

RISK COMMUNICATION: THE ROLES OF MESSAGE APPEAL AND COPING STYLE

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We examined the main effect of message appeal (emotional and logical) and coping style (monitors and blunters) and the interaction effect between the two on risk message processing outcomes. Participants were 74 U.S. undergraduate and graduate students who read news stories about tornadoes, then rated their risk message processing outcomes. Results showed that emotional appeals led to a higher risk perception, probability of risk occurrence, and more accurate recognition memory than did logical appeals. Further, we found significant interaction effects between message appeal and coping style on risk perception. When message appeals were emotional, monitors perceived a higher risk and probability of risk occurrence than did blunters; however, when message appeals were logical, this difference between monitors and blunters disappeared. The findings suggest that (a) emotional appeals should be included in risk communication and (b) coping styles should be considered in effective risk communication.

Keywords: risk communication, emotional appeals, logical appeals, coping styles.

Effective risk communication starts from understanding people's *risk perception*, that is, people's subjective judgment about the likelihood of negative occurrences (Slovic, 1987), because how people perceive a risk guides their risk-related decisions and behaviors (Bubeck, Botzen, & Aerts, 2012; Burns & Slovic, 2012). As perception has a critical role in risk communication, previous

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researchers have identified factors that influence risk perception. One such factor is media messaging (Hove & Paek, 2015; Oh, Paek, & Hove, 2015). When evaluating risks, people with little or no firsthand experience of disasters often rely on news media and how risks are presented or framed in the media (Oh et al., 2015).

Researchers have traditionally adopted a cognitive perspective in examining risk message processing and have suggested that people base risk decisions on logic, rationality, probabilities of loss, and expected outcomes (Johnson, 2005). In an emerging body of risk communication research, however, scholars have documented the role of emotion in guiding the public's risk perception and judgments (Pachur, Hertwig, & Steinmann, 2012; van der Linden, 2014). Although these previous studies are valuable to risk communicators, because the researchers manipulated people's emotional states (e.g., fear, anger, sadness) rather than the risk message itself, the results have rarely been adopted. In real risk situations, risk communicators cannot manipulate the public's emotional state. To provide practical guidelines for risk communicators to design risk messages, it would be beneficial to examine whether emotions work the same way when the message is manipulated to be emotional as when the message is logical. Thus, the primary purpose of this study was to test whether and how different message appeals influence people's risk message processing outcomes, that is, their risk perception, assessment of probability of risk, and recognition memory of the risk message.

Another important factor in understanding risk perception is the role of individual difference. Scholars have argued that risk perception varies by individual, so risk communication should account for the interaction of risk message characteristics with the personal characteristics of message recipients (Mileti & Fitzpatrick, 1991). One individual difference factor is coping style (Miller, 1987), which can influence a person's responses to threatening information. Thus, in this study we examined how people's coping style influenced risk message processing outcomes independently of, and jointly with, the type of message appeal. This study should therefore provide a practical basis for effective risk message development by exploring two important but less examined variables in risk communication: message-related variables (message appeal) and people's personality traits (coping style).

Effects of Message Appeal on Risk Message Processing Outcomes

Scholars have argued that people's risk message processing is strongly influenced by the way the risk is framed or presented (Hove & Paek, 2015; Oh et al., 2015). Two message presentation formats frequently examined in the communication field are logical appeals and emotional appeals (Y. Kim, 2016). A logical appeal provides objective facts, statistics, and figures (Shimp, 1990);

an emotional appeal attempts to elicit object-related emotions (Rosselli, Skelly, & Mackie, 1995), that is, the aim is to cue the retrieval of emotional experiences associated with a person or thing. To elicit the desired emotion, emotional appeal messages often include vivid, concrete, image-evoking, and personal elements (Slovic, Finucane, Peters, & MacGregor, 2004). In empirical studies in health communication scholars have found that an emotional appeal is more memorable and more likely to stimulate participants' health-related information seeking than is a logical appeal (Betsch, Ulshöfer, Renkewitz, & Betsch, 2011; Janssen, van Osch, de Vries, & Lechner, 2013). The advantage of emotional over logical appeals is attributable to affect heuristics (Slovic et al., 2004). Feelings of dread, perceived lack of control, and the extent to which a hazard is judged to be unknown are used as cues for the estimation of risks, influencing people's risk perception and subsequent decisions (Slovic et al., 2004).

