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Effects of Risk-Focused and Recommendation-Focused Mental Imagery on Occupational Risk Communication

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This study examined the impact of mental imagery instructions in a National Institute for Occupational Safety and Health (NIOSH) safety document conveying risk and safety information to farmers. A sample of 314 farmers recruited from a large Southeastern state fair was randomly assigned to conditions in a 2 × 2 design. Participants received a NIOSH safety document about skid steer loader safety in which 2 types of mental imagery instructions were manipulated: (a) risk-focused (imagery vs. control) and (b) recommendation-focused (imagery vs. control). Results indicate that risk-focused imagery influenced perceptions of susceptibility to workplace accidents, whereas recommendation-focused imagery influenced attitudes toward engaging in safety behaviors, intentions to share safety information with others, and perceptions of the safety message. Further analyses indicated that ease of imagery partially mediated the relationship between the imagery manipulations and these outcomes. Other potential mechanisms for these effects are discussed.

Risk perception is considered an integral construct for understanding and predicting health behavior, as reflected by the inclusion of this concept in many prominent theories of health behavior (Ajzen & Madden, 1986; Rogers, 1983; Rosenstock, 1990; Sutton, 1982; Weinstein & Sandman, 1992; Witte, 1992). Similarly, risk communication often plays a major role in health campaigns (Campbell & Babrow, 2004; Emmons et al., 2004; Reynolds & Seeger, 2005; Witte, 1992), the assumption being that individuals must first understand the risk associated with a health or safety threat before they will change their behaviors to reduce that risk.

Given the theoretical link between risk perception and health behavior, it is important to understand how to most effectively communicate risk information in health and safety messages. A component of risk perception frequently targeted in communication efforts is perceived susceptibility, or an individual's beliefs about the likelihood he or she will experience the negative outcomes associated with a health or safety threat (Murray-Johnson & Witte, 2003; Witte, 1992). Perceived susceptibility can be influenced by a variety of message variables, including personalized references (Stephenson & Witte, 1998), message tailoring (Kreuter, Farrell, Olevich, & Brennan, 2000), similarity to or empathy with the message target (Campbell & Babrow,

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2004; Gonzales, Goepplinger, & Lorrig, 1990), and active engagement (Emmons et al., 2004). In addition to influencing perceived susceptibility to a risk, another goal of risk communication is to persuade the recipient to engage in behaviors that will reduce or avert the risk (Murray-Johnson & Witte, 2003). To accomplish this, a two-part, "problem–solution" framework is often adhered to, in which information about a particular safety or health threat is presented first, followed by recommended behavioral changes (Leventhal & Singer, 1965; Maddux & Rogers, 1983; Rogers, 1975, 1985).

In this study, we examined the use of mental imagery instructions to communicate risk information. Mental imagery, also referred to as mental simulation, involves the process of forming a cognitive representation or "picture" of an event or series of events (Escalas & Luce, 2003; Taylor & Schneider, 1989). To test the impact of imagery on perceptions of risk susceptibility and attitudes toward safety recommendations, we conducted a field experiment examining two types of mental imagery instructions embedded in a workplace safety message for farmers.

MENTAL IMAGERY AND LIKELIHOOD JUDGMENTS

Research has shown that mentally simulating a hypothetical event or situation can increase expectations that such an event will actually happen (Gregory, Cialdini, & Carpenter, 1982; Gregory, Burroughs, & Ainslie, 1985; Sherman, Cialdini, Schwartzman, & Reynolds, 1985). For example, after being asked to imagine the victory of a political candidate, participants were more likely to believe that the candidate would be voted into office (Carroll, 1978). Because mental imagery increases the accessibility of the imagined event, a person is more likely to perceive the event as probable when asked to estimate the likelihood of its occurrence (Carroll, 1978; Gregory et al., 1982; Sherman et al., 1985). Similarly, imagery instructions that are focused on the self increase expectations that a hypothetical event will happen to oneself. Participants who were asked to imagine themselves in positive or negative situations judged these events as more likely to happen to them compared to participants who imagined another person (rather than themselves) in the scenario (Anderson, 1983) or participants who did not engage in imagery at all (Gregory et al., 1982). These findings suggest that using self-targeted imagery in the context of risk communication may also increase perceptions of risk susceptibility.

