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Testing a susceptibility threshold for risk promotion messages in the shark diving context

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ABSTRACT

This paper presents the results of two experiments designed to test a susceptibility threshold in the shark cage diving context, positing that persons who are high relative to low sensation-seekers are more likely to approach risks that are portrayed as scary and moderately probable. The results of study one provide evidence for the susceptibility threshold showing high sensation-seekers having greater behavioral intent to engage in risk behaviors when a message portrays a scary but only moderately probable risk. The second experiment finds high susceptibility messages result in more negative attitudes and behavioral intentions. Implications for risk message design and theory are addressed.

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KEYWORDS

Risk messages; severity; susceptibility; sensation-seeking; fear appeals; sharks

Introduction

Risk communication campaigns are an important source of risk-related information as people make decisions about whether or not to engage in a behavior. Health communicators, often through the use of fear appeals, rely on perceptions of risk as a key factor influencing risk-protective decisions. Fear appeals are typically designed to enhance perceptions of the severity (scariness of the risk) and susceptibility (probability of the risk occurring) to a risk in order to promote fear responses and ultimately influence action (e.g. Witte 1992; Rogers 1975). The extent to which someone perceives a risk as severe and probable functions with other social–psychological factors to motivate information seeking, attitudes, and risk reduction decisions (Carpenter 2010; Tannenbaum et al. 2015).

There is a large consumer-sector in the economy that actually exists to promote risk-taking both in the health and experience sectors: tobacco consumption, celebratory alcohol consumption, sky-diving, extreme skiing, shark diving, even space exploration. Content analysis data reveals that some of the communication strategies used to promote risks may not be that different from those used in risk reduction. Indeed, the consumer sector promotes risky behaviors, in part, through communicating severity and susceptibility information about risks while leveraging the positive emotional and social benefits of scary experiences and presenting the negative outcomes of risks as improbable (Lapinski et al., 2013). Indeed, there appears to be an
understanding in the risk promotion sector that scary experiences are sought-out by certain types of people; likely high sensation-seekers.

In this paper, we have sought to understand the mechanisms to explain how risk-taking is promoted to sensation-seekers and propose and test the concept of a susceptibility threshold derived from the work of Lapinski et al. (2013) which deals with how high sensation-seekers respond to risk messages and use risk information in their decisions. The susceptibility threshold compares high and low sensation-seekers’ response to risk information and is based on the assumption that people who are high and low sensation-seekers process and respond to information about risks in different ways (Stephenson & Palmgreen 2001).

Specifically, the susceptibility threshold posits that high sensation seekers are likely to weigh the severity of a risk and the probability of a risk as unique attributes when deciding whether or not to act. It posits that high sensation-seekers will be most likely to take a risk under conditions when a risk is portrayed as severe (that is, very scary) yet only moderately likely to result in negative outcomes for them (moderate susceptibility). We further predict and test the possibility that risk information results in positive emotional responses for high sensation-seekers but not low sensation-seekers. People who are lower in sensation-seeking are likely to take risk protective action (or avoid the risk) particularly when a risk is portrayed as severe and highly probable. This mechanism can explain differences in response to risk messages for high and low sensation-seekers and might also explain why high sensation seekers are more prone to risk taking (Zuckerman 1979).

The two experiments presented here test this prediction and extend the literature on risk messages in three key ways. First, by testing for the unique and multiplicative effects of severity and susceptibility information embedded in risk communication on behavioral decisions it unpacks these variables rather than bundling them together as has been done in recent research (Tannenbaum et al. 2015). Second, in response to Tannenbaum and colleagues call to identify the individual difference factors that might influence response to fear appeals, it tests for the moderating role of sensation-seeking in the relationship between risk information and behavioral decisions. Third, it extends research and theory on fear appeals to human-wildlife interactions specifically to the issue of cage diving with great white sharks. As such, the current paper presents the results of two experiments designed to test for the susceptibility threshold in order to address the gap in our understanding of the mechanisms behind the role of severity and susceptibility information in behavioral decisions.

Severity and susceptibility in risk messages

The most robust literature to look to in order to understand how people respond to risk messages is the literature on fear appeals. There are at least six theories of fear appeals, all of which include the concepts of severity and susceptibility in their design. Because our purpose here is not to test a particular theory but to understand the ways in which susceptibility and severity information function in decision-making, we will focus only on key concepts and lessons derived from prior reviews and meta-analysis data (Boster & Mongeau, 1984; Witte 1992; Witte and Allen 2000) used to inform the design of the present study.

In two of the major theories of health risk messages, the health belief model (HBM; Becker 1974; see Carpenter 2010 for a review) and the extended parallel processing model (EPPM, Witte 1992; Maloney, Lapinski, and Witte 2011) perceived threat is comprised of two key dimensions: perceived severity and perceived susceptibility. Perceived severity is conceptualized as beliefs regarding the seriousness of the threat and perceived susceptibility is conceptualized as beliefs regarding one’s chances of experiencing the threat (Witte 1992). In the most recent comprehensive examination of fear appeals studies, Tannenbaum and colleagues quantitatively synthesized the findings from 248 independent samples (total $N = 27,372$) and tested the propositions of 6
theories. In general, their review found that fear appeals have a positive impact on attitudes, intentions, and behaviors but that susceptibility and severity in messages had distinct effects. A ceiling effect was evidenced where for certain highly frightening behaviors where fear appeals were ineffective in influencing either perceptions of severity or outcomes like attitudes and behaviors. They identified several moderators of the effects of messages on behavioral intent and behaviors. The moderation analysis indicated fear appeals are most efficacious when messages include efficacy statements, promote high susceptibility and severity, recommend one-time only rather than repeated behaviors, and target women.

