# DISCRETE EMOTIONS IN ANTI-SMOKING CAMPAIGNS: AN APPLICATION OF THE EXTENDED PARALLEL PROCESS MODEL

by

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## LIST OF ABBREVIATIONS

| Abbreviation | Description |
| --- | --- |
| AIDS | Acquired Immunodeficiency Syndrome |
| AU | Action Unit |
| BI | Behavior Intentions |
| CDC | Centers for Disease Control and Prevention |
| CMV | Common Method Variance |
| COPD | Chronic Obstructive Pulmonary Disease |
| EPPM | Extended Parallel Process Model |
| FACS | Facial Action Coding System |
| FEA | Facial Expression Analysis |
| fMRI | Function Magnetic Resonance Imaging |
| GATS | Global Adult Tobacco Survey |
| GSR | Galvanic Skin Response |
| HIV | Human Immunodeficiency Virus |
| HPV | Human Papillomavirus |
| HSI | Heaviness of Smoking Index |
| PSA | Public Service Announcement |
| RBD | Risk Behavior Diagnosis scale |
| WHO | World Health Organization |

# I. INTRODUCTION

"It's just a cigarette and it harms your pretty lungs

*Well, it's only twice a week so there's not much of a chance*

It's just a cigarette, it'll soon be only ten

*Honey, can't you trust me? When I want to stop, I can."*

- Lyrics from *The Cigarette Duet* by musical artist Princess Chelsea

Tobacco use is one of the deadliest vices, yet tobacco products continue to be widely available to and used by millions of Americans. Each year, over 480,000 people in the United States die from cigarette smoking (Centers for Disease Control and Prevention, 2019A). These deaths are preventable – even if someone is already a smoker, they can reduce their risk of death by 90% by quitting before age 40 (Centers for Disease Control and Prevention, 2018). Tobacco use is therefore a key area for health professionals to reduce mortality in a widespread population.

Problematically, youth and young adults continue to be a major target for tobacco advertising (Campaign for Tobacco-Free Kids, 2020). Such targeting warrants scholars' attention because evidence suggests that smokers form tobacco habits early in life. In fact, 98% of smokers begin smoking before the age of 26 (Centers for Disease Control and Prevention, 2019b). In light of the recently passed federal law, Tobacco 21, which raised the legal age to buy tobacco products to 21 (Food and Drug Administration, 2020a), health communication researchers have a unique opportunity to study smoking in a population of 18- to 21-year-olds that legally cannot smoke but may have the means and desire to do so. As such, this thesis targets a young adult population in order to produce insight into the effects of anti-smoking campaigns in a particularly at-risk age cohort.

This study utilizes the Extended Parallel Process Model (EPPM) to investigate the effects of anti-smoking campaigns on college students' emotions, cognitions, and behavioral intentions to abstain from smoking. The EPPM offers a framework for understanding the emotional and cognitive processes that individuals experience in response to threat (severity and susceptibility) and efficacy (self-efficacy and response efficacy) appeals in health campaigns (Witte, 1992). Studies that have applied the EPPM to anti-smoking messaging have demonstrated that anti-tobacco fear appeals can influence positive changes in perceptions, attitudes, and behavioral intentions (Choi et al., 2005; Chun et al., 2018; Owusu et al., 2019; Thrasher et al., 2016; Popova, 2014). The EPPM, therefore, provides a theoretical basis for creating and evaluating effective anti-smoking health campaigns that utilize fear to influence behavior.

This project extends the EPPM's focus on fear by exploring additional discrete emotions (i.e. anger, contentment, guilt, happiness, sadness, surprise) and considering their role within the model, as previous studies have associated fear appeals and their outcomes with emotions beyond fear (Carrera et al., 2010; Dillard et al., 1996; Gali, 2018; Nabi & Myrick, 2019; Swanson, 2016; Timmers & van der Wijst, 2007) and called for similar studies within the EPPM framework (Pokharel et al., 2019; Popova, 2012). In addition, this study incorporates a physiological measure of emotion, facial expression analysis, to gain insight into conscious and unconscious emotional expression (Cacioppo et al., 2007). Physiological measures of emotion are more objective than self-report measures, as the data they provide are not filtered through conscious processing of personal perceptions (Mahler, 2015). In sum, this study provides a deeper understanding of the complex emotions incited by fear appeals and their corresponding outcomes, which will aid health professionals in producing effective messaging.

The following sections of the literature review provide background information for the models, constructs, and methods used within this thesis. The first section includes an analysis of tobacco use by college students in the United States in light of historical trends and recent legislation. The second section explores the core propositions of the EPPM, followed by a review of of previous EPPM research that has focused on tobacco messaging, comparisons of groups by smoking behavior, and discrete emotions. Finally, the third section explains the use of physiological measures in communication research, with a particular focus on their usage alongside the EPPM. The third section concludes with an explanation of facial expression analysis, the physiological measure used in this study. Following the literature review, this thesis includes a report on the methods used in the study, an analysis of results, and a discussion of the study's contributions and applications to future research.

# II. LITERATURE REVIEW

"I feed a weakness or two lest they should get clamorous."

- The Vicar explaining his tobacco habit, from *Middlemarch* by George Eliot

**Tobacco Use in the United States**

While cigarette smoking has declined in the past twenty years (Centers for Disease Control and Prevention, 2019a), cigarette smokers still make up a significant portion of the population. In the United States, as of 2018, 34 million adults (13.7%) smoke cigarettes (Centers for Disease Control and Prevention, 2019a), with 74.6% of these being daily smokers (Centers for Disease Control and Prevention, 2020a). Smoking rates vary between demographic groups. For example, men are more likely to smoke than women (15.6% vs. 12.0%, Centers for Disease Control and Prevention, 2020a). As this study samples college students, smoking rates among young adults are of primary interest. Currently, 7.8% of 18-24-year-olds are smokers (Centers for Disease Control and Prevention, 2020a). Smoking rates decrease as education levels and income increase (Centers for Disease Control and Prevention, 2020a), indicating that rates may be lower for college students than the general population. However, as the vast majority of smokers begin smoking before age 26 (Centers for Disease Control and Prevention, 2019b), a college education should not be considered to be a foolproof shield for young adults against such a highly addictive behavior.

