messages.

These predictions taken together propose that,

H4: When feeling uncertainty (certainty) related emotions, participants will process the high (low) efficacy message to a greater extent compared to the low (high) efficacy message.

4.4 Study 4: Certainty Appraisal and Response Efficacy

For a high (low) efficacy message, the participants who are induced with uncertainty related emotions will be more (less) likely to scrutinize the message compared to participants who are induced with certainty related emotions.

The objective of Study 4 is to test whether individuals induced with uncertainty associated emotions will process a high efficacy message to a greater extent compared to a low efficacy measure.

A 2 (Certainty Emotion: anger vs. Uncertainty Emotion: worry) X 2 (High-efficacy message vs. Low-efficacy message) between participants design was employed.

Procedure

Sixty undergraduate students participated in this study for extra credit. Like in Study 1 and 2, the participants were told that they would participate in two unrelated studies during the experiment: the emotional life event task and the second study that involves reading an article related to Hepatitis C.

The Chlamydia article was identical to the one used in Study 1. Before viewing the article, participants were informed that this second study involved reading an article related to Chlamydia and they were about to read was adapted from an article published in a medical journal in 2006.

In addition, the efficacy information was briefly given in the introduction so that the participants would know what to expect (Block and Keller 1995). Specifically, the participants in the low (high) efficacy condition read the following: “Health authorities

report that the prevention recommendations provided in this article can reduce your risk of contracting Chlamydia by 40% (90%).”

At the end of the experiment, all participants in all conditions were debriefed. They were explained that the effectiveness percentages of the message recommendations are fictitious and actually the methods provided in the message are highly effective and certain. They also received an apology for the use of deception and an explanation why it was necessary. Further, the participants were offered a chance to ask any questions to the experimenter and were reminded of their right to have their data/information destroyed instead of used for data analysis (please see Appendix G for the debriefing form).

Outcome Measures

Message Related Thoughts. After reading the article the participants were instructed to list the thoughts that crossed their minds as they read the article. The extent of message processing was measured using the same procedure as Study 1. The number of thought listings relevant to the message was reported as the message processing measure.

Manipulation Checks

Emotion Manipulation Checks

Certainty Appraisals. As expected, certainty related emotions were higher on the certainty appraisal (Cronbach's alpha = 0.77) compared to uncertainty related emotions $F(1, 59) = 30.00, p < .001$. Participants who were induced to feel worry ($M = 4.57, SE = 0.36$) had lower ratings of certainty than did those who were induced to feel anger ($M = 7.39, SE = 0.37$).

Pleasantness Appraisals. There were no significant differences in the pleasantness appraisal (Cronbach's alpha = 0.91) for induced worry ($M = 1.59, SE = 0.16$) and anger ($M = 1.67, SE = 0.16$), $F(1, 59) = 30.00, p > .70$.

Efficacy Manipulation Checks

The manipulation checks included check for efficacy, which was expected to yield different results for the low and high efficacy conditions as well as checks for perceived severity and vulnerability which were expected to be not significantly different for the two conditions.

Perceived Efficacy. The participants answered three checks on perceived efficacy: 2 questions regarding the perceived effectiveness of the recommendations –one was asked right after the message introduction and the other was asked after the participants had read the whole message- and a multiple choice question as a recognition measure for the manipulation. The responses in the high and low efficacy conditions were significantly different in the expected directions, indicating that the efficacy manipulation was successful.

The questions and one way ANOVA results using efficacy condition as the independent variable are as follows in respective order:

1) Following the prevention recommendations is important in reducing the risk of Chlamydia (7 point scale; 1: Strongly Disagree, 7: Strongly Agree), $F(59, 1) = 14.36, p < .001$ $M_{\text{high efficacy}} = 5.19 (0.27)$. $M_{\text{low efficacy}} = 3.72 (0.28)$.

2) Following the prevention recommendations in this article are not useful because I may not be able to prevent Chlamydia even if I did them (7 point scale; 1:

Strongly Disagree, 7: Strongly Agree, reverse coded), $F(59, 1) = 20.94, p < .001, M_{\text{high efficacy}} = 4.61 (0.28), M_{\text{low efficacy}} = 2.76 (0.29)$.

3) Clinical studies show that the recommendations in the article I have read would reduce my risk of contracting Chlamydia by (11 point scale: 0: 0% - 10: 100%), 80% of the respondents were able to give the exact correct answer to the question -48 out of 60 - (low efficacy condition: 40% vs. high efficacy condition: 90%).

Perceived Vulnerability. The manipulation check question for perceived vulnerability was: “How vulnerable do you think you are to contracting Chlamydia? (from 0 to 100 indicating your chance of actually getting the disease)” (11 point scale: 0: 0% - 10: 100%), $F(59, 1) = 0.58, p > .4$.

Perceived Severity. Perceived severity was measured on a two-item scale that asked participants to rate the extent to which Chlamydia is frightening and severe. These were collapsed to a single measure (Cronbach’s Alpha= 0. 81). There were no significant differences in perceived severity between the two message conditions (high vs. low efficacy). $F(59, 1) = 0.20, p > .6$

Other Measures. The participants also responded to questions regarding their extent of prior knowledge of Chlamydia, experience with Chlamydia (i.e., whether themselves, partners or any friends had ever been diagnosed with Chlamydia), whether they were ever tested for Chlamydia, the familiarity of information conveyed in the message, how often they use condoms, total number of sexual partners, and gender. Separate ANCOVAs were conducted using each of these potential covariates. None of these yielded significant effects.

Results

A 2 (response efficacy: high vs. low) x 2 (emotion: certainty vs. uncertainty related) ANOVA was conducted for message recall, $F(1, 59) = 9.12, p < .02$.

As hypothesized, when the participants were induced with uncertain emotion, they scrutinized the high efficacy message compared to the low efficacy message. Moreover, as hypothesized, there were no differences in message scrutiny when the participants were induced with certainty related emotions.

Follow up contrasts revealed that for uncertainty emotion condition, message recall was higher in high efficacy message condition ($M_{\text{low efficacy}} = 3.20, M_{\text{high efficacy}} = 4.57; F(1, 59) = 5.84, p < .05$). An opposite trend was present for those who were induced with certain emotions, ($M_{\text{high efficacy}} = 3.33, M_{\text{low efficacy}} = 5.00$), $F(1, 59) = 3.70, p < .05$.

Discussion

The results of study 4 suggest that when consumers are feeling uncertainty related emotions, they process messages which carry high response efficacy information more extensively. Presumably, feeling uncertainty related emotions created a motivation for seeking reassurance and which is provided by highly effective prevention recommendations. Hence, the results of this study show that induction of the uncertainty related emotion (i.e., worry) results in increased processing when the message is expected to provide high response efficacy information.