Tannenbaum et al. (2015) conclude that severity and susceptibility should be considered independently and that their multiplicative effects should be tested (also the conclusion of Popova 2012). They also conclude the need for additional understanding of individual difference variables (like sensation-seeking) in response to severity and susceptibility information. Further, they concluded that for highly threatening issues, it may not be possible to influence severity and susceptibility perceptions with messages. The topic of our current study (cage diving with great white sharks) may be an issue about which risk perceptions are already too high to be influenced by risk messages and is therefore presented as a research question below.

Lapinski et al. (2013) proposed that for people who are high sensation-seekers in particular, there is a susceptibility threshold for response to severity and susceptibility information about a risk but this prediction has not been tested empirically. Zuckerman (1979) characterized sensation-seeking as a personality trait exemplified by an intense need for stimulation and suggested high sensation-seekers desire intense experiences (see Hittner and Swickert 2006; Wilson and Scarpa 2011 for meta-analytic reviews); but little is known about how sensation-seeking impacts response to risk information (Tannenbaum et al. 2015).

The susceptibility threshold may explain why certain risks are approached by high sensation-seekers and was first identified through examination of the content of cage diving promotion websites. These sites contain messages about the severity and probability of risks associated with sharks and cage diving; yet, these sites are designed to promote the behavior (Lapinski et al. 2013). In particular, the susceptibility threshold concept is based on an interactive effect of susceptibility and severity perceptions resulting from risk messages on attitudes toward a risk and risk-related behaviors. When high sensation-seekers perceive risks that are very scary (high severity) risks, they are motivated to approach those risks because of the anticipation of positive emotions associated with scary risks (e.g. people who love horror films). It is perceptions of susceptibility to the risks that moderates their behavioral response. Perceptions of susceptibility that are low (e.g. ‘it is very unlikely something bad will happen’) or moderate (e.g. “it is possible that something bad could happen”) should result in behavioral action, but high perceived susceptibility (e.g. “it is very likely something bad will happen”) should inhibit behaviors. That is, susceptibility perceptions above a moderate threshold inhibit desire to engage in the behavior.

High sensation-seekers desire to engage in highly scary behavior, but only when they do not perceive themselves to be at too high of a risk of actually suffering the negative consequences of a scary behavior. As such, there is a tipping point for the effects risk messages on behavioral action. Scary messages can portray a risk as moderately probable (the risk could happen), but not highly probable (the risk will happen), if they are designed to motivate action for high sensation-seekers. On the other hand, low sensation-seekers should avoid high or even moderately severe risks regardless of susceptibility level. Thus, a three-way interaction is predicted between sensation-seeking, severity messages, and susceptibility messages for their effects on attitudes toward a behavior and behavioral intention. The current study was designed around an issue people perceive as risky: cage diving with great white sharks (Davey et al. 1998; Gore et al. 2011; Pringle 2001). Although there are many types of human-shark interactions offered in the experience industry (with varying degrees of risk associated with them), we focus here on cage diving with great white sharks. Both the animal (i.e. great white shark) and the action (i.e. cage diving) are likely to have high risk perceptions associated with them. Like severe diseases such as HIV/
AIDS, it may be the case that perceived severity exists at its maximum level and messaging may have little effect on perceptions. As such, it is important to understand how people respond to risk messages about cage diving with great white sharks and differences in sensation-seeker’s response to messages about the severity and susceptibility of the risk.

RQ1: Will severity and susceptibility information in messages have unique effects on participants’ perceptions of severity and susceptibility of risks?

RQ2: Will levels of sensation-seeking be associated with differences in the ways in which severity and susceptibility are perceived in risk messages?

The following predictions test the susceptibility threshold:

H1 and H2: There will be a three-way interaction between sensation-seeking, severity, and susceptibility such that high sensation-seekers relative to low sensation-seekers are likely to have positive attitudes toward cage diving (H1) and behavior intentions (H2) when the risk is portrayed as highly severe and moderately probable.

In short, the effects of susceptibility on behaviors are predicted to be non-linear for high sensation-seekers and linear and negative for low sensation-seekers. The a priori specified contrast coefficients for this effect are presented in Table 1.

**Experiment 1**

**Method**

This study used a 2 (low/high severity message) × 3 (low/medium/high susceptibility message) between subjects, post-test only experimental design with random assignment. Sensation-seeking was a measured independent variable; attitude toward the risk and behavioral intention were the measured dependent variables.

**Participants**

Participants (N = 403) were undergraduate students at a large Midwestern university. Average age of participants was 20.05 (sh = 1.85); 67.5% of participants were female. Participants represented several major concentrations including communication, accounting, education, fisheries and wildlife, psychology, and nursing. The majority of participants indicated they were White (77.6%), 6.7% reported as Black or African-American, 7.2% Asian or Asian-American, 2.7% Hispanic or Latino/a, and 4.2% self-identified as another race or ethnicity.