Accordingly, smoking cessation initiatives for college students have achieved mixed success. Thousands of university campuses have enacted smoke-free or tobacco-free policies (American Nonsmokers' Rights Foundation, 2020), but enforcement of these policies varies from campus to campus (T. W. Wang et al., 2018). E-cigarettes and vapes show promise when used as smoking-cessation tools by college students (Mantey et al., 2017). In non-smoking college students, however, using e-cigarettes increases the probability of transitioning to cigarette smoking (Spindle et al., 2017). As such, even as e-cigarettes become more popular (Jones, 2019), cigarette smoking should not be written off as a problem of the past. Anti-smoking initiatives can only go so far if college students still have the desire to smoke.

College students' legal ability to smoke may be hindered in the next year due to a recent federal law, Tobacco 21, that has raised the age to buy tobacco products to 21 years old. In December 2019, Tobacco 21 was put into effect, with retailers being offered a transition period to adjust to the law that has now ended (Food and Drug Administration, 2020a). Nineteen states passed similar state laws prior to the federal law, including Texas (Campaign for Tobacco-Free Kids, 2020a). However, ten of these states (including Texas) put their laws into effect less than six months prior to the federal law, and three states' laws came into effect after the law was signed (Campaign for Tobacco-Free Kids, 2020a). Consequently, 2019 was a critical turning point in state and national tobacco legislation, one that severely limited availability of tobacco products to 18–21-year-olds.

If these laws have been effective, smoking rates should drop for adults in this age demographic, including traditional-aged college students. However, just as the legal age of alcohol consumption being 21 has not prevented underage drinking (Centers for Disease Control and Prevention, 2020a), savvy college students may simply find ways to smoke or vape illegally. As this thesis is being conducted right after these laws were enacted and may include participants who smoked legally prior to their enforcement, the timing is ripe to explore if these legal changes have affected smoking behavior. However, a blanket ban on tobacco use may be ineffective without strategic communication interventions that focus on the devastating health consequences of tobacco. As such, this thesis will be guided by the Extended Parallel Process Model to investigate the effects of messages that focus on the negative health consequences of smoking.

**The Extended Parallel Process Model (EPPM)**

Anti-tobacco campaigns often rely on fear appeals to scare people into smoking cessation or smoking prevention (De Jaeghere et al., 2020). Fear appeals can be defined as “persuasive messages that emphasize the harmful physical or social consequences of failing to comply with message recommendations” (Hale & Dillard, 1995, p. 65) with the goal of motivating positive behavior change. Fear intensity evoked by fear appeals has been shown to be comparable to the fear evoked by stressful life events (e.g. terrorism, hurricanes; Dillard & Li, 2020). The effects of fear appeals can be further strengthened by incorporating efficacy messaging, which includes information on an individual’s ability to prevent a feared outcome. Fear appeals that include efficacy messaging are more effective than fear appeals that only communicate threat (Roberto & Liu, 2018). As such, fear appeals are best tested within frameworks that incorporate these dimensions.

The Extended Parallel Process Model (EPPM) is a composite fear appeal theory that breaks fear appeals into two parts: threat (severity and susceptibility) and efficacy (response efficacy and self-efficacy; Witte, 1992; see Figure 1). Severity is the perceived danger of the threat itself (Witte, 1992), while susceptibility is the perceived likelihood of the threat applying to the participant (Witte, 1992). For example, an anti-smoking campaign might include information about the painful side effects of lung cancer

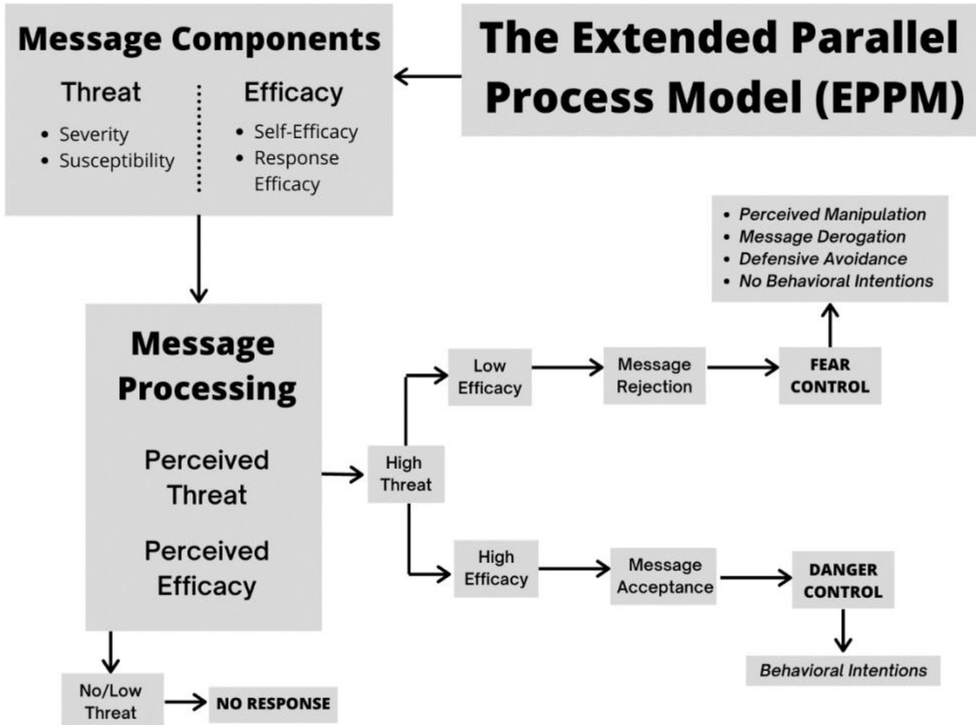


**Figure 1**. *The Extended Parallel Process Model (EPPM).*

(severity) and lung cancer rates among smokers (susceptibility). Response efficacy is the perceived effectiveness of a potential response (Witte, 1992), whereas self-efficacy is the perceived ability of a participant to apply said response (Witte, 1992). For example, an anti-smoking campaign could advise viewers that quitting smoking today will greatly reduce their risk of lung cancer (response efficacy) and affirm that viewers have the willpower to quit smoking or offer resources that can help viewers quit (self-efficacy). All four components are critical for the effectiveness of fear appeals (Roberto & Li, 2018). As such, this study will include all four constructs in the content of its stimuli.