Employing an affect heuristics perspective, we expected people to perceive a higher risk and a higher level of perceived probability of risk with an emotional appeal message than with a logical appeal message. This is because, when evaluating risks, people use emotions evoked by emotional appeal messages rather than those evoked by the statistics and probabilities in logical messages. We also expected people to remember a risk message better when they were exposed to an emotional appeal than when they were exposed to a logical one. Thus, we formed the following hypotheses:

Hypothesis 1: An emotional appeal message will lead to a higher level of risk perception than a logical appeal message.

Hypothesis 2: An emotional appeal message will lead to a higher level of perceived probability of a risk occurrence than a logical appeal message.

Hypothesis 3: Recognition memory for an emotional appeal message will be significantly more accurate than will recognition memory for a logical appeal message.

Effects of Individual Differences on Risk Message Processing Outcomes

Risk perception varies from person to person, despite the constancy of the message (Mileti & Fitzpatrick, 1991). Thus, along with the message characteristics, the characteristics of recipients should be taken into account for when communicating risks to the public. Previous researchers in risk communication have investigated the effects of individual differences on risk perception, such as demographics (Savage, 1993), expertise (H. J. Kim & Kim, 2013), personality and prior experience (Bubeck et al., 2012), and world view (Mileti & Fitzpatrick, 1991).

Among individual difference factors, one personality variable that is relevant to risk communication, but which has not yet been sufficiently examined, is people's coping style (Miller, 1987). *Coping style* refers to people's trait response styles

to threatening information, of which there are two types. *Monitors* tend to worry about risks. They pay attention to, scan for, seek out, and magnify threatening cues of information (Miller, 1987). When it comes to risk messages, monitors can be motivated by detailed information about risks and by risk-reduction strategies.

Blunters, in contrast, do not seek detailed information about risks. They tend to be overwhelmed and stressed by large amounts of information. Blunters often distract themselves and avoid taking threatening information seriously (Miller, 1987). Thus, short and simple messages can be effective for blunters.

Although these coping styles have not been adopted in research on risk communication, findings reported in studies in health communication have shown the associations between coping style and health-related risk perception (S. Kim, Kim, & Lee, 2014; Miller et al., 2005) in that monitors tend to perceive greater risk and susceptibility to risk, and have stronger information-seeking intentions than do blunters (Miller et al., 2005). Thus, we formed the following hypotheses:

Hypothesis 4: When exposed to risk information, monitors will perceive higher risks than will blunters.

Hypothesis 5: When exposed to risk information, monitors will perceive higher probability of risk occurrence than will blunters.

Hypothesis 6: When exposed to risk information, monitors will have a higher level of recognition memory than will blunters.

Interaction Effects between Message Appeal and Coping Style on Risk Message Processing Outcomes

Further, we expected coping style to moderate the effect of message appeals on risk message processing outcomes. In health communication, researchers have identified the interaction effects of message appeal and individual differences on message processing outcomes (Flora & Maibach, 1990; Zhang, 2013). For example, Flora and Maibach found that people with low involvement (i.e., people for whom the issues under consideration were of little personal importance) remembered emotional messages better than they remembered logical messages, whereas those with high involvement (i.e., people for whom the issues under consideration were of great personal importance) did not show any difference between their memory of emotional or logical messages. Although risk communication scholars have noted a significant interaction effect between risk message characteristics and message recipients' personal characteristics on message processing outcomes (Mileti & Fitzpatrick, 1991), few researchers have empirically tested that effect. Given the limited body of literature, we proposed the following research question:

Research Question 1: Will there be any significant interaction effect between message appeal and coping styles on risk message processing outcomes?