**Procedure**

Participants were recruited through an online research participant pool at a large Midwestern university and through email distribution by course instructors across several departments; participants were provided course credit. After providing consent and answering demographic questions, participants were informed that they would be reviewing a website with information about a potential study abroad activity (i.e. shark cage diving in South Africa) and would be answering questions about it following their review of the website. Participants were randomly assigned to see either a low severity or high severity message and then were randomly assigned to see either a low, medium, or high susceptibility message. The number of participants in each condition is presented in Table 1.
assigned to one of six message conditions; slightly uneven sample size across conditions can be attributed to the random assignment. After viewing the website, participants answered questionnaire items pertaining to their attitudes and beliefs. Specifically, participants first answered questions about their perceptions of the website followed by their perceived level of severity and susceptibility to the risks associated with diving, fear of shark cage diving, evaluations of sharks, attitudes and behavioral intention, and finally sensation-seeking. All procedures and materials were institutional review board approved.

Stimulus materials. Six distinct websites were created for this study (see Appendix Supplementary material) which were strategically designed to influence peoples’ perceptions of risk (both severity and susceptibility) associated with cage diving with sharks. The websites were focused on a study abroad opportunity that included cage diving as one of the activities and were developed to mirror the format of other cage diving websites as described in Gore et al. (2011). Format, layout, color, background, photos, and the majority of the message text remained constant across the websites; only specific sections of text indicating severity and susceptibility and call out boxes highlighting this information were altered. These sections indicated that cage diving was either a low or high severity activity, and participants were at a low, moderate, or high level of susceptibility. Small callout boxes repeated and highlighted these severity and susceptibility messages to make them more visible to participants. Self-efficacy information was kept high across all conditions.

Measures

Unless otherwise noted, all measures used seven-point Likert-type scales with one indicating strongly disagree and seven indicating strongly agree; items were derived from published measures (e.g. Witte and Allen 2000) and were subject to confirmatory factor analysis (CFA) following Byrne (2001) using Amos 12.0. There were few missing data, but it was handled using listwise deletion for the measurement analysis and SPSS 22 defaults (listwise for most model tests) for the hypothesis testing.

Severity. Four Likert-type items (e.g. ‘I believe shark diving is scary’) were used to measure perceived severity. The scale was analyzed using CFA and demonstrated acceptable fit ($\chi^2(2)=2.3, p=.32, \text{CFI}=.99, \text{RMSEA} = .02$). These items were averaged to create a severity scale ($M=4.55, SD = 1.38, \alpha = .81$) with higher scores indicating greater perceived severity.

Susceptibility. Four Likert-type items (e.g. ‘I am at risk for getting seriously injured diving with sharks’) were used to assess perceived susceptibility. CFA of the items demonstrated acceptable fit ($\chi^2(2)=2.3, p=.32, \text{CFI}=.99, \text{RMSEA} = .02$); thus, the items were averaged to create a susceptibility scale ($M=4.32, SD = 1.45, \alpha = .84$) in which higher scores indicate greater perceived susceptibility.

Sensation-seeking. Participants responded to 17 items from the Zuckerman Sensation-Seeking Scale-Form V (SSS-V) scale representing all four dimensions of sensation-seeking. The SSS-V items use a semantic differential response format with answer options ranging from one to seven (with higher numbers indicating greater levels of sensation-seeking). The Zuckerman SSS-V sensation-seeking scale has been used as the gold standard for measurement of sensation-seeking in diverse contexts (Zuckerman 2007; Zuckerman, Eysenck, and Eysenck 1978). Despite the widespread reliance on the scale, the measurement of sensation-seeking is controversial (see Gray and Wilson 2007) and indicates primary limitations include outdated items (e.g. ‘I enjoy the company of real swingers,’ ‘I stay away from anyone I suspect of being gay or lesbian’), and forced-choice, diametrically opposed answer options.
Previous attempts to confirm the factor structure have been mixed (see Haynes, Miles, and Clements 2000 for example); the four dimension solution reported by Zuckerman, Eysenck, and Eysenck (1978) could not be replicated in the current study. After extensive analysis of the psychometric properties of the scale, the scale was reduced to a four-item measure representing the thrill and adventure seeking dimension of sensation-seeking (e.g. ‘A sensible person avoids activities that are dangerous. v. I sometimes like to do things that are a little frightening.’) and was utilized for the current study. CFA demonstrated acceptable fit \( \chi^2(2)=3.8, p=.14, \text{CFI}=99, \text{RMSEA} = 0.05 \). A higher sensation-seeking score indicates greater thrill and adventure seeking tendencies (\( M=4.45, SD = 1.28, \alpha = .60 \)). Given the measurement issues highlighted here, conclusions about this variable will be interpreted with caution.

**Attitude.** Four semantic differential items were designed to measure attitude toward shark diving (e.g. ‘I think shark diving is: bad… good’) based on previous measures of attitude (Ajzen and Fishbein 1980). Higher values corresponded to more positive attitudes toward shark diving. Analysis using CFA demonstrated acceptable fit \( \chi^2(2)=3.1, p=.21, \text{CFI}=99, \text{RMSEA} = 0.04 \); averaged to create an attitude scale (\( M=3.79, SD = 1.40, \alpha = .88 \)).