This effect was reversed when a negative but certain emotion (i.e., anger) was induced. Individuals who were feeling certain already did not differentiate in their extent of processing high versus low efficacy messages. Perhaps, these participants do not

refrain from processing the low efficacy message more, perhaps with anticipation of finding a way to protect themselves (Gleicher and Petty 1992), whereas in the high efficacy message condition this extra effort is not necessary. Uncertain individuals on the other hand are interested in restoring their certainty, and will attend to the message which guarantees such restoration (i.e., high efficacy) and will refrain from a message which would cause further uncertainty (i.e., low efficacy)

4.5 Study 5: The Mediation of Response Efficacy

Study 5 extends the results of Study 4 by 1) including emotions that vary on both certainty and valence dimensions (i.e., happiness, hope, anger and worry), 2) broadening the range of dependent variables by measuring message persuasion, 3) focusing on a different health issue: Hepatitis C. Furthermore, it provides some evidence for the processes underlying the demonstrated effects.

Similar to Study 4, it is hypothesized that individuals induced with uncertainty are motivated toward reassurance and therefore prefer a high efficacy message over a low efficacy message. On the other hand, individuals who are feeling certain already are not driven by the anticipated reassurance but by the informational benefit of relevant health information. As the strategy to accomplish long term health goals is not guaranteed in the low efficacy message, it will be processed more by the individuals in the certainty emotions condition.

According to the affect regulation based proposition that uncertainty emotions evoke uncertainty reduction motives, they lead to a higher processing of reassuring high efficacy messages. Contrarily, low efficacy message is expected to provide no

reassurance but only further uncertainty, and are therefore avoided. Hence, the demonstrated effects are due to the differences in expected reassurance from the high (vs. low) efficacy messages. Study 5 tests this proposition via a mediational analysis.

Procedure

One hundred and fifty eight undergraduate students participated in this study for extra credit. Like in Study 4, the participants were told that they would participate in two unrelated studies during the experiment: the emotional life event task and the health related article.

Following emotion induction, the participants were instructed to continue to “the second study” and were introduced to the message about Hepatitis C.

Article on Hepatitis C. The Hepatitis C article was identical to the one used in Study 2. Before viewing the article, participants were informed that this second study involved reading an article related to Hepatitis C prevalence, symptoms and prevention methods. They were also informed that the article which they were about to read was adapted from an article published in a medical journal in 2006.

In addition, the efficacy information was briefly given in the introduction so that the participants would know what to expect (Block and Keller 1995). Specifically, the participants in the low (high) efficacy condition read the following: “Health authorities report that the prevention recommendations provided in this article can reduce your risk of contracting Hepatitis C by 40% (90%).”

After reading the article the participants were instructed to list the thoughts that crossed their minds as they read the article. The questionnaires following the thought

listings involved a quiz related to the article, questions related to persuasion and behavioral intentions pertaining to Hepatitis C, other questions about the participant's current behaviors that might put them at risk for Hepatitis C.

At the end of the experiment, all participants in all conditions were debriefed. They were explained that the effectiveness percentages of the message recommendations are fictitious and actually the methods provided in the message are highly effective and certain. They will also receive an apology for the use of deception explanation of why it was necessary and were be offered a chance to ask any questions to the experimenter and were reminded of their right to have their data/information destroyed instead of used for data analysis (please see Appendix G for the debriefing form).

Manipulation Checks

Emotion Manipulation Checks

The emotion manipulation checks were identical to those in Study 2. The certainty and pleasantness measures were internally valid (Certainty: Cronbach's alpha = 0.79; Pleasantness: Cronbach's alpha = 0.91).

Certainty Appraisals. As expected, certainty related emotions were higher on the certainty appraisal compared to uncertainty related emotions $F(1, 154) = 46.39, p < .0001$. Participants who were induced to feel hope ($M_{hope} = 6.18, SE = 0.33$) and worry ($M_{worry} = 5.32, SE = 0.31$) had lower ratings of certainty than did those who were induced to feel anger ($M_{anger} = 7.30, SE = 0.31$) and happiness ($M_{happiness} = 8.48, SE = 0.31$). A 2 (valence) X 2 (certainty) ANOVA revealed no significant interaction between valence and certainty $F(1, 154) = 0.28, p > .5$. The main effect of valence was

also significant, positive emotions were associated with higher certainty than negative emotions, $F(1, 154) = 10.50, p < .005$.

Pleasantness Appraisals. As expected positive emotions resulted in higher ratings on the pleasantness measure $F(1, 154) = 304.87, p < .0001$. Participants who were induced to feel hope ($M = 6.44, SE = 0.37$) and happiness ($M = 10.16, SE = 0.34$) had higher ratings of pleasantness than did those who were induced to feel anger ($M = 2.43, SE = 0.34$) and worry ($M = 1.98, SE = 0.34$).

Efficacy Manipulation Checks

The manipulation checks included check for efficacy, which was expected to yield different results for the low and high efficacy conditions as well as checks for perceived severity and vulnerability which were expected to be not significantly different for the two conditions (Block and Keller 1995).

Perceived Efficacy. The participants answered three checks on perceived efficacy: two questions regarding the perceived effectiveness of the recommendations –one was asked right after the message introduction and the other was asked after the participants had read the whole message- and one multiple choice question as a recognition measure for the manipulation (Block and Keller 1995). The responses in the high and low efficacy conditions were significantly different in the expected directions, indicating that the efficacy manipulation was successful. The questions and one way ANOVA results using efficacy condition as the independent variable are as follows in respective order:

1) Following the prevention recommendations is important in reducing the risk of Hepatitis C (11 point scale; 1: Strongly Disagree, 11: Strongly Agree), $F(156, 1) = 21.08$, $p < .001$, $M_{\text{high efficacy}} = 6.53 (0.23)$. $M_{\text{low efficacy}} = 4.99 (0.24)$.

2) Following the prevention recommendations in this article are not useful because I may not be able to prevent Hepatitis C even if I did them (7 point scale; 1: Strongly Disagree, 7: Strongly Agree, reverse coded), $F(156, 1) = 12.50$, $p = .0005$, $M_{\text{high efficacy}} = 5.52 (0.16)$, $M_{\text{low efficacy}} = 4.72 (0.16)$.

3) Clinical studies show that the recommendations in the article I have read would reduce my risk of contracting Hepatitis C by (11 point scale: 0: 0% - 10: 100%), $F(156, 1) = 184.42$, $p < .0001$. The participants in the high efficacy condition ($M = 8.02 (0.20)$) assessed this percentage likelihood as being higher compared to the participants in the low efficacy condition ($M = 4.17 (0.21)$). 79% of the respondents were able to give the exact correct answer to the question (low efficacy condition: 40% vs. high efficacy condition: 90%).