MENTAL IMAGERY, ATTITUDES, AND BEHAVIOR

Within the context of advertising and consumer decision making, mental imagery has been shown to favorably influence attitudes toward the advertisement (Babin & Burns, 1997; Escalas, 2004; Homer & Gauntt, 1992), brand attitudes (Babin & Burns, 1997; Bone & Ellen, 1990, 1992; Escalas, 2004; MacInnis & Price, 1987), purchase intentions (Bone & Ellen, 1990, 1992; Escalas & Luce, 2004), and compliance (Gregory et al., 1982). For example, participants who received a brochure in which they were asked to imagine themselves enjoying the benefits of cable television had more positive attitudes toward cable and were more likely to subscribe than were participants who received a brochure stating features and benefits in the third person (Gregory et al., 1982). Similarly, embedding imagery instructions into a car advertisement (e.g., "Imagine the car in your mind . . . ," "Picture it . . . ," "Feel it . . .") led to greater vividness of processing and more favorable attitudes (Babin & Burns, 1997).

Imagery effects on attitudes and intentions are facilitated by advertisements that include high amounts of contextual details (Krishnamurthy & Sujan, 1999) and a strong narrative or "story-telling" dimension (Escalas, Moore, & Edell, 2004). Ease (Petrova & Cialdini, 2005) and vividness (Ayres, Hopf, & Edwards, 1999; Keller & Block, 1997) of the imagery are also found to contribute to the persuasive impact of mental simulation instructions. In addition, the degree to which imagery instructions are self-relevant appears to play a significant role in these effects. For example, Bone and Ellen (1990, 1992) manipulated imagery by creating advertisements in which the main character was either the participant ("you") or an eccentric chemistry professor. Greater imagery processing and more positive attitudes toward the advertisement occurred only when participants imagined themselves as the main character.

Parallels exist between the imagery effects described here and self-referencing effects that have been identified in the persuasion literature (Burnkrant & Unnava, 1989, 1995). Self-referencing refers to the process by which self-relevant associations are formed between incoming information and information stored in memory (Burnkrant & Unnava, 1995). Typically, self-referencing manipulations contain targeting of the reader through the use of second-person wording and the use of cues to recall past autobiographical memories related to the content of the advertisement (Burnkrant & Unnava, 1989; 1995; Sujan, Bettman, & Baumgartner, 1993). Advertisements that contain these components produce enhanced message elaboration and (if the arguments contained in the ad are strong) more positive attitudes (Burnkrant & Unnava, 1989; 1995; Debevec & Iyer, 1988). Manipulations of imagery differ from self-referencing in terms of their focus on future hypothetical events (rather than autobiographical memories)[1]

[1]This may be a key dimension on which these two strategies differ, given that Burnkrant and Unnava (1989) suggest that the impact of self-referencing on persuasion is due to increased processing ability that stems from the associations made between retrieved memories and information in the advertisement.

and their inclusion of explicit instructions to imagine. In spite of these differences, it is possible that self-referencing and imagery engage some of the same processes, because the use of second- versus third-person voice has been a component of both types of manipulations (Bone & Ellen, 1990, 1992; Burnkrant & Unnava, 1989, 1995; Meyers-Levy & Peracchio, 1996). Thus, imagery manipulations may have the added effect of increasing self-referent processing, as well as mental imagery. If this is the case, such increases in self-referent processing may further facilitate the persuasion effects of the imagery manipulation.

EFFECTS OF MENTAL SIMULATION ON PLANNING AND GOAL-SETTING

Past work has also documented the impact of mental imagery on goal setting behaviors (Pham & Taylor, 1999; Taylor, Pham, Rivkin, & Armor, 1998), demonstrating that engaging in mental simulation facilitates the development of an action plan to reach one's goals. Mental simulation that focuses on the *process* of reaching a goal, rather than the *outcome* of having completed or achieved a goal, appears to provide the most benefits in terms of directing behavior toward successful goal completion (Pham & Taylor, 1999). This finding is consistent with recent advertising research (Escalas & Luce, 2003) that shows a similar advantage for advertisements that focus on process imagery (imagining the experience of purchasing and using the product) versus outcome imagery (imagining the outcomes or benefits of using the product).