**Behavioral intention.** Four Likert-type items (e.g. ‘I intend to go shark diving some day.’) were used to determine the extent to which participants intended to engage in shark diving. CFA demonstrated acceptable fit \( \chi^2(2)=3.1, p=.36, \text{CFI} = 1, \text{RMSEA} = 0.01 \) and the items were averaged to create a scale for behavioral intention (\( M=3.40, SD = 1.86, \alpha = .94 \)).

**Results**

In order to test for the effectiveness of the message manipulations and test the first two research questions, a series of 2 (high/low severity message) \( \times \) 3 (high/moderate/low susceptibility message) ANOVA’s were conducted with perceptions of severity and susceptibility as the dependent variables. The significance level was set a priori at \( p < .05 \) for all tests.

For perceived severity, the analysis indicates a main effect for the severity manipulation such that participants in the high severity condition (\( M=4.75; SD = 1.36 \)), perceived shark diving as more scary than people in the low severity condition (\( M=4.33; SD = 1.38 \); \( F(1, 394) = 8.82, p = .003, \eta^2 = .02, r = .15 \)). There were no differences in perceived severity for the susceptibility manipulation, \( F(2, 394) = 1.75, p = .175 \), and the interaction between manipulated severity and susceptibility did not influence perceived severity, \( F(2, 394) = 1.29, p = .88 \). A review of the means and single sample t-tests indicates that both the manipulated high and low severity means are above the scale mid-point indicating high perceptions of the severity of the risk across experimental conditions (\( p < .05 \)). Thus, the data indicate perceptions of the severity of the risk were induced by the messages as intended, but participants in both message conditions saw diving with sharks as a risky activity. The findings for the effects of the message on perceived severity are acceptable because our hypotheses are primarily focused on the high severity condition.

In terms of perceptions of susceptibility to the risk, analysis indicates the pattern of means for perceived susceptibility were consistent with the message manipulation, \( F(2, 397) = 14.17, p = .001, \eta^2 = .07, r = .26 \); Table 2. Pairwise comparisons indicated all pairs of means were significantly different from each other (\( p < .05 \)) but there was a slight overlap in the moderate and high susceptibility confidence intervals. The severity manipulation (\( F(1, 394) = 3.00, p = .084 \)), and the interaction between the two message manipulations did not have a substantial effect on perceived susceptibility \( F(2, 397) = .66, p = .52 \). These findings suggest participants exposed to the high risk messages perceived higher levels of risk (i.e. severity and susceptibility) than those exposed to a low risk message (RQ1).
In order to address research question two, the sensation-seeking measure was split at the median and included in the ANOVA’s above as an additional predictor. For perceived severity as the dependent variable, analysis indicated the same pattern as reported above for the message manipulations, but there was a significant main effect for thrill-seeking on perceptions of severity. That is, high thrill seekers indicated lower perceived severity of shark diving ($M = 4.13, SD = 1.37$) relative to low thrill seekers ($M = 4.92, SD = 1.29$; $F(1, 386) = 35.35, p = .001, \eta^2 = .08, r = .29$). None of the interaction terms were significant ($p > .05$) indicating no differences in the message effects for high relative to low sensation-seekers. For perceived susceptibility as the dependent variable, only the susceptibility message manipulation had a significant effect; thrill-seeking had no significant impact on perceptions ($F(1, 388) = .93, p = .34$) and the two-way and three-way interaction between message type and sensation-seeking were not significant. Thus, these data indicate differences in the extent to which high vs. low sensation-seekers perceive the severity of risks independent of messages; high sensation-seekers evaluate risks as less severe than low sensation-seekers (RQ2). Differences for perceptions of susceptibility were not evidenced nor were interactions between the message conditions and sensation-seeking.

The hypotheses predicted a three-way interaction between sensation-seeking and the severity and susceptibility messages such that high sensation-seekers are most likely to have positive attitudes toward a risk behavior when the risk is portrayed as severe and moderately probable. This hypothesis was tested with planned contrast analysis using ANOVA$^{23}$; the a priori specified contrasts are shown in Table 1. The analysis indicated the contrast model was a significant predictor of attitude (H1; see Table 3) and behavioral intention (H2; see Table 4). Because contrast coding is designed to examine linear models, the significance tests are of limited utility, and as such, it is useful to examine the pattern of means and test for the significance of the quadratic effect. A review of the mean scores for attitude toward the risk behavior (Table 7) do not clearly indicate the presence of a susceptibility threshold. For behavioral intentions, a review of the means provides evidence for the susceptibility threshold (Table 7 and Figures 1 and 2). That is, the greatest behavioral intention to engage in the behavior is seen in the cell in which a high severity, moderate susceptibility message was received by a high sensation-seeker. There is also a main effect for sensation-seeking evidenced such that high sensation-seekers demonstrated greater intent to dive relative to low sensation-seekers; but this is subsumed by the interaction effect among the 3 variable.