Perceived Vulnerability. The manipulation check for perceived vulnerability used the following question: “How vulnerable do you think you are to Hepatitis C? (from 0 to 100 indicating your chance of actually getting the disease)” (11 point scale: 0: 0% - 10: 100%), $F(156, 1) = 0.39$, $p > .5$

Perceived Severity. Perceived severity was measured on a two-item scale that asked participants to rate the extent to which Hepatitis C is frightening and severe. These were collapsed to a single measure ($\alpha = 0.76$). There were no significant differences in perceived severity between the two efficacy conditions $F(156, 1) = 2.25$, $p > .2$.

Outcome Measures

Message Related Thoughts. The extent of message processing was measured using the same procedure as Study 1. The number of items in the relevant category was recorded as the message related thoughts. Initial intercoder reliability was 95% and differences were settled through discussion.

Persuasion and Intention Index. In order to measure message effectiveness, the participants indicated their agreement with the following statements regarding the influence of the message. (Scale: 1 (strongly disagree) to 7 (strongly agree))

In order to measure message effectiveness, the participants indicated their agreement with the following statements regarding the influence of the message. (Seven point scale)

1. The article convinced me that Hepatitis C infection can lead to serious health problems
 2. I should contact my healthcare provider to test for Hepatitis C infection.
 3. Hepatitis C infection is not an important issue that I should think about.
- (R)
4. The article was important in persuading me to follow the prevention recommendations
 5. I will not share manicure, pedicure or grooming products with any one.
 6. I will follow the recommendations in the article.

These items were combined to create a single measure of persuasion and intention (Cronbach's alpha =0.75).

Other Measures. The questionnaire ended with a number of possible covariates: extent of prior knowledge of Hepatitis C, experience they had with Hepatitis C (i.e.,

whether themselves or any friends had ever been diagnosed with Hepatitis C), whether they were ever tested for Hepatitis C, how often they use condoms, total number of sexual partners, how often they share personal grooming products with other people, how many times they have gotten tattoos or piercings, how often they get a professional manicure or pedicure, age and gender. ANCOVAs were conducted using each of these potential covariates.

For the persuasion and intentions measure, condom use ($F=10.71$, $p=0.001$), number of sexual partners ($F=8.82$, $p<.005$) and the frequency of sharing grooming products ($F=4.18$, $p<.05$) yielded significant effects and therefore were used as covariates for persuasion and intentions.

Results

Three separate 2 (valence: positive vs. negative) x 2 (certainty appraisal: certainty related vs. uncertainty related) x 2 (efficacy: high vs. low efficacy) ANOVAs or ANCOVAs were conducted for each of the dependent measures (i.e., message recall, persuasion and intention, and quiz). The ANOVA on the number of message relevant thoughts yielded only a significant interaction of certainty and level of efficacy $F(1, 148) = 11.12$, $p = .001$. Follow up contrasts revealed that the effects were in the hypothesized directions. Under uncertainty emotions, individuals listed higher number of thoughts when the efficacy of the response measures were high ($M_{\text{low efficacy}} = 3.52 (0.49)$, $M_{\text{high efficacy}} = 5.31 (0.50)$; $F(1, 148) = 6.56$, $p = .01$). The opposite was true for the certainty related emotion condition ($M_{\text{low efficacy}} = 3.45 (0.45)$, $M_{\text{high efficacy}} = 4.89 (0.50)$; $F(1, 148) = 4.61$, $p < .05$). (please see Figure 9).

Results of the three-way ANCOVA for the message persuasion and attitude index showed a similar pattern; only the interaction of certainty and efficacy was significant $F(1, 148) = 11.10, p = .001$. Frequency of condom use ($F = 9.83, p = 0.001$), number of sexual partners ($F = 8.82, p < .005$) and the frequency of sharing grooming products ($F = 4.18, p < .003$) were used as covariates for this measure. As expected, when feeling uncertainty emotions, individuals were more persuaded by the high efficacy message ($M_{\text{low efficacy}} = 5.84 (0.13), M_{\text{high efficacy}} = 6.28 (0.13); F(1, 148) = 5.88, p = .01$). In contrast, while feeling certain this effect was reversed ($M_{\text{low efficacy}} = 6.20 (0.13), M_{\text{high efficacy}} = 5.86 (0.13); F(1, 148) = 3.88, p = .05$) (please see Figure 8).

Results of the quiz score revealed both a 2 way interaction between certainty and efficacy $F(1, 148) = 2.99, < .09$ and a 3 way interaction between valence, certainty and efficacy $F(1, 148) = 5.66, p < .05$. Further analysis revealed that for positive emotions (hope vs. happy) the effects were in the predicted direction and were significant for hope ($M_{\text{low efficacy}} = 5.78 (0.38), M_{\text{high efficacy}} = 7.50 (0.40); F(1, 148) = 9.67, p < .003$) but not for happy ($p > .2$). On the other hand, for negative emotions (worry vs. anger) no contrasts were significant (all $p > .1$).

Finally, a 2 (response efficacy: high vs. low) x 2 (emotion: certainty vs. uncertainty related) MANOVA was also conducted for the following three dependent variables: thought listings, accuracy in the quiz, message persuasion and intention to follow recommendations in the article $F(1, 152) = 4.78, p < .005$.

Figure 8: Study 5- Persuasion and Intention Index related to the message for low and high efficacy.

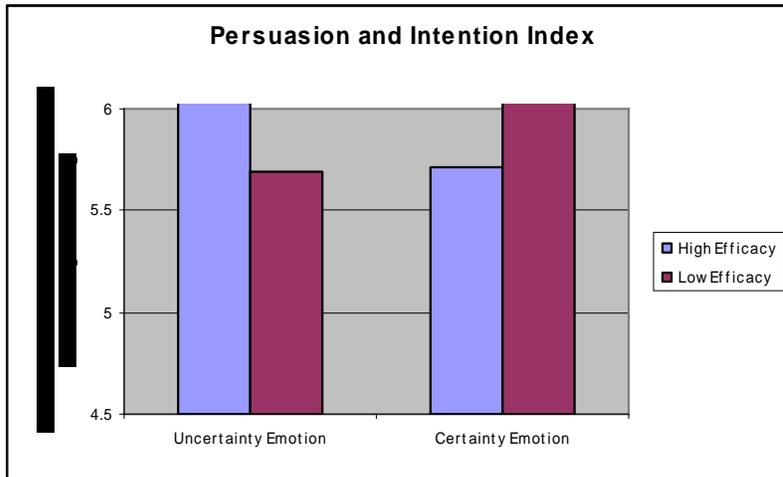
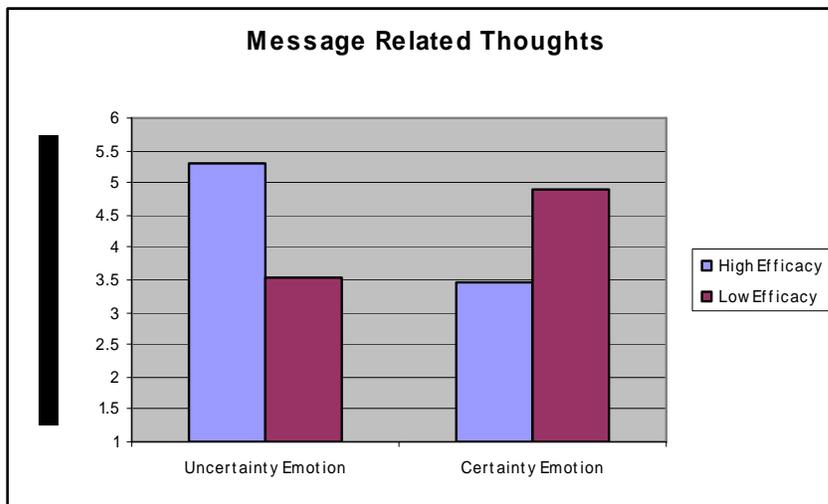