While the EPPM places some focus on threat and efficacy as message features, the main hypotheses of the EPPM are centered on threat and efficacy as personal perceptions. EPPM postulates that the levels of threat and efficacy perceived by participants determine their response to fear appeals (Witte, 1992). If perceived threat is too low, then participants will not consider changing their behavior, as an inadequate threat does not require a change in behavior (Witte, 1992). If perceived threat is adequate, perceived efficacy determines a participant's reaction to the threat. If perceived efficacy is higher than perceived threat, participants will enter danger control processes (Witte, 1992). Danger control is a cognitive process in which participants attempt to tackle the threat itself, leading to positive behavioral changes that remove the threat (Witte, 1992). Danger control is typically indicated by behavioral intention. If participants indicate that they intend to implement the recommended prevention behaviors, they are exhibiting danger control (Popova, 2012). For example, smokers would be in danger control if they indicated high behavioral intentions to quit smoking after watching an anti-smoking fear appeal (e.g. Thrasher et al., 2016). Therefore, danger control represents a positive outcome in response to fear appeals.

If perceived threat is higher than perceived efficacy, participants will instead enter fear control processes (Witte, 1992). In fear control, participants attempt to remove their fear, acting defensively rather than proactively (Witte, 1992). Fear control is indicated by a lack of positive behavioral intentions, as well as rejection of the message itself. Message rejection is operationalized as defensive avoidance (i.e., attempting to ignore thinking about the message), perceived manipulation (i.e., judging the message as misleading), and message derogation (i.e., judging the message as an exaggeration) (Popova, 2012; Witte, 2000). For example, if smokers do not feel able to quit smoking, they might respond by attempting to not think about the message when they smoke (defensive avoidance), telling themselves that the message was created by someone with an anti-smoking agenda who distorted the facts (perceived manipulation), and telling themselves that the effects of smoking are not as probable or severe as presented in the message (message derogation). Therefore, if a fear appeal does not include adequate efficacy messaging, it will be less effective at motivating positive attitude/behavior change.

Within this study, care will be taken to distinguish threat/efficacy as message components and threat/efficacy as perceptions. Often, threat/efficacy are operationalized as message components (Popova, 2012). In this approach, researchers assign participants to groups and present each group with a different combination of a high or low threat message and a high or low efficacy message (Popova, 2012). Researchers then hypothesize outcomes based on the threat and efficacy designations of the stimuli viewed by each group (Popova, 2012). For example, the group that viewed the high threat message and low efficacy message would be hypothesized to be in danger control, because the threat content that they viewed was "higher" than the efficacy content that they viewed. While this approach offers insight into the mechanisms of specific message features, it is does not align with the main EPPM hypotheses' explicit focus on perceptions of threat and efficacy (Popova, 2012).

Witte (1992) clearly states that "the same fear appeal may produce different perceptions in different people, thereby influencing subsequent outcomes" (p. 338-339), indicating that individual perceptions play a critical role in determining whether participants enter danger control or fear control. In addition, the EPPM specifically refers to threat and efficacy as continuous perceptions when predicting danger control or fear control outcomes. For example, fear control is predicted to occur "as perceived threat increases when perceived efficacy is low" (Witte, 1992, p. 341). Even when researchers evaluate this hypothesis with self-report measures of threat and efficacy, they often use median splits to divide participants into high/low threat and efficacy groups, based on whether a participant's perceived threat/efficacy value is above or below the median (Popova, 2012). This practice does not address the actual hypothesized relationships between variables, which are more accurately evaluated with regression analysis (Popova, 2012). Perhaps more critically, previous EPPM findings cannot be easily generalized as long as some studies measure threat/efficacy as experimental groups, some as median splits, and some as continuous perceptions, because these methods do not evaluate identical variable relationships.

To ensure that this study can be compared to past research and accurately tests the EPPM's core hypotheses, I will employ both the experimental group approach and the continuous perception approach. This study will be designed around four study conditions (high threat/high efficacy, high threat/low efficacy, low threat/high efficacy, low threat/low efficacy). Difference tests will be used to evaluate differences between groups in perceptions of threat and efficacy, as well as differences in danger control and fear control outcomes. In addition, the EPPM's hypotheses will be tested using regression analysis, specifically moderation analysis. Popova (2012) cites Smalec & Klingle (2000) as an example of how to properly test the EPPM's danger and fear control hypotheses, as the authors tested perceived efficacy as a moderator. Therefore, this thesis will follow Smalec & Klingle's (2000) example and test efficacy as a moderator.

Separating message components and perceptions in this manner will contribute to the literature by enabling scholars to draw conclusions from this study, no matter their method of approaching the EPPM's hypotheses. In the following section, previous EPPM studies specific to the context of tobacco or smoking will be evaluated in terms of both their findings and their hypothesis-testing methods, in order to provide greater context for predictions involving the message feature approach and the perceptions approach in the current study.

***Tobacco and the EPPM***

Smoking seems to be a natural subject for EPPM research. Smoking is a deadly, debilitating disease, something that many anti-smoking campaigns are quick to highlight (e.g. Food and Drug Administration, 2020b). In an analysis of EPPM components in Truth® campaign advertisements, LaVoie and Quick (2013) report that the majority of advertisements communicate severity but only a third communicate susceptibility. None of the Truth® advertisements communicate self-efficacy or response efficacy (LaVoie & Quick, 2013). As the EPPM hypothesizes that a combination of high threat and low efficacy will lead to fear control responses (Witte, 1992), the exclusion of efficacy may decrease the effectiveness of anti-smoking campaigns. It is therefore essential for researchers to determine if the EPPM is applicable in this context.

Researchers use the EPPM to study anti-smoking campaigns in a variety of formats. Researchers typically study the effects of anti-tobacco video PSAs (Choi et al., 2005; Miles, 2008; Wong & Cappella, 2009), print advertising (LaVoie, 2016; Popova, 2014; Swanson, 2016), or graphic health warnings (GHWs) on tobacco products (Chun et al., 2018; Kumar, 2019; Mead, 2014; Owusu et al., 2019; Thrasher et al., 2016; Timmers

& van der Wijst, 2007). The EPPM has even been used to guide less direct applications of its concepts, such as evaluations of Twitter responses to the CDC's Tips from Former Smokers campaign (Abril et al., 2017; Emery et al., 2014). Overall, the EPPM has demonstrated utility in a wide variety of anti-tobacco contexts.