**Experiment 1 discussion**

The findings from this experiment indicate several key insights for understanding the use of severity and susceptibility information in behavioral decisions. The messages resulted in
modifications to people’s perceptions of its severity and the probability that something bad could happen if one engaged in the behavior (RQ1) despite the fact that sharks are generally seen as a frightening animal. This experiment also addressed the extent to which differences in sensation-seeking would be associated with differences in the ways in which severity and susceptibility are perceived in risk messages. These data show high sensation-seekers generally saw cage diving with sharks as less frightening than low sensation-seekers. None of the interaction terms were significant indicating no differences in the message effects on severity perceptions for high relative to low sensation-seekers. Thus, the data indicate differences in the extent to which high vs. low sensation-seekers perceive the severity of risks is independent of messages such that high sensation-seekers evaluate risks as less severe than low sensation-seekers (RQ2).

Table 4. Contrast analysis for the effects of the predicted model on behavioral intentions; Experiment 1.

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<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>η²</th>
<th>r</th>
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<td>11</td>
<td>31.32</td>
<td>11.71**</td>
<td>.24</td>
<td>.06</td>
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<tr>
<td>Within subjects</td>
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</table>

Note: Significant at **p = .001.

Table 5. Means (M), standard deviations (SD), and cell sizes (N) for the attitude variable and behavioral intent variables; Experiment 1.

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<tr>
<th>Sev cond</th>
<th>Suscep cond</th>
<th>Thrill seeking median split at 4.75</th>
<th>Dive attitude</th>
<th>Behavioral intent variable</th>
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<tr>
<td></td>
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<td>M</td>
<td>SD</td>
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<td>53</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>3.5237</td>
<td>1.3696</td>
<td>116</td>
</tr>
<tr>
<td>Total</td>
<td>Low</td>
<td>3.3175</td>
<td>1.3869</td>
<td>211</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>4.3320</td>
<td>1.2146</td>
<td>183</td>
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<td></td>
<td>Total</td>
<td>3.7887</td>
<td>1.4028</td>
<td>394</td>
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</tbody>
</table>
Differences among high and low sensation-seekers for perceptions of susceptibility were not evidenced.

Predictions about the susceptibility threshold focused largely on the condition in which high sensation-seekers received information about a risk that was highly severe and moderately probable. The contrast analysis indicated that the data were consistent with the a priori specified contrasts for behavioral intention. That is, for intention to cage dive, the high severity, moderate probability message viewed by a high sensation-seeker resulted in the greatest behavioral intention to cage dive. The effect for the model was relatively small, but in the predicted direction. There is also a clear direct effect of sensation-seeking on behavioral intention such that high sensation-seekers reported greater intention to dive across message conditions.

Effects were less straightforward when attitude toward cage diving was the dependent variable. Although the contrast model was a significant predictor of attitudes, dissecting the model reveals more a complex situation. Again, a direct effect of sensation-seeking was evidenced (i.e. higher sensation-seekers had more positive attitudes toward the behavior), as was a direct effect for each of the message conditions. These effects are in the same direction such that participants in the low severity and low susceptibility conditions had the most positive attitudes toward the behavior relative to the high severity and moderate/high susceptibility messages. Thus, the attitudinal data does not mirror the intention data, making the findings inconclusive; attitude-behavioral consistency although never perfectly associated, suggest the effects should be similar. Taken as a whole, these findings provide some evidence for the susceptibility threshold.

Figure 1. Marginal means for behavioral intent for the three way interaction between severity message (sevcond), susceptibility message (susceptcond) for low sensation-seeking participants (thrill); Experiment 1.
Given the results of the first experiment, further examination of risk perception and the susceptibility threshold was necessary. Importantly, the first experiment failed to assess the extent to which positive and negative emotion was experienced in response to the messages. Of particular interest here, is the extent to which fear and thrill was experienced as a result of reading the messages. A second experiment designed to be a replication and extension of the first experiment is presented below to address these issues.

**Experiment 2**

This experiment was designed to further examine the nature of the relationship between sensation-seeking, susceptibility, and severity and extend the research to include emotional response to the messages. Importantly, the first experiment is also extended by sampling from a different population in a region where participants are likely to have more personal experience with the issue. Further, items were added to the weak sensation-seeking scale used in the first experiment to attempt to provide additional validity and reliability evidence for the scale. As in the first experiment, the effects of susceptibility are predicted to be non-linear for high sensation-seekers and linear and negative for low sensation-seekers in this experiment. The a priori specified contrast coefficients for this effect are presented in Table 1.

H1 and H2: There will be an interaction between sensation-seeking, severity, and susceptibility such that high sensation-seekers are most likely to have positive attitudes toward a risk behavior (H1) and behavioral intentions (H2) when the risk is portrayed as severe and moderately probable.
Additionally, the first experiment did not test for the emotional responses to the messages. In this study, we focus on two particular emotions likely to be important for the issue of shark cage diving: fear and thrill. Previous research suggests that motivations for risk-taking are not limited to sensation-seeking but that anticipated emotional arousal can promote risk-taking (Barlow, Woodman, and Hardy 2013). It is clear from our own research, that positive and negative emotional message content is used in risk promotion messages (Anonymou). Fear response, associated with sharks generally, is common in fear appeal messages (see Witte 1992) and thrill, conceptualized as a keen wave of excitement, is a positive emotion associated with messages about risk-taking (Anonymou). It is plausible to predict that high sensation-seekers will report more thrill and less fear in response to risk messages than low sensation-seekers. As such the following was addressed:

H3: High sensation-seekers will report greater thrill as a result of the messages than low sensation-seekers.