Method

Participants and Procedure

We recruited 92 undergraduate and graduate students majoring in advertising and public relations at a large Midwestern university in the USA, who participated in this study for extra credit (female 59%, males 41%, $M_{\text{age}} = 23$ years, $SD = 5.32$). In regard to ethnicity, the sample comprised Caucasian (47%), Asian (35%), African American (14%), others (3%), and Hispanic (1%). Students who were interested in participating were asked to remain after a regular class. Each participant was randomly assigned to one of two conditions, either emotional appeal messages or logical appeal messages.

Each participant was given a packet that contained two news stories about tornadoes and a paper-and-pencil questionnaire. Once participants had completed an informed consent form, they were instructed to read the two news stories about tornadoes and complete the questionnaire. The participants in the emotional condition read two emotional news stories about tornadoes and the participants in the logical condition read two logical news stories. After each exposure, they filled out a questionnaire about risk perception and risk probabilities. After completing the questionnaire, they responded to the Miller Behavioral Style Scale (MBSS; Miller, 1987) along with demographic items. This was designed to measure their individual differences and to be a distractor prior to the memory test. Finally, participants took a recognition test. Then each participant was debriefed and thanked.

Design

To test the proposed hypotheses and answer the research questions, a 2 (message appeal: emotional vs. logical) \times 2 (coping style: monitor vs. blunter) between-subject experimental design was employed. Message appeal was manipulated and individual difference was measured using the MBSS.

News stories about tornadoes were chosen as stimulus materials because of the high relevancy of tornadoes for study participants. On average, 1,200 tornadoes are reported in the United States each year, and the upper Midwest into the Great Lakes region is an area where tornadoes occur frequently (National Oceanic and Atmospheric Administration, 2016). By referring to the website of the Federal Emergency Management Agency (2015) and news items about tornadoes retrieved from LexisNexis and NewsBank, 16 news stories (eight emotional and eight logical) were developed. The news stories contained risk elements such as severity, susceptibility, recommended preventive actions, self-efficacy, and response efficacy (Witte, 1995). The content of each news story was identical except for the message appeals. The emotional appeal was manipulated by emphasizing such elements as concreteness (i.e., the degree of detail and

specificity), narratives, vividness, linkage to people, anecdotes, and personal relevance. The logical appeal consisted of numbers, percentages, logical analysis, and an abstract description. The length of each news story set (e.g., message number 1 for emotional vs. message number 1 for logical appeal) was carefully controlled, keeping a difference of fewer than 50 words.

To select stimulus materials for the main experiment, a pretest with 95 undergraduate and graduate students (females 72%, males 28%, $M_{\text{age}} = 21$ years, $SD = 3.12$) was conducted at a large U.S. Midwestern university. Among eight logical messages pretested, we selected as the logical appeal messages the two with the largest gap between the mean of the logical and the emotional scores, logical message 1 (L1), $M_{\text{logic-emotion}} = 3.41$, $SD = 2.08$, $t(31) = 9.28$, $p < .001$; logical message 2 (L2), $M_{\text{logic-emotion}} = 2.28$, $SD = 2.02$, $t(31) = 6.39$, $p < .001$. In the same manner, among the eight emotional messages pretested, we selected as the emotional appeal messages the two with the largest gap between the mean of the emotional and logical appeal scores, emotional message 1 (E1), $M_{\text{emotion-logic}} = 1.06$, $SD = 1.88$, $t(30) = 3.16$, $p < .01$; emotional message 2 (E2), $M_{\text{emotion-logic}} = 1.50$, $SD = 2.02$, $t(31) = 4.55$, $p < .001$.

Measures

Coping style. The short version of the MBSS was used to identify monitors and blunterners. Participants were asked to imagine two naturalistic stress-evoking scenarios (e.g., “Imagine that you are afraid of the dentist and have to get some dental work done”). After each scenario, eight statements representing different responses to that situation were provided. Four statements pertained to monitoring or information-seeking behaviors (e.g., “I would watch all the dentist’s movements and listen for the sound of the drill”) and the other four were about blunting or information-avoiding behaviors (e.g., “I would try to think about pleasant memories”). This scale was scored by adding the number of monitoring items selected to the number of blunting items selected.