MENTAL IMAGERY AND RISK COMMUNICATION

The previously described findings suggest that embedding self-targeted mental imagery instructions within health and safety messages may be an effective tool in conveying information about risk and safety recommendations. Past research examining imagery in health and safety domains is limited and focuses primarily on likelihood judgments. For instance, participants were more likely to believe they could be involved in an automobile accident after imagining such an event taking place (Gregory et al., 1985). In another study, ease of imagery influenced how likely participants were to perceive themselves at risk for a fictional disease (Sherman et al., 1985). These studies have not directly assessed the impact of imagery within a persuasive health message.

This study examined the impact of two types of mental simulation instructions, mental imagery of risks and mental imagery of safety recommendations, that were manipulated within a National Institute for Occupational Safety and Health (NIOSH) safety document. A sample of Southeastern farmers received a NIOSH message pertaining to the use of skid steer loaders, a type of loading machinery frequently used by farmers that has been linked to risk of injury and mortality when used improperly (NIOSH, 1998). This safety message (based on the NIOSH safety Alert "Preventing Injuries and Death from Skid Steer Loaders") outlined the risks associated with unsafe skid steer loader use, as well as the safety recommendations that should be followed when operating a skid steer loader to avoid or reduce these risks. Imagery was manipulated both in the risk information (risk-focused imagery) and in the recommended safety behaviors (recommendation-focused imagery) through the use of self-targeted imagery instructions, second-person language, and hypothetical scenarios embedded within the safety document. The following predictions were made:

H1: Risk-focused imagery will impact risk perception such that participants who receive a message with self-targeted imagery contained in the risk information will see themselves as more susceptible to workplace accidents involving skid steer loaders than will participants who receive the risk control message.

H2: Recommendation-focused imagery will influence attitudes toward the safety recommendations, such that participants receiving a message with self-targeted imagery embedded in the recommendations will have more positive attitudes toward engaging in safety behaviors and greater intentions to use and pass on the safety information than will participants receiving the recommendation control message.

H3: Risk-focused and recommendation-focused imagery manipulations will impact perceptions of the safety message such that participants who receive imagery instructions embedded in the risk and recommendation information will report greater attention, comprehension, elaboration, positive impressions, and persuasiveness with regard to the message, compared to participants who receive the control (no imagery) versions of these variables.

METHOD

Participants

A total of 314 farmers attending a large Southeastern state fair were recruited over a 10-day period to participate in this study. Prospective power analyses based on the effect size index f (Cohen, 1977) were conducted to ensure that we would have .80 power in detecting medium effects (f = .25). The average participant had been a farmer for 21.8 years. All participants indicated that they used skid steer loaders in their work and reported frequent use of this equipment: 58% used a skid steer loader at least once a month and 38% used it once a week or more. Out of this

sample, 77% reported owning a skid steer loader, and 43% reported supervising others who used skid steer loaders.

Design

A 2 × 2 factorial design was used in this study. Two types of imagery, risk-focused (imagery vs. control) and recommendation-focused (imagery vs. control), were manipulated within the context of the safety brochure. Participants were randomly assigned to each combination of these two variables.

Materials

Safety brochure. The safety message used in this project was a federal government safety "Alert" developed by NIOSH (1998). The NIOSH Alert is a safety message that is used to disseminate information about leading workplace hazards to specific workers who may be at high risk. This particular Alert focused on skid steer loader safety, and targeted farmers and other at-risk occupations. The standard version contained a series of case studies pertaining to the described workplace risks, as well as a series of safety recommendations for preventing the described hazard. Information in both of these sections was systematically manipulated to create "risk-focused" and "recommendation-focused" imagery versions of this standard government message.

Risk-focused imagery manipulation. Risk-focused mental imagery was manipulated within the portion of the NIOSH Alert that illustrated the dangers of unsafe skid steer loader use. Imagery was manipulated through the use of second- versus third-person voice and through the presence or absence of instructions to imagine. Participants received either the standard (control) version of the risk information or a modified (risk-focused imagery) version. Participants receiving the control message read two case studies emphasizing aspects of unsafe skid steer loader use and the consequences that resulted from poor adherence to safety recommendations. The passage began with a general description ("The following situations involve working on or near a skid steer loader."), followed by the case studies. Case studies were framed in the third person, and described incidents that had happened to other farm workers. The following is an excerpt:

> At the time of the incident, the victim was spreading topsoil to prepare for grass seeding. . . . As he approached the edge of the work area, he turned the loader around and backed toward the wall. . . . The left rear tire of the machine went over the wall followed by the right rear tire. . . . The victim, who was not wearing a seat belt, remained inside the cab but came out of the operator's seat. He was knocked unconscious, with his head and chest wedged between the seat and the side screen . . . several coworkers heard the impact and came immediately to the victim's aid. Emergency personnel were unable to find a pulse, and the victim was pronounced dead at the scene by the medical examiner.