H4: High sensation-seekers will report less fear as a result of the messages than low sensation-seekers.

Method

The procedures from Experiment 1 were replicated with minor adjustments and a sample from a coastal geographical location. Unless otherwise noted, this experiment used the same procedure and measures as the first experiment.

Participants

Participants (N = 616) were undergraduate students at a large Southeastern university. Average age of participants was 19.82 (SD = 3.4); 62.8% of participants were female. Participants represented diverse majors. The majority of participants indicated they were White (67.7%), 10.9% reported as Black or African American, 7.0% Asian or Asian-American, 18.5% Hispanic or Latino/a, and 1.9% self-identified as another race or ethnicity. Five percent of our sample reported prior experience shark diving.

Procedure

The procedure is the same as in the first experiment, with the exception of the inclusion of additional measures described below. Items designed to measure emotional response to the message were placed in the questionnaire after demographics. Measures of self-efficacy and response-efficacy were placed after the sensation-seeking measures.

Stimulus materials

All stimulus materials were the same as in the first experiment, with only the name of the school being adjusted to match the university of the participants.

Measures

All measurement models were tested prior to other model testing using CFA following procedures in Experiment 1.

The severity scale demonstrated acceptable fit $[\chi^2(2)=5.78, p=.06, \text{CFI}=.99, \text{RMSEA} = .06]$; items were averaged to create a severity scale ($M = 4.50, \text{SD} = 1.62, \alpha = .89$) with higher scores indicating greater perceived severity. The susceptibility scale demonstrated acceptable fit
\[\chi^2(2)=0.91, p=.64, \text{CFI} = 1, \text{RMSEA} = 0.001]\]; items were averaged to create a susceptibility scale \((M=4.46, \text{SD} = 1.50, \alpha = .84)\) in which higher scores indicate greater perceived susceptibility.

The 17-item Zuckerman SS-V scale and brief sensation-seeking scale (Hoyle et al. 2002) again failed to demonstrate acceptable fit. Thus, the four item thrill and adventure seeking scale was again used; it demonstrated acceptable fit \(\chi^2(2) =8.26, p=.02, \text{CFI}=.98, \text{RMSEA} = 0.07\). A higher sensation-seeking score indicates greater thrill and adventure seeking tendencies \((M=4.54, \text{SD} = 1.26, \alpha = .65)\).

CFA demonstrated acceptable fit for the attitude items \(\chi^2(2)=5.19, p=.08, \text{CFI}=.99, \text{RMSEA} = 0.05\); items averaged to create a scale \((M=3.27, \text{SD} = 1.02, \alpha = .89)\) with higher numbers indicating more positive attitudes. The behavioral intent items demonstrated acceptable fit \(\chi^2(2) =4.58, p=.10, \text{CFI}=.99, \text{RMSEA} = 0.01\) and the items were averaged to create a scale for behavioral intention \((M=3.17, \text{SD} = 1.81, \alpha = .95)\) with higher scores indicating greater intent.

Discrete emotions resulting from the message were measured with a series of Likert-type items with 7-point response formats that asked about the emotion elicited by the message (e.g. 'This message made me feel frightened'). Two items \((r =.70)\) were designed to measure fear and 3 items to were designed to measure thrill [e.g. 'This message made me feel thrilled (excited, exhilarated).' \(\alpha =.86)\].

**Results**

**Preliminary analysis**

In order to test for the effectiveness of the message manipulations series of 2 (high/low severity message) X 3 (high/moderate/low susceptibility message) ANOVA’s were conducted with perceptions of severity, susceptibility, and fear as the dependent variables. The significance level was set at \(p < .05\) for all tests and the data were examined to determine the extent to which it met the assumptions of ANOVA prior to analysis. For perceived severity, the main effect for the severity manipulation was not significant; participants in the high severity condition \((M=4.52; \text{SD} = 1.63)\), did not perceive diving as more scary than people in the low severity condition \([M=4.49; \text{SD} = 1.52; F (1, 605) =.10, p = .78]\). Bonferoni analysis indicates there are differences in perceived severity for the susceptibility manipulation; low \(M=4.05; \text{SD} = 1.61, \text{medium} M=4.50, \text{SD} = 1.64, \text{high} M=4.99, \text{SD} = 1.48; F (2, 605) =17.72, p = .001; \eta^2 =.055, r =.23\). The interaction between manipulated severity and susceptibility did not influence perceived severity, \(F (2, 605) = .20, p = .81\).