Figure 9: Study 5 - Mean number of thoughts related to the message for low and high efficacy.



Mediation Analysis

This research posits that for the participants induced with uncertainty related emotions, the effect of response efficacy is a result of the expected reassurance from the message. If the message's anticipated impact on certainty plays this role, then the expectation of reassurance should statistically mediate the relationship between efficacy and the scrutiny effects.

This approach suggests that when feeling uncertainty related emotions, individuals strive for stimuli which will restore their certainty. As previously mentioned, high response efficacy has been found to provide reassurance while low response efficacy is likely to increase uncertainty even further. As a result, when feeling uncertain emotions individuals read a potentially reassuring (high efficacy) message more than they would read an uncertainty raising (low efficacy) message.

Naturally, this effect of efficacy and the mediation of reassurance expectancy should exist only in the uncertainty emotions condition. Induced with certainty emotions, individuals feel certain and confident and do not feel the necessity for reassurance.

Mediational analysis was conducted following the procedures outlined by Baron and Kenny (1986). If reassurance expectancy mediates the relationship between efficacy and message scrutiny, then when both reassurance expectancy and efficacy are simultaneously used as predictors for the message scrutiny outcome measures, only the coefficient for the ratings of reassurance expectancy should be significant (Baron and Kenny 1986).

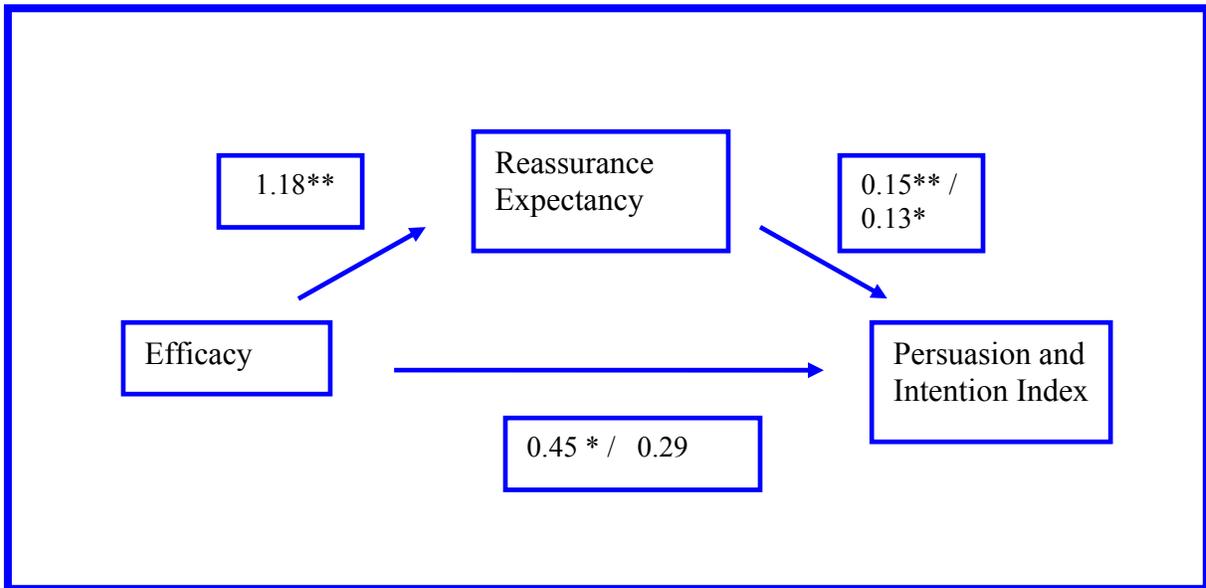
Reassurance Expectancy

The extent to which the participants expect the upcoming message to be reassuring was measured using two questions: 1) “I would expect this health article to be” (11 point Likert scale: 1- Extremely Reassuring 11- Not Reassuring at all); 2) “I expect the article to make me feel certain about my health” (11 point Likert scale: 1- Strongly Agree 11- Strongly Disagree). These assessments were combined to form a single reassurance expectancy measure (Cronbach’s Alpha =0.71).

Using only the data from the uncertainty condition ($n = 73$), four regressions were run for the two outcome measures of thought listings and persuasion and intention index.

First (a), the outcome (dependent) variable (i.e., Persuasion and Intention Index) was regressed on the independent variable (response efficacy low=0, high=1) and this effect was significant ($R^2 = .052$, $B = 0.45$, $t=1.99$, $p = .05$). Second (b), the outcome (dependent) variable was regressed on the mediator (reassurance expectancy) ($R^2 = .11$, $B = 0.15$, $t=2.89$, $p = .005$). Third, (c) the mediator (reassurance expectancy) was regressed on the independent variable (response efficacy). The effect of efficacy on reassurance expectancy was significant ($R^2 = .08$, $B = 1.18$, $t=2.51$, $p = .01$). Lastly, (d) the outcome variable was regressed on both the independent variable and the mediator. In this case the efficacy measure became non-significant ($B = .29$, $t=1.28$, $p>.2$) but reassurance expectancy remained significant ($B = .13$, $t=2.42$, $p < .02$), $R^2 = .13$. Please see Figure 10 for an illustration of this mediation.