Participants receiving the imagery version of the message viewed the same case study information; however, it was reframed as a scenario in the second-person voice ("you") in which participants were asked to imagine themselves as a target of a high-risk situation resulting from unsafe use of the equipment. Instructions to imagine were provided ("Imagine yourself in the following situations involving work on or near a skid steer loader") followed by the risk scenarios. The following is an excerpt:

> Imagine you are spreading topsoil to prepare for grass seeding. . . . As you approach the end of the work area, you turn the loader around and back toward the wall. The left rear tire goes over the wall, followed by the right rear tire. . . . You are not wearing your seatbelt. You remain inside the cab, but come out of the operator's seat. You are knocked unconscious, and your head and chest are wedged between the seat and the side screen. . . . Several coworkers hear the impact and immediately come to your aid. Emergency personnel are unable to find your pulse, and you are pronounced dead at the scene by the medical examiner.

Recommendation-focused imagery manipulation.. Mental imagery was also manipulated within the safety recommendation section of the Alert. Participants received either the control version of the recommendations or a modified version in which they were given instructions to imagine themselves carrying out these safety recommendations during their next skid steer loader use. Participants receiving the control version read a series of safety recommendations, such as the following excerpt:

> The following subsections discuss the safety recommendations in detail: Regularly inspect and maintain all safety devices provided by manufacturers, . . . Make sure that the seat belt is secured around the operator whenever the seat is occupied. . . . If seat belts are part of the interlocked control system, they protect workers from being caught and crushed between the lift arms and frame.

Participants receiving the imagery version received the same recommendations; however, self-targeted imagery instructions (e.g., "Imagine yourself" "Picture yourself" "See yourself") were embedded in multiple places throughout the passage, and participants were asked to imagine themselves engaging in the safety recommendations during their next instance of using a skid steer loader. Second-person voice ("you") was used in the passage to communicate the imagery instructions:

> Think about the next instance in which you might work on or near a skid steer loader. In the following subsections *picture yourself* [italics added] going through the steps necessary to keep you safe while operating the skid steer loader:

> *Imagine yourself* [italics added] regularly inspecting and maintaining all safety devices provided by manufacturers. . . . As you sit down in the loader, you make sure to secure your seatbelt, because you know that it will protect you from being caught and crushed between the lift arms and frame.

Measures

Perceived susceptibility. Participants rated the degree to which they believed that they were at risk for an accident involving the use of a skid steer loader (on a 5-point scale ranging from "strongly disagree" to "strongly agree").

Attitudes toward safety behaviors. Participants were asked to rate their attitudes toward engaging in each of four specific safety behaviors that had been included in the safety recommendation portion of the message ("Working with the seat belt fastened and restraint bar in place"; "Avoiding the use of foot or hand controls for steps or handholds"; "Keeping foot controls on a skid steer loader free of ice, snow, and debris"; and "Setting the parking brake and turning off the engine before exiting"). Each attitude item was rated on a 5-point scale (ranging from "very bad" to "very good").

Intention to share information. Participants were asked to report their intention to pass the safety brochure and safety information on to other farmers. This was assessed with dichotomous response options, with participants indicating a "yes" or "no" response.

Message ratings. Participants rated the safety message on a series of questions scored on 5-point response scales. Specifically, participants rated the degree to which they agreed that the message caught their attention (attention), was easy to read and understand (comprehension), and led them to think about the dangers of operating or working near skid steer loaders (thought). They also rated their overall opinion of the safety brochure (liking) on a 5-point scale ranging from "very good" to "very bad." Perceived persuasiveness of the message was measured with 2 items ($\alpha = .69$), rated on 5-point scales that asked participants to rate how strong and how convincing the safety message was.

Ease of imagery. Participants rated their agreement with the statement "It was easy for me to form a visual picture when reading the Alert" on a 5-point scale ranging from "strongly disagree" to "strongly agree."