Despite the large area of literature devoted to anti-tobacco messaging, these studies have not demonstrated overwhelming support for the EPPM's hypotheses. Multiple studies have found that anti-tobacco PSAs are associated with danger control and/or fear control responses (Choi et al., 2005; Chun et al., 2018; Owusu et al., 2019; Thrasher et al., 2016; Popova, 2014) but the reasons behind this association vary between studies. In particular, researchers have not found consistent support for the interaction effects of threat and efficacy on danger control and fear control. Choi and colleagues (2005) measured threat and efficacy as message components and found that when efficacy levels in videos are low, high threat messages had a positive effect on both fear control and danger control responses (including behavioral intention). Thus, the findings from Choi and colleagues (2005) contradict the EPPM's proposition that a combination of high threat and low efficacy only leads to fear control processes. However, Choi and colleagues (2005) only included low-efficacy messaging in their study, rather than a low-efficacy message and a high-efficacy message. As such, their conclusion that fear and danger control may not be inversely related for smoking stimuli requires further investigation.

Studies that have based their threat and efficacy measurement in perceptions are equally contradictory. Wong and Cappella (2009) found that increases in perceived efficacy do not affect behavioral intentions when perceived threat is low but do increase behavioral intentions (and therefore danger control) when perceived threat is high. Wong and Cappella (2009) therefore confirmed that responses to anti-smoking PSAs line up with the EPPM's propositions. However, this effect was only confirmed for one of their behavioral intention outcomes (intent to seek help for quitting smoking) but not the other (intent to quit smoking; Wong & Cappella, 2009). As another example, Popova (2014) controlled for efficacy instead of threat and found that perceived threat is positively correlated with danger control responses when perceived efficacy is high. However, researchers did not find evidence for the corresponding prediction (i.e. perceived threat is positively correlated with fear control responses when perceived efficacy is low; Popova, 2014). As these studies do not delineate a comprehensive set of results for EPPM tests of tobacco PSAs, this study will fill gaps in the literature by testing the EPPM in this context.

Therefore, the following hypotheses are proposed to test the assumptions of the EPPM in an anti-smoking context:

**Hypothesis 1 (H1)**: The high threat message condition will elicit higher perceptions of threat than the low threat message condition.

**Hypothesis 2 (H2):** The high efficacy message condition will elicit higher perceptions of efficacy than the low efficacy message condition.

**Hypothesis 3 (H3):** The high threat/low efficacy condition will elicit significantly higher fear control (i.e. perceived manipulation, message derogation, defensive avoidance) than the other conditions.

**Hypothesis 4 (H4):** The high threat/high efficacy condition will elicit significantly higher danger control (i.e., positive behavioral intentions) than the other conditions.

**Hypothesis 5 (H5)**: Perceptions of efficacy will moderate the relationship between threat and danger control outcome variables (a. non-smoking behavioral intentions, b. sharing information behavior intentions) such that at high levels of efficacy, threat and danger control outcomes will be positively related, and at low levels of efficacy, threat and danger control outcomes will be negatively related.

**Hypothesis 6 (H6)**: Perceptions of efficacy will moderate the relationship between threat and fear control outcome variables (a. perceived manipulation, b. message derogation, c. defensive avoidance) such that at high levels of efficacy, threat and fear control outcomes will be negatively related, and at low levels of efficacy, threat and fear control outcomes will be positively related.

**Sampling Non-Smokers.** A key area of methodology in tobacco research bears examination and improvement: sampling populations with varying levels of smoking behavior. Fear appeal studies that focus on anti-tobacco messaging usually sample smokers (e.g. Manyiwa & Brennan, 2012; Mead, 2014; Miles, 2008; Popova, 2014; Swanson, 2016; Thrasher et al., 2016; Wong & Cappella, 2009). This practice allows messaging to focus on quitting smoking and the study's conclusions to recommend interventions in the smoking population. However, there is also value in conducting anti-smoking studies in a general audience. This is especially important to consider among the young adult population as the non-smoker of today may become the smoker of tomorrow (Office of the Surgeon General, 2017). Knowing this, the tobacco industry targets both smokers and non-smokers. For example, in 1973, tobacco company RJ Reynolds classified young people into "pre-smokers, learners, and smokers" (Dautzenberg, 2018, p. 197) and aimed to turn young pre-smokers into smokers. This principle has continued with vaping, as adolescents who use e-cigarettes are more likely to begin smoking cigarettes than adolescents who do not use e-cigarettes, even when sociodemographic characteristics and initial intentions to begin smoking are controlled between groups (Barrington-Trimis et al., 2016). Taking this into account, scholarship must examine the effects of anti-smoking PSAs on all audiences, not just smokers. Therefore, this thesis is designed to test the effectiveness of anti-smoking campaigns in a general young adult audience, as this will assess how well interventions work regardless of prior knowledge or smoking behavior.

A few difficulties arise when creating studies that are disseminated to a wide audience that varies in smoking behavior. Researchers have to choose whether and how to divide participants into groups by smoking behavior for comparison. It can be difficult to design scales that are relevant for both groups, as non-smokers cannot have intentions to quit smoking or perceptions of their self-efficacy to do so. Three strategies used by previous studies have informed this thesis's approach to this issue.

First, smoking behavior can be separated into past, current, and lifetime smoking history and analyzed based on the intensity of usage in each time period (Blanton et al., 2014). With this approach, researchers can, for example, perform between-groups analysis between participants who have ever or never smoked, participants who currently do or do not smoke, participants who quit or continued to smoke, and/or participants who smoked in the past or just began smoking. While this approach can complicate analysis

(Blanton et al., 2014), it provides more dynamic data than a static approach based in whether participants currently smoke. This thesis, therefore, will ask about current and past smoking behavior and the intensity of behavior in both time periods.