In terms of perceptions of susceptibility to the risks associated with cage diving, analysis indicates the pattern of means for perceived susceptibility were consistent with the message manipulation such that low \((M=3.84, \text{SD} = 1.55)\), medium \((M=4.59, \text{SD} = 1.41)\), and high \((M=4.97, \text{SD} = 1.30)\) conditions differed significantly from each other \([F (2, 603) = 32.84, p = .001, \eta^2 = .10, r =.32]\). Pairwise comparisons using Bonferoni corrections indicates all pairs of means were significantly different from each other \((p < .05)\). The main effect for the severity manipulation and the interaction between the two message manipulations did not have a substantial effect on perceived susceptibility, \(p > .05\). There is a small but significant direct effect for the susceptibility messages on fear, \(F (2, 591) = 9.11, p = .001, \eta^2 =.03\), with the high susceptibility \((M=4.14; \text{SD} = 1.74)\) message resulting in the greatest fear followed by the medium \((M=4.08; \text{SD} = 1.73)\) and low \((M=3.48; \text{SD} = 1.74)\) susceptibility messages. Bonferoni post hoc analysis revealed all means were significantly different except the medium and high means; other main and interaction effects were not significant \((p < .05)\). These findings indicate that the messages did not differentially influence severity perceptions, that risk perceptions associated with shark diving is high, and that modifications to susceptibility content resulted in changes to perceived susceptibility and fear making additional hypothesis testing plausible. Nearly half (46%) of the respondents reported as high sensation-seekers when the data were split at the
scale median (4.5). History of shark diving and self-efficacy did not change the nature of the effects.

**Hypothesis and research question tests**

Testing Hypothesis 1, a 3-way ANOVA model using the message conditions and sensation-seeking median split indicates similar to the prior experiment indicates that the data were not consistent with the predicted interaction for attitudes; \( F(2, 594) = .20, p = .82 \). The data were consistent with a main effect for susceptibility message \( F(2, 594) = 13.95, p = .001 \), partial \( \eta^2 = .05 \) such that people in the high susceptibility message condition \( (M = 3.10, SD = .93) \) had less positive attitudes toward shark diving relative to the low conditions \( (M = 3.52, SD = 1.04; p < .05) \). The moderate \( (M = 3.20, SD = 1.06) \) and high message conditions did not differ significantly and other interactions were not significant \( (p > .05) \). Examination of the means indicates additional contrast analysis is unwarranted to test H1.

H2 predicted a 3-way interaction for the effects of sensation-seeking, manipulated severity, and susceptibility on behavioral intent (the susceptibility threshold prediction for behaviors). The prediction was tested with a 3-way ANOVA model with the message manipulations and median split sensation-seeking as the independent variables and intention to shark dive as the dependent variable. The data were not consistent with the predicted 3-way interaction for behavioral intent although the interaction approached statistical significance, \( F(2, 593) = 2.59, p = .08, \eta^2 = .009 \). There was a small susceptibility message main effect on behavioral intent \( F(2, 593) = 8.097, p = .001, \eta^2 = .03 \). The higher the susceptibility portrayed, the less likely the participants would go diving; low susceptibility \( M = 3.45, SD = 1.88 \), moderate susceptibility \( M = 3.13, SD = 1.84 \), high susceptibility \( M = 2.94, SD = 1.69 \). Bonferonni tests indicated that only the low and high means were significantly different \( (p < .05) \). There was also a main effect for sensation-seeking on intentions to dive \( F(1, 593) = 132.42, p = .001, \eta^2 = .18 \) such that high sensation-seekers \( (M = 3.98, SD = 1.74) \) generally exhibited more positive intent to dive than low sensation-seekers \( (M = 2.47, SD = 1.57) \), the greatest intent to dive was exhibited by high sensation-seekers who received the low severity/low susceptibility messages followed by high severity, low susceptibility messages. When controlling for history of shark diving, the pattern of effects remained consistent. Thus, the data were not consistent with H2.

Testing Hypothesis 3 and 4 using ANOVA with the message conditions and sensation-seeking median split as the independent variables and the thrill scale as the dependent variable, the data indicate that across message conditions, high sensation-seekers experienced greater thrill \( (M = 4.08, SD = 1.59) \) relative to low sensation-seekers, \( M = 3.42, SD = 1.54; F(1, 593) = 23.86, p = .001, \eta^2 = .04 \). A significant interaction between the message manipulations was also evidenced with the ANOVA with fear as the dependent variable indicating that the low sensation-seekers \( (M = 4.09, SD = 1.67) \) exhibited slightly greater fear relative to the high sensation-seekers \( (M = 3.69, SD = 1.76; F(1, 591) = 9.43, p = .002, \eta^2 = .02) \). Thus, the data were consistent with Hypotheses 4 and 5 but the effects were small.

**Experiment 2 brief discussion**

The results of the second experiment indicate risk promotion messages can influence perceptions of susceptibility and result in changes in perceived fear. The findings evidence direct effects for sensation-seeking on emotional response across messages with high sensation-seekers reporting greater thrill and less fear than low sensation-seekers. It does not provide evidence for the susceptibility threshold for either attitudes or behaviors but does show divergent effects for severity and susceptibility messages; susceptibility messages result in lower intentions to engage
in the behavior and less positive attitudes toward the issue regardless of the level of sensa-
tion-seeking.

Concluding Discussion
Risk-promoting messages are an important, but understudied, aspect of risk communication because communicators are typically charged with designing messages to inhibit or decrease risk-taking behaviors. Theorizing in this realm is important because it may be profitable to promote certain risk behaviors to help people avoid others. Moreover, promotion of risks may occur commonly in social networks (Muter, Gore, and Riley 2013), and research on risk promotion can inform the design of risk prevention messages by understanding the theoretical mechanisms driving message response.