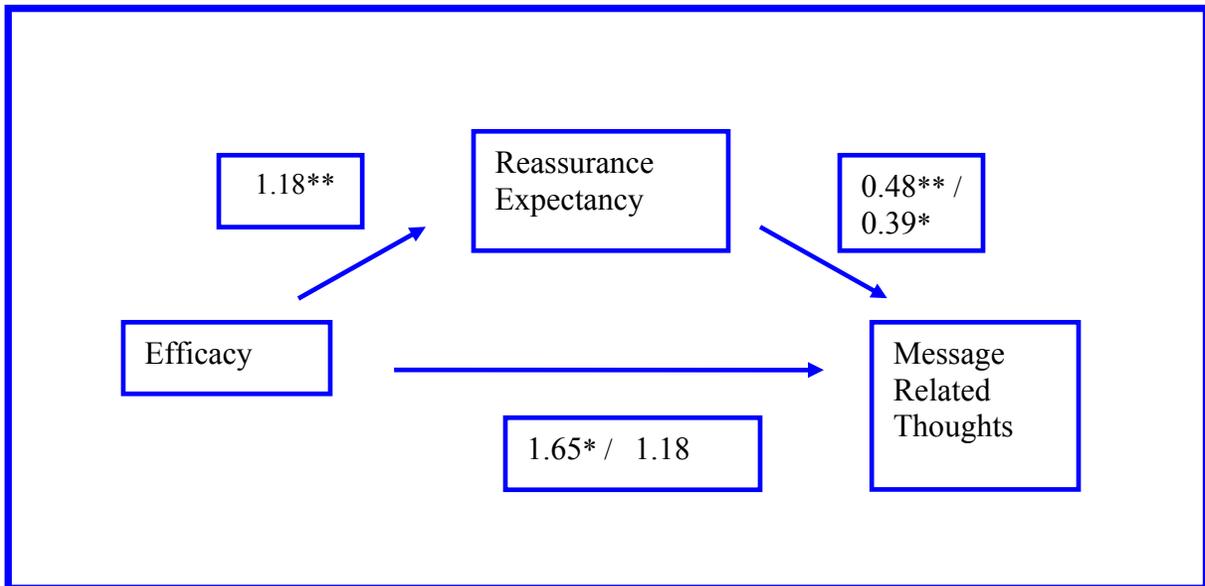
Figure 10: Mediation of Reassurance Expectancy using Persuasion and Intention Index as outcome measure (for uncertainty emotions condition). * $p < .05$, ** $p < .005$



The same procedure was followed to demonstrate mediation for the thought listing measure. First (a), the outcome (dependent) variable (i.e., message related thoughts) was regressed on the independent variable (response efficacy low=0, high=1) and this effect was significant ($R^2 = .07$, $B = 1.65$, $t=2.38$, $p = .02$). Second (b), the outcome (dependent) variable was regressed on the mediator (reassurance expectancy) ($R^2 = .11$, $B = 0.48$, $t=2.92$, $p < .005$). Third, (c) the mediator (reassurance expectancy) was regressed on the independent variable (response efficacy). The effect of efficacy on reassurance expectancy was significant ($R^2 = .08$, $B = 1.18$, $t=2.51$, $p = .01$)-same as above-. Lastly, (d) the outcome variable was regressed on both the independent variable and the mediator. In this case the efficacy measure became non-significant ($B = 1.18$, $t=1.68$, $p=.1$) but reassurance expectancy remained significant ($B = 0.39$, $t=2.36$, $p <$

.03), $R^2 = .14$. Please see Figure 3 for an illustration of this mediation. Please see Figure 11 for an illustration of this mediation.

Figure 11: Mediation of Reassurance Expectancy using Message Related Thoughts as outcome measure (for uncertainty emotions condition). * $p < .05$, ** $p < .005$



Discussion

This experiment serves two important goals. First, it replicates the findings of Study 4 and it extends the findings in several ways: 1) using both positive and negative emotions that differ in certainty 2) including additional outcome measures 3) using a different health context

Furthermore, this study also provides a direct measure of the mediating process that was proposed. Specifically, it was argued that uncertainty associated with an emotional experience evokes uncertainty reduction goals, leading to avoidance of messages that are expected to increase uncertainty and a tendency towards messages that

are expected to provide reassurance. In this experiment, a direct measure of expected reassurance was included and its relationship to message processing and persuasion. As predicted, this relationship was significant and expectancy to achieve emotion specific goal of uncertainty reduction (or reassurance expectancy) statistically mediated both the processing and persuasion outcomes for individuals feeling uncertainty related emotions.

CHAPTER 5

5.1 General Discussion

This research examines the impact of discrete incidental emotions on health message effectiveness. It is suggested that appraisal components of emotion, specifically certainty appraisals, affect both the content and the extent of health message processing. Previous studies have found that people tend to reject personally relevant health messages and process them in limited depth. This considerably undermines the efficacy of health communications as health messages advocating behavioral change are most applicable to those for whom the behavior is personally relevant. Present research examines the role of discrete emotions and their interaction with vulnerability to the health threat on message processing and persuasion in health communications.

The results provide support for the proposition that certainty-related emotions provide confidence to attend relevant but threatening information. Whereas, when feeling uncertain emotions, attending relevant health information clashes with uncertainty reduction goals, limiting the depth of message processing.

Results from these experiments extend affect regulation theories are in agreement with affect regulation theories and extend them to involve emotional uncertainty as an emotional state to be “repaired”, by avoiding further deterioration or restoration. Uncertainty related emotions trigger uncertainty reduction goals (Raghunathan and Pham 1999) and thus, individuals in this condition avoid threatening information (Studies 1-2) and incline towards positive, reassuring information (Study 3) about their health.

Furthermore, findings in low relevance conditions bolster the Tiedens and Linton (2001) proposition that certainty related emotions lead to heuristic processing. For low

risk individuals the message is less threatening and therefore certainty appraisals affects information in accord with affect-as-information hypothesis. Certainty-associated emotions signal the individual that sufficient confidence is reached and deep processing is necessary while uncertainty-associated emotions signal a further processing is needed. Consequently, individuals induced with certainty-related (compared to uncertainty-related) emotions scrutinize the message to a lesser extent.

Studies 4 and 5 focus on the relationship between certainty appraisal and response efficacy (i.e., the effectiveness of recommendations advocated in a health message). High efficacy information signals that the recommendations in the message are highly likely to avert the health threat, while low efficacy signals that even though one was to follow these recommendations, protection is not guaranteed. These studies demonstrate how efficacy and emotional certainty interact to influence message processing and to provide some evidence regarding the underlying mechanism that may be driving the demonstrated effects. When feeling emotions with a high uncertainty component, individuals are more willing to attend a high efficacy as it offers reassurance by useful and valid recommendations. This effect is reversed for individuals feeling certainty-related emotions as they are focusing on the long term goal of protection rather than immediate uncertainty reduction. In this case, more processing effort will be extended to low efficacy messages because they pose a challenging task in terms of finding a way to protect oneself (Block and Keller 1995). Study 5 provides a direct measure of the mediating process that was proposed. A direct measure of expected reassurance was included and its relationship to message processing and persuasion. As predicted, this relationship was significant and expectancy to achieve emotion specific goal of

uncertainty reduction (or reassurance expectancy) mediated both the processing and persuasion outcomes for individuals feeling uncertainty related emotions.