Second, researchers can create different versions of questions for smokers and non-smokers. For example, researchers can measure non-smokers' intentions to encourage others to quit smoking (Choi et al., 2005; Gallopel-Morvan et al., 2018), measure non-smokers' intentions to avoid initiating smoking (Chun et al., 2018; Wehbe et al., 2017) or only ask smokers about their behavioral intentions (Owusu et al., 2019). This approach, however, does not allow for true between-group comparisons or analysis of the overall sample, as participants are not being asked equivalent questions. This thesis, therefore, will ask all participants about their intentions to smoke and to talk to others about smoking, as these questions can apply to anyone. Current smokers will be asked additional questions about quitting intentions to allow for supplementary analysis of their subgroup.

Third, researchers can design scales that apply to all participants equally, so that responses can be compared throughout the entire sample. This approach is complicated when applied to the EPPM, as threat and efficacy are highly personal perceptions. For example, if susceptibility is measured as a participant's personal risk of getting lung cancer, then stimuli detailing the risk to smokers will not create a perceptible change in non-smokers' susceptibility perceptions. To solve this, researchers can measure threat and efficacy as third-person perceptions of the risk to/efficacy of people who smoke, so that non-smokers are asked to consider the risk of smoking to smokers (LaVoie, 2016). For the smoking subgroup, scales are still tied to personal threat/efficacy perceptions

(LaVoie, 2016), but these perceptions can still be compared to perceptions of non-smokers. This approach makes it possible to analyze universal shifts in perceptions of smoking, which suits this thesis's goal of evaluating the effectiveness of anti-smoking PSAs in a wider college population. As this approach is less popular than only sampling smokers or providing separate questions, this thesis will serve as a test run of this approach that will help guide future anti-smoking studies.

### *Emotions in the EPPM*

While a large part of health communication research focuses on cognitions, integrating emotions into theory provides insight into an area of complex individual factors that underly our motivations and actions (Mahler, 2015). Social science researchers generally conceptualize emotions in one of two ways: dimensional or discrete (Lang et al., 2009; Nabi, 2010). The dimensional emotion approach examines emotion in terms of valence and arousal, measuring emotion on a continuum from positive to negative (Lang et al., 2009; Nabi, 2010). This thesis will primarily employ the discrete emotion approach, which conceptualizes emotions based on "the unique set of cognitive appraisals, or thought patterns, underlying them" (Nabi, 2010, p. 154). Each discrete emotion is associated with action patterns, biological responses, facial expressions, and emotional vocabulary (Harmon-Jones et al., 2016). For example, anger is associated with fight response, testosterone release, brow muscle movement, and "words like anger, rage, irritation, and exasperation" (Harmon-Jones et al., 2016, p. 5). This approach provides a more precise distinction between emotional states, which allows for clearer prediction of outcomes (Nabi, 2010). As such, the discrete emotion approach is better suited for research that aims to differentiate between distinct positive (e.g. happiness, contentment) and negative (e.g. sadness, anger, disgust, fear) emotions.

EPPM studies generally do not account for emotional factors that influence behavior. Even fear, the central emotion in the EPPM, is often given a limited role of influence within the model. Fear is hypothesized to directly influence fear control outcomes only, as danger control outcomes are described as a result of cognitive processes alone (So, 2013; Witte, 1992). Recently, scholars have called these assumptions into question and suggested that fear should be granted a larger focus (So et al., 2013; Tannenbaum et al., 2015). Specifically, fear should be tested as a mediator between stimuli features and outcomes (Tannenbaum et al., 2015), or, put another way, between "cognitive appraisal… and coping appraisal" (So, 2013, p. 78). Multiple studies have used this approach and have confirmed that fear acts as a mediator (Byrne et al., 2015; Meadows, 2020; Pokharel et al., 2019; Wong et al., 2013; Zhang et al., 2015). Therefore, this study will investigate the role of fear as a mediator within the EPPM.

Scholars have also called for EPPM research that measures discrete emotions beyond fear in order to have a fuller understanding of the emotions evoked by fear appeals (Pokharel et al., 2019; Popova, 2012). This call is substantiated by studies that show that fear appeals can evoke multiple discrete emotions, which have effects on message outcomes (e.g. message acceptance, behavioral intentions, behavior; Carrera et al., 2010; Dillard et al., 1996; Gali, 2018; Nabi & Myrick, 2019; Swanson, 2016; Timmers & van der Wijst, 2007). Both positive (e.g. hope) and negative (e.g. sadness, disgust) emotions can have significant effects on judgments and behavior (Carrera et al., 2010; Nabi & Myrick, 2019; Swanson, 2016; Timmers & van der Wijst, 2007). EPPM studies would therefore benefit from measuring emotions beyond fear, as these emotions could help explain discrepancies in results for fundamental EPPM propositions between studies (previously discussed in the above section on *Tobacco and the EPPM)*. Additionally, as the EPPM has been shown to work well when applied to other types of emotional appeals, such as guilt appeals (Popova, 2012), emotion research in general would benefit from the extension of the EPPM in this direction.

In terms of the EPPM specifically, a few anti-tobacco fear appeal studies have used the model to examine multiple emotional responses. Swanson (2016) measured smokers' shame, guilt, and anger and found that these emotions do not significantly vary based on cigarette dependence. However, shame and guilt were significantly higher for smokers who had previously attempted to quit smoking (Swanson, 2016). Timmers and van der Wijst (2007) measured frustration, surprise, fear, puzzlement, and sadness, and found that all emotions measured besides frustration increased reflection on one's smoking behavior (Timmers & van der Wijst, 2007). Additionally, sadness and surprise predicted intentions to quit smoking in smokers, and surprise predicted intentions to not try a cigarette in non-smokers (Timmers & van der Wijst, 2007). Miles (2008) measured positive and negative affect in response to efficacy content using facial electromyography (EMG) and demonstrated that messages with higher efficacy content increased positive affect. Additionally, in messages with a negative emotional tone, efficacy content decreased negative affect (Miles, 2008). Finally, Owusu et al. (2019) coded smokers' responses to cigarette warning labels based on fear and danger control responses and compared coding to a composite negative emotion score based on sadness, anger, fear, guilt, disgust, and worry. The researchers found that participants with danger control responses had the highest negative emotion score, with sadness having the highest score of the subscales, indicating that increased negative emotions may not lead to fear control responses (Owusu et al., 2019).