Each participant had a monitoring and a blunting score. To obtain the difference between the two scores, we subtracted the blunter score from the monitor score. The mean of the differences between blunter and monitor score was 2.34 ($SD = 2.10$). Participants having scores above the mean were categorized as monitors, and those having scores below the mean were categorized as blunterners (Miller & Mangan, 1983). Among our participants there were 46 monitors and 46 blunterners. Each participant was randomly assigned to the emotional-appeal or the logical-appeal condition.

Risk perception. Risk perception was measured with five items adopted from Slovic’s (1987) study (risky, dread-inducing, controllable, fatal, and catastrophic) on a 7-point Likert-scale ranging from 1 = *not at all* to 7 = *extremely* (Cronbach’s $\alpha = .85$ for a logical appeal and $.94$ for an emotional appeal). Exploratory factor

analysis (EFA) with principal components method showed a one-factor solution (68% of total variance explained for a logical appeal, 84% of total variance explained for an emotional appeal).

Probability of risk occurrence. Probability of risk occurrence was measured by asking, "Based on the news story you have just read, how likely is it that Michigan will be hit by a tornado?" Participants rated their answers on a 7-point Likert-scale ranging from 1 = *not at all likely* to 7 = *highly likely*.

Memory. Memory was measured by a multiple-choice recognition test. The number of correct answers was summed and used in the data analysis. Two multiple-choice questions for each news story were developed to test the participants' recognition memory.

Covariates. Previous scholars have found that demographics (e.g., gender, age) influence people's risk perception (Savage, 1993). Other researchers have reported that risk perception can also be influenced by people's previous experience of risks and knowledge of risks (Mileti & Fitzpatrick, 1991). Therefore, tornado knowledge, personal experience of tornadoes, gender, age, and ethnicity were controlled.

Data Analysis

To test the proposed hypotheses and answer the research question, a multivariate analysis of covariance (MANCOVA) was conducted using SPSS 20 with tornado knowledge, personal experience of tornadoes, gender, and ethnicity as covariates.

Results

Manipulation Checks

To confirm the success of message appeal manipulation, participants were asked to rate the news stories as (a) emotional, (b) logical, and (c) neutral using a 7-point Likert scale ranging from 1 = *strongly disagree* to 7 = *strongly agree*. As intended, paired *t* test results showed that the participants exposed to logical appeals rated the appeals as more logical than did those exposed to the emotional appeals, L1 ($M_{\text{logic-emotion}} = 1.53$, $SD = 2.18$), $t(48) = 4.91$, $p < .001$; L2 ($M_{\text{logic-emotion}} = 1.32$, $SD = 2.29$), $t(48) = 4.24$, $p < .001$. The participants exposed to the emotional appeals also perceived the appeals as more emotional than did those exposed to the logical appeals, E1 ($M_{\text{logic-emotion}} = .58$, $SD = 1.69$), $t(42) = 2.25$, $p < .05$; E2 ($M_{\text{logic-emotion}} = .79$, $SD = 1.66$), $t(42) = 3.13$, $p < .01$. Thus, the manipulations were successful.

Hypotheses Testing

MANCOVA revealed a significant multivariate main effect for message appeals, Wilk's $\lambda = .74$, $F(3, 80) = 9.35$, $p < .001$, and a significant two-way

interaction effect between message appeals and coping style, Wilk's $\lambda = .85$, $F(3, 80) = 4.67$, $p < .01$. The main effect for coping style was not significant, Wilk's $\lambda = .93$, $F(3, 80) = 1.90$, $p = ns$.

Effects of message appeal on risk message processing outcomes. In Hypothesis 1, we predicted that participants exposed to the emotional appeals would perceive a higher level of risk than would those exposed to the logical appeals. As expected, a significant main effect of message appeals on risk perception was found, $F(1, 82) = 5.99$, $p < .05$, $\eta^2 = .07$, such that participants perceived a higher level of risk when they were exposed to an emotional appeal ($M = 5.41$, $SD = .97$), than when exposed to a logical appeal for the same message ($M = 4.92$, $SD = .77$). Thus, Hypothesis 1 was supported.