The present research complements the mood as resource hypothesis (Raghunathan and Trope 2002) and other work which posits positive mood enables individuals to be more attentive and adaptive towards relevant risk information (e.g., Reed and Aspinwall 1998). These approaches suggest that positive emotions provide the necessary resources to handle threatening information while individuals feeling negative emotions lack the confidence to attend such information due to its possible adverse effects on their affect. Present research proposes an alternative emotional dimension that suggests a different set of emotions that would help handle negative health information. According to this, even if an emotion is negative; it can still increase attendance to threatening health messages.

Moreover, it addresses a gap in the work on emotions and health communications, which often focuses on emotions that are caused the health message (e.g., fear appeals, Witte and Allen 2000). Focusing on incidental emotions rather than emotions that are evoked by the message, it is proposed that the emotional effects of a health message on message readership will differ depending on the present emotional state of the person and its interaction with vulnerability.

Furthermore, this research extends recent advances in the literature on emotions and health communications by emphasizing the impact of appraisal dimensions (Agrawal, Menon and Aaker 2007; Passyn and Sujana 2006). Hence, it highlights the importance of the unique effects of discrete emotions on judgment and behavior in the health arena. By so doing, it adds to the growing body of research that conceptualizes discrete as reflecting multiple levels of person-environment relationships (1991a), and

accordingly activate goals (e.g., Raghunathan and Corfman 2004; Rucker and Petty 2004) and action tendencies (Lerner and Keltner 2000) designed to realize those goals.

Limitations include alternative dimensions of emotion, such as effort, control, and agency (Roseman 1984; Scherer 1988; Smith and Ellsworth 1985) which might also be relevant to health message processing. Some of these dimensions were examined in Study 2 and did not find that the other dimensions could explain the processing effects we observed. However, they were included only to rule out these dimensions as alternative explanations for the observed effects. Future research might focus on these different dimensions' independent influence on health message processing. Also, here only the effects of single emotional states were taken into account, not examining the possibility and influence of mixed emotions. Furthermore, in this research multiple individual differences such as prior knowledge, previous behaviors and familiarity with the health contexts were measured. However, additional measures of self esteem or self efficacy might have effects on message processing as well.

Other limitations to this research merit attention as they afford opportunities for future work. For example, future research could examine the underlying mechanisms which lead to the effects in the presented studies. Although the direct influence of certainty appraisal is demonstrated, exactly how certainty creates the effects is still to be answered. A couple of possible mechanisms which might account for the findings come to mind. For example, emotions associated with a certainty appraisal signal the possibility of goal attainment and provide confidence that a given outcome will be achieved in the future (Johnson and Stewart 2005), thus, it is possible that high (low) certainty appraisal may increase (decrease) one's confidence that effective protection is possible and

therefore alleviate the defensive avoidance of threatening messages (Witte 1998).

Alternatively, it may be the case that certainty might increase the person's confidence in their health status or self risk perceptions. Hence, in case of high self relevance, the individual may not be excessively intimidated by the message and therefore be better able to attend to it. For the low relevance individuals, in which case uncertainty (certainty) emotion might signal increased (decreased) risk (e.g. Lerner and Keltner 2001) and therefore an increased necessity to increase (decrease) processing.

The implications of this research concern not only the context in which a health message should be presented but also which message factors should be emphasized in that context. For example, it is supported that people are more likely to process uncertainty increasing information when they are feeling certainty related emotions and more likely to avoid this sort of information when they are feeling uncertainty related emotions. This suggest that a health message conveying high vulnerability may be more effective if aired in the context of a television show that evokes certainty-related emotions like disgust (e.g., horror movie) versus certainty-related emotions like worry (e.g., environmental documentary). Furthermore, implications can involve service encounters. Healthcare settings evoke a range of emotions. For example, one can feel surprised by the news of a pregnancy, worried about test results, angry at the insurance company. The findings point at different types of information which could be more effectively conveyed under these emotional contexts. Another context that individuals gather health related information is the internet. Websites' contents involve emotionally charged information or banner ads which may render health information more or less preferable for the individual.

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APPENDICES

APPENDIX A

Emotion Manipulation Directions

“The objective of the first study is to develop a questionnaire to assess life events. In order to construct this questionnaire we will collect a large sample of life events which reflect different types of feelings. From these life events we will then select appropriate materials for the questionnaire.

Please take a few minutes to remember a life event you have experienced which made you feel VERY [Target Emotion]. First close your eyes and try to visualize this event as vividly as possible. We would like you to recall as much detail as you can.

In the space below, please describe this particular life event which made you feel [Target Emotion].

Please try to vividly remember this event and give us as much **DETAIL** as you can. We would like to know every aspect of this situation or event that has made you [Target Emotion].”

Certainty and Pleasantness Appraisal Questionnaires

Certainty Appraisal

1. When you were feeling [Target Emotion] how well did you understand what was happening around you in this situation?
2. When you were feeling [Target Emotion], how certain were you about what was happening in this situation?

3. When you were feeling [Target Emotion], how well could you predict what was going to happen in this situation?

Pleasantness Appraisal

1. When you were feeling [Target Emotion], to what extent did you feel that circumstances beyond anyone's control were controlling what was happening in this situation?

2. When you were feeling [Target Emotion], to what extent did you feel that you had the ability to influence what was happening in this situation?

APPENDIX B

Article on Chlamydia

What is Chlamydia ?

Chlamydia is the most common bacterial sexually transmitted disease in the United States, particularly among sexually active young adults. Any sexually active person can be infected with Chlamydia through vaginal, anal, or oral sex (although less likely). Individuals under 25 are at particularly high risk for infection; as many as one in ten young adults test positive for Chlamydia.

Symptoms and Effects on Health

Chlamydia is known as a "silent" disease because most infected individuals have no symptoms at all. Hence, researchers emphasize that it is a substantial mistake to assume one is not infected because he/she does not have any symptoms.

Women who do have symptoms might have a burning sensation when urinating, pain during intercourse, or bleeding between menstrual periods.

Men with symptoms might have a discharge from their penis or a burning sensation when urinating. Chlamydia infections can have very serious health outcomes if left untreated.

Chlamydia infections in women may lead to Pelvic Inflammatory Disease (PID), and cystitis (inflammation of the urinary bladder). PID can lead to very serious consequences including infertility, ectopic pregnancy (a pregnancy in the fallopian tube or elsewhere outside of the womb), abscess formation, and chronic pelvic pain.

Chlamydia in men may lead to Prostatitis (inflammation of the prostate gland), scarring of the urethra, and infertility. A person with Chlamydia is also at greater risk for getting HIV, if exposed.

Testing

There are several different tests for Chlamydia. The most common test requires a pelvic exam during which a swab is used to take a specimen from the cervix. Some new tests are very reliable, like NAATs (short for nucleic acid amplification tests) which detect Chlamydia from a urine specimen.

Treatment

Chlamydia can be cured by antibiotics. Most medicines need to be taken every day for 2-3 weeks, but there is also single-dose therapy that can cure the infection.