In combination, scholarship has demonstrated significant differences in emotional responses based on past behavior and message content, which in turn influences behavioral outcomes. However, these studies vary widely in design and use the EPPM only as a basis for their claims, rather than as a fundamental framework to be tested. As such, definite conclusions cannot yet be drawn regarding the role of emotions within the EPPM. This thesis will therefore measure multiple discrete emotions (surprise, anger, fear, sadness, guilt, happiness, contentment; see Table 1) and test their role within the EPPM. This will provide a deeper understanding of the complex emotions incited by fear appeals and their corresponding outcomes, which will aid researchers in expanding the EPPM and health professionals in producing effective anti-smoking messaging.

Thus, the following research questions are posed to explore how discrete emotions, including fear, fit into the EPPM:

**Research Question 1 (RQ1):** Are there significant differences in discrete emotions based on message components (threat and efficacy)?

**Research Question 2 (RQ2):** Are discrete emotions related to EPPM perceptions and outcomes?

**Table 1**. *Definitions of Discrete Emotions Measured by Self-Report or Physiological Measures*

| Emotion | Definition |
|---|---|
| Anger[a] | Tension and hostility caused by frustration or perceived unjust acts |
| Contempt[b] | Dislike and superiority towards others, often due to morality |
| Contentment[c] | Passive satisfaction with life due to the absence of a threat |
| Disgust[d] | Dislike, aversion, or repulsion towards a person or object |
| Fear[a] | Alarm in response to an identifiable, immediate threat |
| Guilt[ac] | Regret for wrongdoing, often accompanied by a desire to atone |
| Happiness[e] | Pleasure and satisfaction due to an event or life circumstance |
| Sadness[f] | Unhappiness or sorrow in response to the loss of something valued |
| Surprise[ag] | Arousal due to an unexpected occurrence or novel stimulus |

*Notes.* [a] (American Psychological Association, n.d.). [b] (Paul Ekman Group, 2021A). [c] (Dillard & Shen, 2007). [d] (Paul Ekman Group, 2021B). [e] (Paul Ekman Group, 2021C). [f] (Paul Ekman Group, 2021D). [g] (Paul Ekman Group, 2021E).

## Physiological Measures in Social-Science Research

Physiological measures offer great promise for social science research. Physiological measures are an effective method of empirically measuring key constructs and verifying assumptions. Physiological measures allow researchers to assess psychological variables through physiological phenomena (Ravaja, 2004). For example, attention can be measured with heart rate, as psychological attention processes are linked to reactions in the body’s cardiovascular system (Y. J. Wang & Minor, 2008; Ravaja, 2004). By linking self-report measures to physiological data, researchers can determine whether hypotheses hold true for both conscious cognitions and unconscious processes (Cacioppo et al., 2007). This approach can improve social science methodology as it grounds research in observable scientific phenomena (Lang, 2013). Physiological measures are still in their infancy in communication research, but the increasing publication of communication articles that use physiological measures (Pokharel et al.,

2021) indicates that an increasing number of researchers are interested in implementing physiological measures into their research.

For emotion research in particular, researchers have called for increased implementation of physiological measures of emotion alongside self-report measures (Mahler, 2015). Firstly, practice can help lower the risk of common method variance (CMV; Mahler, 2015). CMV is variance that occurs because of a study's method, not actual variable relationships (Chang et al., 2010). Studies that use only a self-report questionnaire are more at risk for CMV, as participants may answer questions with higher consistency, which can create false relationships between variables (Chang et al., 2010). Relating a non-perceptual metric like physiological measures to self-report measures can therefore reduce the risk of CMV, as this minimizes the chance that survey design is distorting participant responses. Second, self-report measures require participants to be aware of their emotional states and filter that awareness through language, a process that cannot be easily separated from cognition (Mahler, 2015). Emotional data derived from self-report answers, therefore, may not reflect actual, unconscious emotion states (Mahler, 2015). Often, physiological measures and self-report measures of emotion do not demonstrate significant correlations or similar results (Mahler, 2015), indicating that each measure may tap into different types of emotional experience that may have different implications for communication outcomes. Therefore, physiological measures of emotion can provide researchers with more robust sets of data that offer greater insight into involuntary emotional processes.

This thesis will use facial expression analysis (FEA) to measure real-time emotional reactions to fear appeals. FEA breaks down human facial movement into

Action Units (AUs) that describe individual movements of the facial muscles (Matsumoto & Ekman, 2008). Each of the fundamental human facial expressions (i.e. joy, surprise, contempt, sadness, fear, disgust, anger; see Table 1) is associated with a set of AUs, which can be used to identify these emotions in participants (Matsumoto & Ekman, 2008). While FEA can be performed manually, it is typically performed using specially designed software, as the complexity of AUs makes the process time-consuming for researchers (Matsumoto & Ekman, 2008; Zhi et al., 2020). These programs also allow for more objective coding, as AUs are coded independently using normative databases of facial expressions, rather than relying on individual interpretations (Krosschell, 2020). However, researchers have cautioned against the assumption that facial movements convey the same universal meaning, as cultural and individual differences can alter emotional expression (Barrett et al., 2019). As such, FEA is not a comprehensive measure of objective, internal emotions. Instead, it is one piece of the overall puzzle of human emotional response that can add additional context to the more cognitive emotions measured by self-report surveys.

Therefore, this thesis will test the relationship between self-report discrete emotion measures and FEA, in order to evaluate how closely emotional processing matches up with emotional expression:

**Research Question 3 (RQ3):** How do self-report measures of emotion compare to physiological measures of emotion?

# III. METHODS

## Participants

Participants (*N* = 146) were recruited from Texas State University communication studies classes, primarily COMM 1310, the core communication course that all students are required to complete. Participants were recruited voluntarily through emails sent out by instructors and were offered extra credit for participating. In order to collect a wide-ranging sample, participants were recruited regardless of past or current tobacco use (see Measures for tobacco data). Respondents ranged in age from 18-40 years old (*M* = 19.73, *SD* = 2.68). The majority (69.9%) of participants identified as female and as white (78.8%). A third (35.6%) of the participants in the sample identified as Hispanic, Latinx, or of Spanish origin. For further demographic information, see Appendix A.