Demographic information. Participants reported the number of years they worked in the farm industry, how often they operated a skid steer loader, whether they owned a skid steer loader, and whether they supervised anyone who operated a skid steer loader.

Procedure

Participants recruited at a large Southeastern state fair were asked to read a safety brochure about skid steer loader use and fill out a short survey about their safety attitudes and beliefs, as well as their reactions to the message. On completion of the survey, participants received a safety brochure to take with them, as well as additional safety information and novelty items (stickers, note pads, cup holders) provided by NIOSH.

RESULTS

Manipulation Check

An analysis of variance (ANOVA) was conducted to examine the impact of the mental imagery manipulations on self-reported ease of imagery. Ease-of-imagery ratings were significantly influenced by the recommendation-focused imagery manipulation, $F(1, 305) = 4.4$, $p = .04$, $\eta^2 = .014$, such that participants who received the version of the recommendations with self-targeted imagery instructions reported greater ease of imagery ($M = 4.4$) than participants who received the control version of the recommendations ($M = 4.29$). The impact of the risk-focused imagery manipulation did not reach significance, $F(1, 305) = 1.02$, *ns*, $\eta^2 = .003$.

Perceived Susceptibility

An ANOVA was conducted to examine the influence of recommendation-focused imagery and risk-focused imagery on perceptions of susceptibility to skid steer loader accidents (see Table 1). A main effect was found for the risk-focused imagery manipulation, $F(1, 310) = 7.4$, $p = .007$, $\eta^2 = .023$. Consistent with H1, participants who received the brochure containing self-targeted imagery in the risk information perceived themselves as more susceptible to skid steer loader accidents ($M = 4.4$) than did participants

TABLE 1
Means and Standard Deviations for Variables

	Risk-Focused				*Recommendation-Focused*			
	Imagery		*Control*		*Imagery*		*Control*	
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Susceptibility	4.35	.80	4.12	.78	4.30	.78	4.17	.73
Attitudes								
Belt	4.64	.63	4.54	.77	4.67	.67	4.51	.74
Controls	4.10	1.33	4.03	1.30	4.24	1.25	3.89	1.35
Debris	4.77	.56	4.64	.70	4.74	.59	4.63	.67
Brakes	4.71	.58	4.65	.63	4.78	.49	4.59	.67
Message ratings								
Attention	4.06	.87	4.16	.62	4.18	.75	4.04	.75
Comprehend	4.25	.57	4.21	.57	4.26	.59	4.21	.54
Thought	4.14	.84	4.31	.65	4.25	.79	4.20	.71
Liking	4.32	.67	4.43	.67	4.48	.63	4.28	.69
Persuasive	4.10	.61	4.16	.63	4.24	.57	4.02	.65

who received the control version (M = 4.1) of the risk information. Recommendation-focused imagery did not influence susceptibility ratings. No significant interactions were found between variables.

Attitudes Toward Safety Behaviors

To test H2, a multivariate analysis of variance was conducted to examine the influence of the imagery manipulations on attitude ratings of the four safety behaviors. Because each attitude item measured the farmer's attitude toward engaging in a separate type of safety behavior, attitudes scores across the four behaviors were only moderately correlated (*r*s from .19–.41). Therefore, ratings were not summed into an overall attitude score but were instead treated as separate variables. In support of H2, recommendation-focused imagery had a significant impact on attitudes toward the safety recommendations, $F(4, 304) = 2.8$, $p = .02$, such that participants who received recommendations containing self-targeted imagery instructions had more positive attitudes toward engaging in the four safety behaviors than did participants who had received the control version of this variable. Follow-up ANOVAs were conducted to examine effects for each safety behavior (see Table 1). Results indicate that participants asked to mentally simulate engaging in the safety behaviors were more likely to express positive attitudes toward working with the seat belt fastened and the restraint bar in place, $F(1, 311) = 3.71$, $p = .05$, $\eta^2 = .012$; avoiding the use of foot or hand controls for steps or handholds, $F(1, 311) = 5.6$, $p = .02$, $\eta^2 = .02$; and setting the parking brake and turning off the engine before exiting the skid steer loader, $F(1, 311) = 7.6$, $p = .01$, $\eta^2 = .024$. Attitudes toward keeping the foot controls free of debris such as ice and snow were not significantly influenced by the recommendation-focused imagery manipulation, although the means showed a trend in the predicted direction, $F(1, 311) = 2.1$, $p = .14$, $\eta^2 = .01$. The risk-focused imagery manipulation did not influence attitudes toward safety behaviors. No significant interactions were found.