Recommendations for Risk Reduction

As with other sexually transmitted diseases (STDs) there are things people can do to reduce or eliminate the risk of Chlamydia. These include the following:

Abstinence (not having sexual contact)

Mutual monogamy (having sex with only one uninfected partner)

Using latex condoms consistently and correctly for vaginal, oral and anal sex.

Since Chlamydia can be transmitted even if the penis or tongue does not completely enter the vagina, mouth or rectum, using latex condoms at the beginning until there is no longer skin contact is the best form of prevention.

APPENDIX C

Chlamydia Quiz Questions

1. Chlamydia is caused by a: a)Virus b)Bacteria (B)
2. At least 2-3 weeks of multiple dose of antibiotics therapy is the only method to treat Chlamydial infection (F)
3. Being infected with Chlamydia increases your likelihood of being infected with bacteria called cystitis (F)
4. A new and accurate test for Chlamydia is called a) nucleic acid linked assay b) nucleic acid amplification tests (B)
5. Being infected with Chlamydia may lead to infertility in women, but men are not under such risk (F)
6. Every woman with Chlamydial infection will have symptoms including burning sensation and pain during menstrual periods. (F)
7. Several months of antibiotics intake is the most common treatment for Chlamydia infections (T)
8. If not treated, pelvic inflammatory disease (PID) is likely to lead to genital ulcers (F)
9. Chlamydia is known as a "silent" disease because the symptoms sometimes go away without treatment (F)
10. Being infected with Chlamydia increases your likelihood of being infected with HIV if exposed (T)

APPENDIX D

Article on Hepatitis C

What Is Hepatitis C?

Hepatitis C is a blood-borne infection caused by the Hepatitis C virus (HCV). It is estimated to affect 10,000 Americans in its chronic form. In a congressional testimony, former Surgeon General C. Everett Koop, M.D., called Hepatitis C "although not very prevalent in America, a disease that many people around the world will carry for a decade or more while it develops into a threat to their health."

Hepatitis C is one of five currently identified viruses--Hepatitis A, B, C, D, and E-- all of which can attack and damage the liver. The Hepatitis C virus (HCV) can cause cirrhosis (irreversible and potentially fatal liver scarring), liver cancer, or liver failure. HCV is spread primarily through contact with infected blood and once the virus makes a home in the liver, it rarely leaves. According to the CDC, 55 to 85 percent of all infections become chronic. Hepatitis C is one of the main reasons for liver transplants in the world.

Transmission

HCV cannot be acquired through casual contact with an infected person such as shaking hands, hugging, or sharing eating utensils or drinking glasses.

High-risk activities for acquiring Hepatitis C include:

* Sharing used needles or syringes (for steroid, prescription or drug use) and sharing other drug-using equipment such as cookers, cotton, crack cocaine and water pipes (even if you only shared them once or briefly)

* Acquiring HCV through sex is possible although less common. Engaging sexual intercourse with multiple partners and failing to use condoms during any type of sexual activity increase chance of infection.

* Tattooing, piercing or acupuncture with equipment that may have been improperly sterilized.

* Sharing razors, toothbrushes, tweezers, manicure or pedicure equipment (such as nail clippers)

Needle-stick injuries

Prevention

* Intravenous drug use with unclean needles is the most common known mode of transmission. Individuals should never reuse or share drugs, syringes, cookers, cotton, water, or rinse cups.

* If you are considering getting a tattoo or piercing on any part of your body, including ear piercing, make sure the artist or piercer follows good health practices, like using previously unused equipment, sterilize it at high temperatures or bathing it in special sterilizing fluids

* Use latex condoms consistently and correctly for any type of sexual intercourse.

* Avoid sharing personal care articles such as toothbrushes, razors, cuticle scissors, and other manicuring or pedicuring equipment.

Doctors note that a vaccine against Hepatitis C is not likely to be available in the foreseeable future, in part because the virus has many genetic variants and is forever changing genetically.

Testing and Treatment

Hepatitis C is usually a silent disease. According to the Centers for Disease Control and Prevention (CDC), 80 percent of people with the condition have no symptoms at all. Hence, many patients learn they have Hepatitis C through a routine physical or when they donate blood and a blood test shows elevated liver enzymes. Testing for HCV antibodies using the EIA (enzyme immunoassay) can positively identify the infection. A liver biopsy shows disease manifested by damage already done to the liver.

One of the only approved treatments for chronic Hepatitis C, especially for patients with consistently elevated liver enzymes or mild-to-moderate liver damage, is the biological drug interferon alpha, marketed as Intron A by Schering Corp. and Roferon-A by Roche Laboratories Inc. Amgen Inc. also has an approved drug derived from interferon alpha called Infergen. Hepatitis C patients must inject interferon themselves, usually three times a week. In about 25 percent of patients, the drug has a pronounced effect, reducing HCV to very low levels in the blood.

Successful therapy comes at a price, however, because of side effects. Patients using this treatment method suffer from extreme fatigue and have to nap often during the day, and sleep restlessly at night. They also experience depression, irritability and anxiety.

APPENDIX E

Hepatitis Quiz Questions

1. It is estimated to affect approximately 14 million Americans in its chronic form (F)
2. 15 to 25 percent of all Hepatitis C infections become chronic (F)
3. If you are Hepatitis C positive, your partner needs to get tested as well because there is a chance that he/she is infected as well (T)
4. Unlike other forms of Hepatitis, Hepatitis C is usually chronic (long-lasting) (T)
5. There is a vaccine for Hepatitis C (F)
6. Hepatitis C spreads very quickly in the liver in comparison to other prevalent diseases (T)
7. Hepatitis C virus causes severe liver disease in everyone who has it (T)
8. You can be infected with Hepatitis C and not even feel sick (T)
9. People rarely contract the Hepatitis C virus through sex, especially if they have just one partner (T)
10. Sharing a manicure set with an infected person puts you under risk for Hepatitis C infection (T)
11. The medicine that is used to treat Hepatitis C is very effective and hardly has any side effects (F)

APPENDIX F

Debriefing Form: Study 2

Thank you for participating in this experiment.

The PREVALENCE RATIOS OF THE DISEASE WERE FICTITIOUS for experimental manipulation reasons. Actually, Hepatitis C affects 4 million Americans.

We needed to do this alteration of likelihood ratios so that we could understand your reactions to different vulnerability messages (high vs. low susceptibility to threat) in the same health context.

We apologize that we had to use fictitious estimates.

Your participation is entirely confidential. The data gained from your response to this alteration cannot be associated with your identity. Only the researchers themselves will have access to your data and it will be kept on a password protected computer at all times. You have the right to have the data obtained from the research destroyed instead of used for data analysis.

Please see the experimenter if you have any further questions and work through any confusion you might have.

APPENDIX G

Debriefing Form: Study 4 and Study 5

Thank you for participating in this experiment.