## Study Design and Stimuli

The study was a 2 (high threat vs. low threat) x 2 (high efficacy vs. low efficacy) experimental survey study. High/low defined by the amount of information on threat/efficacy included in each video. Consequently, the high threat and high efficacy videos were longer than the low threat and low efficacy videos. Threat videos were selected from the Centers for Disease Control and Prevention's (CDC)'s Tips from Former Smokers campaign, which records personal stories from former smokers on the negative effects of smoking. Participants in the high threat condition watched a longer version (Centers for Disease Control and Prevention, 2020c) of the COPD story watched by participants in the low threat condition (Centers for Disease Control and Prevention, 2020d). Efficacy videos were selected from the CDC and American Lung Association media libraries. Participants in the high efficacy condition watched a longer video from the American Lung Association that detailed more information on the benefits of quitting smoking (American Lung Association, 2017). Participants in the low efficacy condition watched a short video from the CDC that briefly described the benefits of quitting smoking (Centers for Disease Control and Prevention, 2020e). For more detailed descriptions and transcripts of stimuli, see Appendix B.

**Procedures**

The study was performed remotely, using a quantitative survey (for full survey measures, see Appendix C). Participants completed either a Qualtrics questionnaire (just the survey; $N = 102$) or an iMotions questionnaire (the survey with added facial expression analysis; $N = 44$). Participants were offered the two survey options to ensure that students who did not want to be recorded could still complete the survey. The survey items for both questionnaires were identical. Before beginning the survey, participants read and accepted the consent form. Participants who completed the iMotions survey also calibrated their computer camera and were reminded to complete the survey in a well-lit room with their face in frame, in order to minimize data errors.

The survey contained four parts. First, the pre-test questionnaire asked about participant demographics (e.g. age, race/ethnicity, gender) and previous/current tobacco use behavior. Participants were also be asked about their pre-existing behavioral intentions, perceived threat (severity and susceptibility), and perceived efficacy (self-efficacy and response efficacy). Second, participants were randomly assigned by Qualtrics/iMotions to one of four experimental conditions, which consisted of one threat video and one efficacy video. Participants that completed the iMotions survey were

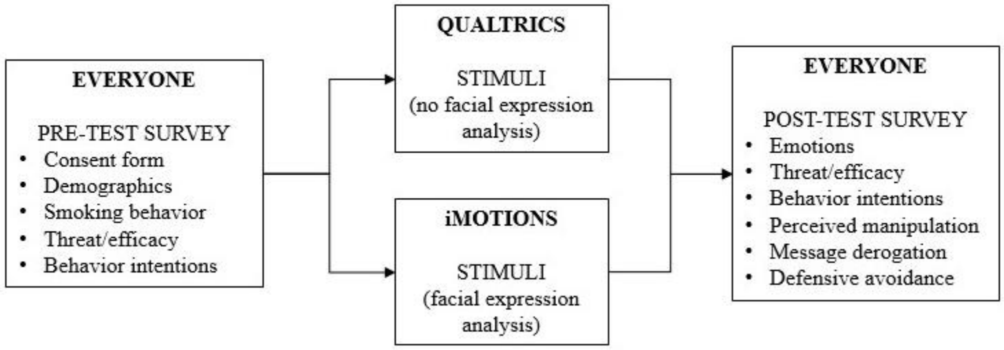


**Figure 2.** *Procedure Diagram*

recorded while they watched the stimuli assigned to their randomized condition. Participants that completed the Qualtrics survey completed a manipulation check, to ensure that they viewed the videos. Third, participants took a post-test that discrete emotions, perceived threat (severity and susceptibility), perceived efficacy (self-efficacy and response efficacy), behavioral intentions, perceived manipulation, message derogation, and defensive avoidance. Finally, participants were thanked for their participation and asked if they had any additional thoughts. Participants who completed the survey for extra credit were linked to a separate survey to input their contact information, so that it could not be linked to their main study responses.

## Self-Report Measures[1]

### *Tobacco Use*

**Global Adult Tobacco Survey (GATS).** Participants' current and past tobacco use was measured by questions taken from the Global Adult Tobacco Survey (GATS), a survey measure developed in collaboration by the World Health Organization (WHO) and the CDC (Global Adult Tobacco Survey Collaborative Group, 2011). Tobacco use

[1] For descriptive statistics and reliability tables, see Appendix D.

was evaluated with two questions: “do you currently smoke tobacco on a daily basis, less than daily, or not at all” and “in the past, have you smoked tobacco on a daily basis, less than daily, or not at all.”

The majority of participants did not currently smoke (93.84%, *n* = 137) or have a history of smoking (88.36%, *n* = 129). Analyzed in combination, 86.30% (*n* = 126) of participants fit both criteria and were therefore never-smokers. Few participants were current daily (1.37%, *n* = 2) or less than daily (4.79%, *n* = 7) smokers, for a total of 6.16% (*n* = 9) current smokers. Similarly, few participants smoked cigarettes daily (4.11%, *n* = 6) or less than daily (6.85%, *n* = 10) in the past, for a total of 10.96% (*n* = 16) past smokers. Analyzed in combination, 4.11% of participants (*n* = 6) were long-term smokers (smoked in the past and present), 6.85% of participants (*n* = 10) were former smokers (smoked in the past but not currently) and 2.10% of participants (*n* = 3) were new smokers (smoke currently but not in the past). For a full breakdown of smoking behavior, see Table A5.

**Age Began/Quit Smoking.** Participants who indicated they currently or previously smoked were asked how old they were when they first smoked. On average, participants began smoking at 16.73 years old (*SD* = 2.79). Participants who indicated that they smoked in the past but not currently were also asked how old they were when they quit smoking. On average, former smokers quit smoking at 18.20 years old (*SD* = 2.30).

**Heaviness of Smoking Index (HSI).** Finally, in order to gauge current smokers’ level of tobacco use, participants who indicated that they currently smoked were asked questions from the Heaviness of Smoking Index (HSI; Heatherton et al., 1989). The HSI is a shortened version of the Fagerström Test for Nicotine Dependence that is an equally reliable predictor of quitting behavior (Borland et al., 2010; Fidler et al., 2010). The HSI asks "on the days that you smoke, how soon after you wake up do you have your first cigarette?" and "how many cigarettes do you typically smoke per day?" with categorical answers. The HSI is measured on a six-point scale, with each question providing 0-3 points (e.g. "after 60 minutes" = 0 points, "31 to 60 minutes" = 1 point, "6 to 30 minutes" = 2 points, "within 5 minutes" = 3 points). Scores of 0-2 indicate low addiction, scores of 3-4 indicate moderate addiction, and scores of 5-6 indicate high addiction. Current smokers ($n = 9$) demonstrated low addiction ($M = 0.22$, $SD = 0.67$).