In Hypothesis 2, we predicted that the perception of probability of risk occurrence would be higher when participants were exposed to the emotional appeals than when exposed to the logical appeals. Consistent with our prediction, a significant main effect of message appeals on the probability of risk occurrence was found, $F(1, 82) = 10.62$, $p < .01$, partial $\eta^2 = .12$. Participants perceived a higher probability of risk occurrence when they were exposed to an emotional appeal ($M = 4.80$, $SD = .87$) than when they were exposed to a logical appeal for the same message ($M = 4.21$, $SD = 1.25$). Thus, Hypothesis 2 was supported.

In Hypothesis 3, we predicted that recognition memory for an emotional appeal would be significantly more accurate than for a logical appeal. In support of Hypothesis 3, a significant main effect of message appeal on recognition memory was found, $F(1, 82) = 16.57$, $p < .001$, partial $\eta^2 = .17$, such that participants who read emotional appeal messages scored higher in the recognition test ($M = 3.63$, $SD = .89$) than did those who read logical appeal messages ($M = 2.88$, $SD = .87$). Thus, Hypothesis 3 was supported.

Effects of coping style on risk message processing outcomes. We predicted the main effect of coping style on risk perception (Hypothesis 4), perception of probability of risk occurrence (Hypothesis 5), and recognition memory (Hypothesis 6). However, contrary to our prediction, the result for the overall model (a multivariate effect for coping style) was not significant. As a multivariate effect was not found, we did not conduct a univariate analysis. Thus, Hypothesis 4, Hypothesis 5, and Hypothesis 6 were not supported.

Interaction between message appeal and coping style. We found significant interaction effects between message appeals and coping style on risk perception, $F(1, 82) = 8.40$, $p < .01$, partial $\eta^2 = .09$, and on perceived probability of risk occurrence, $F(1, 82) = 9.36$, $p < .01$, partial $\eta^2 = .10$. As shown in Figure 1, the contrast test indicated that when message appeals were emotional, monitors ($M = 5.88$, $SD = 1.05$) perceived a higher level of risk toward messages than

did blunterns ($M = 4.93$, $SD = 1.04$), $F(1, 82) = 8.39$, $p < .01$. When message appeals were logical, however, the perceived level of risk was similar between monitors ($M = 4.83$, $SD = .79$) and blunterns ($M = 5.02$, $SD = .98$), $F(1, 82) = .93$, $p = ns$. Monitors ($M = 5.32$, $SD = .95$) also perceived a higher probability of risk occurrence toward emotional appeal messages than did blunterns ($M = 4.30$, $SD = 1.05$), $F(1, 82) = 8.14$, $p < .01$. However, perceived probability of risk occurrence of monitors ($M = 4.11$, $SD = .72$) and blunterns ($M = 4.29$, $SD = .71$) were similar when the messages were logical, $F(1, 82) = .85$, $p = ns$, (see Figure 2). No significant interaction effect on recognition memory was found, $F(1, 82) = .79$, $p = ns$.

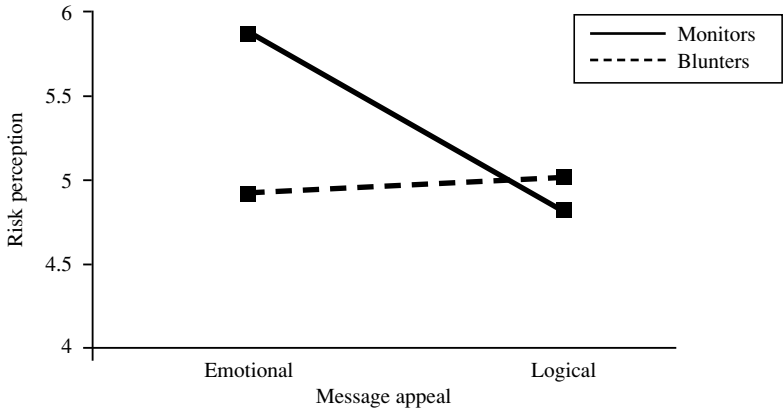


Figure 1. Interaction effect of message appeals and coping style on risk perception.