The findings from this study suggest several key insights for promotion of risky behaviors. In both experiments, the messages significantly impacted risk perceptions. This finding is interesting when contextualized within prior research; in particular, that of Musthusamy, Levine, and Weber (2009). Like HIV/AIDS, shark diving is an issue for which existing risk perceptions are high, but message effects on perceived risk were still observed; that is, messages can still influence risk perception for a high risk issue. Efficacy content in messages was kept constant [mirroring shark dive websites where diving was promoted as an easy and safe activity for everyone], and including perceptions of it as a covariate in the analysis did not change the nature of the effects. Importantly, severity and susceptibility messages functioned in unique ways; direct effects for severity messages on behavioral intentions were not evidenced in either study while susceptibility messages were predictive of both attitudes and behavioral intent. This is an important consideration for theoretical approaches that combine these variables (e.g. the Risk Perception Attitude framework; Rimal and Real 2003) and for those who design messages to promote or reduce risk behaviors.

The concept of a susceptibility threshold was borne out of earlier studies promoting high risk behavior and still seems to be a reasonable prediction, but if replication is the hallmark of social research, these studies fail to meet that test. The first study showed evidence for the effect in predicting behaviors but not attitudes. The second did not provide additional evidence for the hypothesis. Future research should replicate this study and consider the following limitations in its conduct. The concept may be relevant for messages designed specifically for high sensation-seekers or may explain interpersonal communication about high risk behaviors. It may be the case that alternative methods can uncover additional evidence for it. The implicit theory behind the second experiment is that proximity to the ocean (and sharks) should be influential in how people respond to messages about cage diving. Our effects do suggest that location matters; in particular, our findings indicate that people living in closer proximity to the ocean were less influenced by shark severity messages than those living more distally (but still near a large body of water). Personal experience with shark diving was not consequential in people’s response to the messages, but lifetime exposure to the ocean and shark habitat could be. Future studies can examine this issue in more depth.

These studies were carefully conceptualized and conducted yet a key limitation of this study deals with the measure of sensation-seeking. Poor measurement of this construct is an issue that has plagued research on sensation-seeking for years (see Arnett 1994; Gray and Wilson 2007) and this study is no exception. Despite having carefully examined the newest literature in the area, choosing the scales carefully, and conducting rigorous psychometric testing with our sample data (which were both relatively large samples), ultimately, our CFA analysis could only provide validity evidence for one sub-scale and reliability evidence was weak. Future research should continue to explore the extent to which reconceptualization and perhaps new measurement of this construct are merited. Reviewing early research in this area (e.g. Zuckerman et al. 1978) indicates that the conceptual definitions were derived from exploratory factor analysis.
(EFA) and this may be a reason for the poor model fit in subsequent attempts to measure the concept. That is, rather than conceptualizing sensation-seeking a priori and designing a measurement model with the conceptual definition specified, the sensation-seeking concept was inductively derived and ‘retrofitted’ to explain the statistical results of the EFA (Zuckerman et al.). An opportunity exists for those who see value in the sensation seeking concept to revisit the conceptual aspects of it and rethink existing measurement strategies.

Our findings here are also limited to a particular kind of shark diving; that which involves a cage; there are other kinds of shark diving that might have been referenced by our participants during the study which could have caused measurement error. Our experimental instructions were strategically designed to minimize this possibility. In the main, our scales exhibited strong reliability coefficients reducing the likelihood of this as a major limitation of our findings. As a reviewer points out, this study may be limited by the fact that student samples were used in both cases. We chose this sample intentionally as our purpose was to test the mechanisms behind the susceptibility threshold (i.e. internal validity) and leave future research to test for external validity.

Finally, future research should more carefully consider the role of personal experience with scuba diving and shark diving. In both experiments, we used random assignment to conditions as a method to distribute this experience across conditions (creating initially equivalent groups). In the second experiment, including the measure of shark diving history did not change the nature of our findings but the number of people who had dive experience was small. As such, we acknowledge the role of scuba diving experience in message response which may be more important than geographical location in explaining differences between our two experiments.

In sum, this paper presents the results of two experiments designed to test the extent to which high sensation-seekers are differentially motivated by the content of risk promotion messages and to test the concept of the susceptibility threshold. The data presented here provide some evidence that high and low sensation-seekers respond differentially to risk message content. Future research can consider the limitations herein and provide new methods for examining these study goals for other contexts or using alternative methodologies.

Disclosure statement

No potential conflict of interest was reported by the authors.

Notes

1. Approximately 12 participants did not receive course credit for their participation which may have influenced the nature of their response; see: https://www.niehs.nih.gov/research/resources/assets/docs/ethical_and_practical_considerations_of_paying_research_participants_508.pdf for more information on this issue. Because of the small size of this number relative to the sample size, these participants were included in the analysis.

2. ANOVA is notoriously bad for picking up ‘magic cell’ effects such as we predicted here (F. Boster, personal communication). As such, planned contrasts were used for the analysis. Moreover, ANOVA is designed for linear effects although it can be useful for diagnosing non-linear effects, the significance test is not meaningful.

3. In Experiment 2, items designed to measure other discrete emotions were examined in the preliminary analysis. Two additional covariates were measured: self-efficacy and history of interactions with sharks. Self-efficacy was measured with four items; and a single item (‘Have you gone shark diving in the past?’) assessed prior behavior. Details of measures available from the first author. Including self-efficacy and dive history as a co-variate did not change the nature of the effects.

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