Intention to Share Safety Information

A chi-Square analysis was conducted to see if the imagery manipulations influenced whether participants intended to pass on the safety brochure to other farmers that they knew. A significant effect was found for the recommendation-focused imagery manipulation, $\chi^2 = 3.92$, $df = 1$, $p = .05$. Results indicate that participants exposed to recommendations with imagery instructions (95%) were more likely to report that they intended to pass the safety information on to others than were the participants exposed to the control version of the recommendations (88%). Risk-focused imagery did not have a significant impact on intentions to share the safety information.

Message Ratings

ANOVAs were conducted to examine the influence of the recommendation-focused and risk-focused imagery manipulations on self-reported attention, comprehension, thought, liking, and persuasiveness with regard to the safety brochure (see Table 1). Risk-focused imagery impacted thought ratings, $F(1, 309) = 4.1$, $p = .04$, $\eta^2 = .013$, however, in the opposite direction than had been predicted. Participants who received the brochure that contained imagery in the risk information (M = 4.1) reported that they would think less about the dangers of operating a skid steer loader than did participants who received the control version (M = 4.3) of the risk-focused information. Risk-focused imagery did not significantly influence self-reported comprehension, attention, persuasiveness, or liking of the message.

Recommendation-focused imagery impacted liking of the safety message, $F(1, 309) = 7.49$, $p = .007$, $\eta^2 = .024$, and had a marginal influence on attention to the message, $F(1, 309) = 2.90$, $p = .09$, $\eta^2 = .01$. Specifically, participants who received the message containing self-targeted mental imagery with the recommendations reported more positive attitudes toward the message (M = 4.5) and paying more attention to the message (M = 4.2) than did participants who received the control version of the recommendations (M = 4.3 and 4.0, respectively). Participants receiving the recommendation-focused imagery (M = 4.2) also rated the message as more persuasive, $F(1, 305) = 9.3$, $p = .002$, $\eta^2 = .03$, than did participants in the recommendation control condition (M = 4.0). Recommendation-focused imagery did not influence ratings of comprehension or thought.

Mediation Analyses

If the mechanism underlying the obtained effects is visualization, the ease of imagery ratings that participants completed as a manipulation check should mediate the relationship between the manipulated message variables and the outcome variables. To examine this, we tested whether ease of imagery mediated the effects of the recommendation imagery manipulations on message ratings (liking, attention, persuasiveness) and attitudes toward the safety recommendations. Attitudes toward the four safety recommendations were computed as a single variable for this analysis by computing a mean attitude score for each participant. Because the manipulation check was not significant for the risk imagery manipulation, it was not appropriate to test ease of imagery as a mediating variable for the risk imagery effects on susceptibility and thought ratings (Baron & Kenney, 1986).

Mediation analyses were conducted in SPSS version 14 using the Bootstrap sampling method, as recommended by Shrout and Bolger (2002). Bootstrap analysis provides an empirical test of the significance of estimated indirect (mediated) effects. Using sampling with replacement, a

large number of samples (e.g., 1,000) is drawn from the data set, each of which is of the same sample size as the original sample. The mean indirect effect over all the samples is computed, along with 95% confidence intervals for the effect (Preacher & Hayes, 2004; Shrout & Bolger, 2002). To determine statistical significance, the 95% confidence intervals for the indirect effect are examined; if a value of zero does not fall within the range of the confidence interval, this indicates that the indirect (mediational) effect is statistically significant at a value of $p < .05$.

The path coefficients (unstandardized) resulting from these analyses are displayed in Figures 1, 2, 3, and 4. The pattern of results (across each of the dependent measures) is consistent with mediation, showing a decrease in the effect of the recommendation imagery manipulation on the outcome measure when the mediator (ease of imagery) is controlled for. Empirical tests of the indirect (mediated) effects obtained through the Bootstrap sampling method are reported in Table 2. The indirect effects are significant (at $p < .05$) for liking, attention, persuasiveness, and attitudes

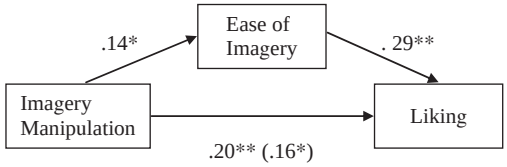

FIGURE 1 Path model for message liking. Values in parentheses represent the direct effect of the independent variable on the dependent variable controlling for the mediator variable. *Note.* All values are unstandardized regression coefficients. *$p < .05$. **$p < .01$.