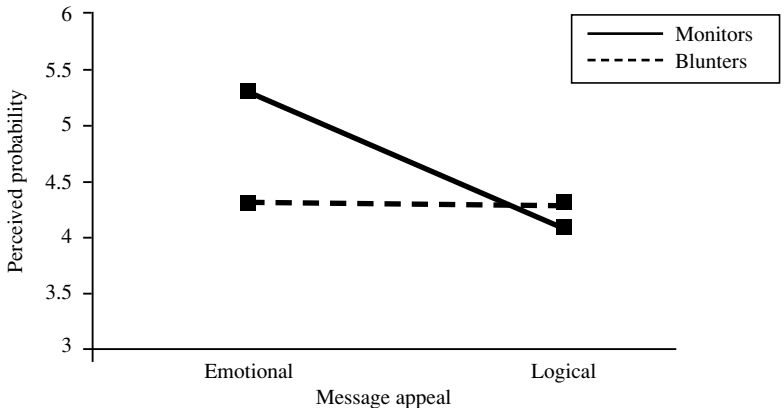


Figure 2. Interaction effect of message appeals and coping style on perceived probability of risk occurrence.

Discussion

For decades, scholars have claimed that emotion plays a critical role in risk message processing (Roeser, 2012; van der Linden, 2014). However, most researchers have manipulated people's emotional states, not the message appeals. The present study was designed to fill the void by testing empirically how people perceive and process risk messages when the message is manipulated as either an emotional or a logical appeal. We also tested the moderating role of individuals' coping styles on risk message processing outcomes.

Our finding is in line with the argument presented by Johnson (1993) and Tversky and Kahneman (1981) that the way in which people perceive a risk is strongly affected by how that risk is framed or presented. Our data showed that emotional appeals yield a higher level of risk perception, perception of higher probability of risk occurrence, and better memory performance than do logical appeals. These findings suggest that to communicate effectively with the public, risk communicators should consider an emotional appeal message.

Another of our interests in this study was to test the moderating role of coping style, that is, individuals' responses to threatening information. We found a significant interaction effect of message appeal by coping style on risk perception and perceived probability of risk occurrence, such that when the message appeals were emotional, monitors perceived a higher risk and a higher probability of risk occurrence toward the messages than did blunterners. However, when the message appeals were logical, monitors and blunterners perceived a similar level of risk and probability of occurrence. These findings have two significant implications. First, as has been suggested in previous studies, if monitors are more likely than blunterners are to pay attention to, actively seek out, and magnify threatening cues of information, the traditional way of communicating risks to this segment (i.e., logical appeals) may not work. When targeting monitors, emotional appeal messages should be considered to communicate the seriousness of a risk. In contrast, blunterners are more likely to distract themselves from risk messages and to dismiss threatening information (Miller, 1987). When targeting blunterners, therefore, message designers may benefit from softening the emotional tone in the content to draw blunterners' attention to risk communication.

Second, the significant interaction effects between message appeal and coping style on risk perception and perceived probability of risk occurrence indicate that the type of appeal message is not the only relevant factor in effective risk communication. Previous scholars (Bubeck et al., 2012; H. J. Kim & Kim, 2013; Mileti & Fitzpatrick, 1991) have suggested that the individual differences in the target audiences should be considered when constructing effective risk messages. Our examination of the individual difference variable of coping style confirms the findings of those earlier studies.

Limitations and Future Research

Although this study has several implications, it also has limitations. First, the college sample used in this study does not represent the public. Future research should include a variety of demographic groups to increase the generalizability of our findings to other population groups. Second, this study was a test only of the risk of a tornado, which is not representative of all risk situations. People react differently to different types of risks (H. J. Kim & Kim, 2013). Therefore, to generalize our findings across different risk domains, future studies are needed to test various types of risks in risk communication areas. Such studies should contribute a great deal to understanding of the ways in which people process risk messages.

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