The EFFECTIVENESS PERCENTAGES OF THE MESSAGE

RECOMMENDATIONS WERE FICTITIOUS for an efficacy manipulation for experimental reasons. The prevention recommendations in the message you have read are actually effective and highly certain. We needed to do this alteration likelihood ratios so that we could understand your reactions to different response efficacy messages (high vs low effectiveness of prevention methods) in the same health context.

We apologize that we had to use fictitious likelihood estimates. Your participation is entirely confidential. The data gained from your response to this alteration cannot be associated with your identity. Only the researchers themselves will have access to your data and it will be kept on a password protected computer at all times. You have the right to have the data obtained from the research destroyed instead of used for data analysis.

Please see the experimenter if you have any further questions and work through any confusion you might have.

APPENDIX H: Magazine Cover and Emotional Quiz and Caffeine Article



LIVE & UNCUT

VENICE:
Italy's City on Water:
Beyond Gondolas,
The Grand Canal and
St. Marks

Are you ready for "the" league ?

All about Hydration

The Call of Kashmir

The Emotional Memory Quiz 

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.

For this quiz, we need you to:

Recall an incident that made you feel very **disgusted**.

Please take your time to try to visualize this incident as vividly as you can.

Please take at least five minutes to do this...

APPENDIX I: IRB Approval Forms for Studies 1-5



Office of Research Compliance
Institutional Review Board
2000 Kraft Drive, Suite 2000 (0497)
Blacksburg, Virginia 24061
540/231-4991 Fax 540/231-0959
e-mail moored@vt.edu
www.irb.vt.edu
FWA00000572| expires 1/20/2010
IRB # is IRB00000667

DATE: November 29, 2007

MEMORANDUM

TO: David L. Brinberg
Canan Corus

FROM: David M. Moore 

SUBJECT: IRB Exempt Approval: "Health Behavior Study 6", IRB # 07-592

I have reviewed your request to the IRB for exemption for the above referenced project. I concur that the research falls within the exempt status. Approval is granted effective as of November 29, 2007.

As an investigator of human subjects, your responsibilities include the following:

1. Report promptly proposed changes in previously approved human subject research activities to the IRB, including changes to your study forms, procedures and investigators, regardless of how minor. The proposed changes must not be initiated without IRB review and approval, except where necessary to eliminate apparent immediate hazards to the subjects.
2. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

cc: File

Invent the Future

VIRGINIA POLYTECHNIC INSTITUTE UNIVERSITY AND STATE UNIVERSITY
An equal opportunity, affirmative action institution

DATE: February 15, 2007

MEMORANDUM

TO: David L. Brinberg
Canan Corus

FROM: Carmen Green 

SUBJECT: IRB Exempt Approval: "Prestudy Health Behavior", IRB # 07-085

I have reviewed your request to the IRB for exemption for the above referenced project. I concur that the research falls within the exempt status. Approval is granted effective as of February 15, 2007.

As an investigator of human subjects, your responsibilities include the following:

1. Report promptly proposed changes in previously approved human subject research activities to the IRB, including changes to your study forms, procedures and investigators, regardless of how minor. The proposed changes must not be initiated without IRB review and approval, except where necessary to eliminate apparent immediate hazards to the subjects.
2. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

cc: File

Invent the Future

VIRGINIA POLYTECHNIC INSTITUTE UNIVERSITY AND STATE UNIVERSITY

An equal opportunity, affirmative action institution

DATE: November 29, 2007

MEMORANDUM

TO: David L. Brinberg
Canan Corus

FROM: David M. Moore 

SUBJECT: IRB Exempt Approval: "Health Behavior Study 5", IRB # 07-591

I have reviewed your request to the IRB for exemption for the above referenced project. I concur that the research falls within the exempt status. Approval is granted effective as of November 29, 2007.

As an investigator of human subjects, your responsibilities include the following:

1. Report promptly proposed changes in previously approved human subject research activities to the IRB, including changes to your study forms, procedures and investigators, regardless of how minor. The proposed changes must not be initiated without IRB review and approval, except where necessary to eliminate apparent immediate hazards to the subjects.
2. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

cc: File

Invent the Future

DATE: September 4, 2007

MEMORANDUM

TO: David L. Brinberg
Canan Corus

FROM: David M. Moore 

SUBJECT: IRB Exempt Approval: "Health Behavior Study 4", IRB # 07-421

I have reviewed your request to the IRB for exemption for the above referenced project. I concur that the research falls within the exempt status. Approval is granted effective as of September 4, 2007.

As an investigator of human subjects, your responsibilities include the following:

1. Report promptly proposed changes in previously approved human subject research activities to the IRB, including changes to your study forms, procedures and investigators, regardless of how minor. The proposed changes must not be initiated without IRB review and approval, except where necessary to eliminate apparent immediate hazards to the subjects.
2. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

cc: File

Invent the Future

VIRGINIA POLYTECHNIC INSTITUTE UNIVERSITY AND STATE UNIVERSITY
An equal opportunity, affirmative action institution

DATE: March 5, 2007

MEMORANDUM

TO: David L. Brinberg
Canan CorusFROM: David M. Moore Approval date: 3/5/2007
Continuing Review Due Date: 2/19/2008
Expiration Date: 3/4/2008

SUBJECT: IRB Expedited Approval: "Health Behavior Study", IRB # 07-113

This memo is regarding the above-mentioned protocol. The proposed research is eligible for expedited review according to the specifications authorized by 45 CFR 46.110 and 21 CFR 56.110. As Chair of the Virginia Tech Institutional Review Board, I have granted approval to the study for a period of 12 months, effective March 5, 2007.

As an investigator of human subjects, your responsibilities include the following:

1. Report promptly proposed changes in previously approved human subject research activities to the IRB, including changes to your study forms, procedures and investigators, regardless of how minor. The proposed changes must not be initiated without IRB review and approval, except where necessary to eliminate apparent immediate hazards to the subjects.
2. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.
3. Report promptly to the IRB of the study's closing (i.e., data collecting and data analysis complete at Virginia Tech). If the study is to continue past the expiration date (listed above), investigators must submit a request for continuing review prior to the continuing review due date (listed above). It is the researcher's responsibility to obtain re-approval from the IRB before the study's expiration date.
4. If re-approval is not obtained (unless the study has been reported to the IRB as closed) prior to the expiration date, all activities involving human subjects and data analysis must cease immediately, except where necessary to eliminate apparent immediate hazards to the subjects.

Important:

If you are conducting **federally funded non-exempt research**, this approval letter must state that the IRB has compared the OSP grant application and IRB application and found the documents to be consistent. Otherwise, this approval letter is invalid for OSP to release funds. Visit our website at <http://www.irb.vt.edu/pages/newstudy.htm#OSP> for further information.

cc: File

Invent the Future