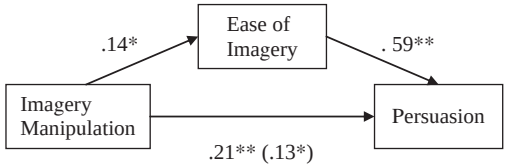

FIGURE 2 Path model for persuasiveness of message. Values in parentheses represent the direct effect of the independent variable on the dependent variable controlling for the mediator variable. *Note.* All values are unstandardized regression coefficients. *$p < .05$. **$p < .01$.

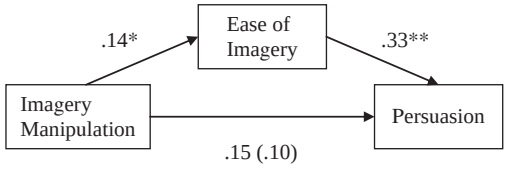

FIGURE 3 Path model for attention to message. Values in parentheses represent the direct effect of the independent variable on the dependent variable controlling for the mediator variable. *Note.* All values are unstandardized regression coefficients. *$p < .05$. **$p < .01$.

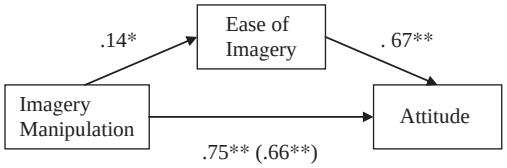

FIGURE 4 Path model for attitude toward the recommendations. Values in parentheses represent the direct effect of the independent variable on the dependent variable controlling for the mediator variable. *Note.* All values are unstandardized regression coefficients. *$p < .05$. **$p < .01$.

TABLE 2
Summary of Indirect Effects

Independent Variable	*Mediator Variable*	*Dependent Variable*	*B*	*95% CI*	*P*
Rec Imagery	Ease of Imagery	Liking	.041	.003–.090	<.05
Rec Imagery	Ease of Imagery	Persuasion	.078	.006–.154	<.05
Rec Imagery	Ease of Imagery	Attention	.045	.004–.101	<.05
Rec Imagery	Ease of Imagery	Rec Attitude	.090	.006–.211	<.05

Note. Rec Imagery = recommendation-focused imagery; Rec Att = attitude toward the recommendations; B = unstandardized coefficient; CI = confidence interval. All values are based on bias-corrected bootstrap estimation.

toward the recommendations, indicating significant mediation. Although ease of imagery was a significant mediator in each of these relationships, it is important to note that the direct effects of the imagery manipulation on the outcome variables were still significant (although smaller in magnitude) when ease of imagery was controlled for, indicating that ease of imagery only partially mediated these relationships.

DISCUSSION

This study examined the impact of a NIOSH communication intervention that used mental imagery instructions and scenarios to convey risk information and safety recommendations to farmers at risk for skid steer loader accidents. Our results indicate that both types of imagery instructions increased the effectiveness of the safety message, although each contributed to different risk communication outcomes. This suggests that both types of manipulations make unique contributions to effective risk communication.

Farmers who were instructed to imagine themselves experiencing the negative consequences, or risks, that could result from negligent skid steer loader use were more likely to perceive themselves as susceptible to skid steer loader accidents. This suggests that incorporating mental imagery instructions into safety messages may be an effective way to convey risk information, leading message recipients to realize their vulnerability to the targeted health or safety risk. This finding is consistent with past research examining the

effects of imagery on likelihood judgments (Gregory et al., 1985; Sherman et al., 1985), and also supports and extends past work indicating that manipulations that increase personal involvement are effective in increasing perceptions of susceptibility (Kreuter et al., 2000; Stephenson & Witte, 1998).

Farmers who received a safety message that encouraged them to mentally simulate engaging in safety behaviors reported more positive attitudes toward engaging in the safety recommendations and were more likely to indicate that they would share this safety information with other farmers, compared to farmers who received a control version of the safety recommendation information. Manipulating imagery within the safety recommendations also led to greater liking of the message, more positive ratings of message persuasiveness, and slightly higher attention toward the message. These findings suggest that manipulating imagery within safety recommendation information can be an effective persuasive strategy for changing safety and health attitudes, similar to the way in which mental imagery increases brand and product attitudes within consumer advertisements (Babin & Burns, 1997; Escalas, 2004).

Risk-focused imagery did not lead to more favorable reactions to the message or more positive attitudes toward the recommendations. Contrary to predictions, participants who received the imagery version of the risk information were less likely to report that the message would make them think about the dangers associated with using a skid steer loader, compared to participants who received the control version of this manipulation. One possible explanation is that engaging in mental simulation of the risk information scenarios led participants to imagine themselves in negative situations in which the consequences were often quite severe. Past work has shown that in cases where messages generate very high levels of fear, this can have the counterproductive effect of preoccupying individuals or making them defensive (Dillard, 1994; Witte, 1995). Similarly, it has been suggested that the persuasion effects noted in advertising studies may stem in part from positive emotions resulting from mental imagery (Goossens, 1994). In cases where mental imagery leads to less positive or even negative affect, attitude change may not be facilitated in the same way.

Ease of visualization was examined as a potential mediator of the effects found in this study. Surprisingly, the inclusion of imagery instructions in the risk information did not lead to an increase in self-reported ease of imagery. This suggests that another mechanism may account for the effects of the risk-imagery manipulation on perceived susceptibility and thought ratings. Ease of visualization partially mediated the influence of the recommendation- focused imagery manipulation on attitudes and message ratings, indicating that these effects were due in part to the increased visualization that occurred when second-person language and imagery instructions were used to convey safety recommendations. However, the absence of full mediation (i.e., the recommendation manipulation still had a strong, significant effect even when controlling for ease of imagery) indicates that ease of imagery was not the only mechanism by which our manipulations had their impact.

One interpretation of this pattern of findings is that, in addition to stimulating visualization processes, our messages may have also increased elaboration due to self-referencing. As previously observed, the use of second- versus third-person language (which was incorporated into the imagery manipulations used here) has also been a component of self-referencing manipulations (Burnkrant & Unnava, 1989; 1995). Under conditions of strong message arguments, self-referencing leads to greater message elaboration and, consequently, more positive attitudes (Burnkrant & Unnava, 1989; 1995). Thus, self-referencing triggered by our messages may have increased elaboration of the strong arguments contained in the safety message, contributing to the persuasion effects.

However, because elaboration was not assessed in this study, we were not able to directly examine it as a mediator of these findings. Another possibility is that other components of imagery processing, such as vividness, quantity, and detail of the imagery, underlie these effects. Past research has shown that because images of future events or future aspects of the self are often vague (Johnson, Foley, Suengas, & Raye, 1988), high levels of contextual detail enhance the formation of rich, detailed images, and facilitate persuasive impact (Krishnamurthy & Sujan, 1999). Therefore, it may not necessarily be the ease with which the image is formed but rather the richness and detail of the imagery that contributes to effects on persuasion and risk susceptibility.

This study is not without limitations. Self-report measures raise the concern of common method variance and are subject to socially desirable responding. Also some of our constructs were assessed with a single item. To address these concerns, future work in this area should strive for a multimethod multimeasure approach to avoid biases associated with a single methodology. In addition, we were not able to measure whether farmers actually went on to use these safety behaviors. Although the link between attitudes and behavior has been well documented in the literature (Ajzen, 1991; Ajzen & Fishbein, 1980; DeVellis, Blalock, & Sandler, 1990; Kim & Hunter, 1993a, 1993b; Montano & Taplin, 1991), the use of behavioral outcome measures would provide additional evidence as to the impact of this communication intervention.

In future work, the generalization of these effects to other types of safety and health behaviors should be explored. It will also be important to examine the impact of imagery on actual behavior or compliance with safety and health recommendations. In addition, we suggest that researchers continue to examine the mechanisms that underlie mental imagery effects in risk communication. Because

imagery and self-referencing manipulations share several of the same components, it will be particularly important to disentangle self-referencing and imagery effects on persuasion and examine whether similar mechanisms underlie both of these persuasion strategies.

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