***Behavioral Intentions (BI)***

**All Participants (Non-Smoking, Sharing Information).** All participants, regardless of smoking behavior, were asked in the pre- and post-test about their behavioral intentions. BI to avoid smoking (referred to henceforth as "non-smoking BI") was measured using a four-item scale, which asked participants the likelihood that in the next month they will "intend not to smoke," "try not to smoke," "plan not to smoke," and "expect not to smoke" (Dietrich, 2012). Items were measured on a seven-point, Likert type scale ranging from 1 = *very unlikely* to 7 = *very likely,* so that higher scores indicate greater intentions to avoid smoking ($M_{pre\text{-}test} = 6.32$, $SD_{pre\text{-}test} = 1.43$; $M_{post\text{-}test} = 6.48$, $SD_{post\text{-}test} = 1.21$). This scale demonstrated good reliability ($\alpha_{pre\text{-}test} = .85$; $\alpha_{post\text{-}test} = .92$).

Intention to share information (referred to henceforth as "sharing information BI") was assessed with a two-item scale adapted from Choi et al. (2005), which asked participants if they "intend to talk to [their] friends and/or family about quitting smoking cigarettes to prevent smoking-related disease" and "intend to talk to [their] friends and/or family about reducing smoking cigarettes to prevent smoking-related disease." Items were measured on a seven-point, Likert type scale ranging from 1 = *strongly disagree* to 7 = *strongly agree* ($M_{pre\text{-}test}$ = 3.94, $SD_{pre\text{-}test}$ = 2.15; $M_{post\text{-}test}$ = 4.45, $SD_{post\text{-}test}$ = 2.16). This scale demonstrated excellent reliability ($\alpha_{pre\text{-}test}$ = .98; $\alpha_{post\text{-}test}$ = .99).

**Smokers (Quitting).** Smokers were asked additional questions to measure their intention to quit smoking. Quitting intention was measured using a Likert scale that has shown better predictive validity than similar measures of quitting smoking (e.g. the Stages of Change scale and Motivation to Stop Scale; Hummel et al., 2018). In the pre-test and post-test, current smokers (*n* = 9) were asked "are you planning to quit smoking within the next 6 months?" The item was measured on a five-point, Likert type scale ranging from 1 = *very unlikely* to 5 = *very likely* ($M_{pre\text{-}test}$ = 4.00, $SD_{pre\text{-}test}$ = 1.00; $M_{post\text{-}test}$ = 3.75, $SD_{post\text{-}test}$ = 1.04)[2]. Current smokers were also asked if they had made any attempts to quit smoking in the past year (Hummel et al., 2018). The majority (66.6%, *n* = 6) of current smokers indicated that they had attempted to quit in the past year.

***Threat and Efficacy***

Perceived threat (severity and susceptibility) and perceived response efficacy were measured using LaVoie's (2016) scales, an adapted version of the Risk Behavior Diagnosis Scale (RBD; Witte et al., 1995). The RBD was created by Witte and colleagues (1995) to measure threat and efficacy beliefs surrounding risk behaviors and recommended responses. LaVoie's (2016) adaption of the RBD was chosen because it was designed to measure smokers' and non-smokers' perceptions. Rather than asking

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[2] In the post-test, only 8 of the 9 current smokers reported quitting intentions. If both means are calculated using only the 8 participants who answered both pre-test and post-test questions, then $M_{pre\text{-}test}$ = 3.88, $SD_{pre\text{-}test}$ = .99; $M_{post\text{-}test}$ = 3.75, $SD_{post\text{-}test}$ = 1.04.

about perceptions of personal risk from smoking, which would not be relevant to non-smokers, this adaption measures general perceptions of smoking. Pilot testing revealed that LaVoie's (2016) self-efficacy measure was confusing to pilot testers, so an adaptation of Witte and colleagues' (1995) original RBD was used for self-efficacy.

**Severity.** Severity was measured in the pre-test and post-test with three items (i.e. "I believe that the threat from smoking is severe," "I believe that the threat from smoking is serious," "I believe that the threat from smoking is significant"; LaVoie, 2016). Items were measured on a seven-point, Likert type scale ranging from 1 = *strongly disagree* to 7 = *strongly agree* ($M_{pre\text{-}test}$ = 6.52, $SD_{pre\text{-}test}$ = 0.73; $M_{post\text{-}test}$ = 6.52, $SD_{post\text{-}test}$ = 1.07). This scale demonstrated excellent reliability ($\alpha_{pre\text{-}test}$ = .92; $\alpha_{post\text{-}test}$ = .98).

**Susceptibility.** Susceptibility was measured in the pre-test and post-test with three items (i.e. "People who smoke are putting their health at risk," "It is likely that people who smoke will suffer health consequences," "It is possible that people who smoke will suffer health consequences"). All three items had their wording slightly changed from LaVoie (2016) for clarity (i.e. item one was changed from "at risk for its health threat" to "putting their health at risk"; items two and three had "the" removed from before "health consequences"). Items were measured on a seven-point, Likert type scale ranging from 1 = *strongly disagree* to 7 = *strongly agree* ($M_{pre\text{-}test}$ = 6.65, $SD_{pre\text{-}test}$ = 0.59; $M_{post\text{-}test}$ = 6.60, $SD_{post\text{-}test}$ = 0.98). This scale demonstrated excellent reliability ($\alpha_{pre\text{-}test}$ = .87; $\alpha_{post\text{-}test}$ = .98)

**Self-Efficacy.** Self-efficacy was measured in the pre-test and post-test with three items (i.e. "I am able to quit (and/or avoid) smoking to prevent health consequences," "I can easily quit (and/or avoid) smoking to prevent health consequences," "I have what it takes to quit (and/or avoid) smoking to prevent health consequences") adapted from Witte and colleagues' (1995) original RBD. Items were measured on a seven-point, Likert type scale ranging from 1 = *strongly disagree* to 7 = *strongly agree* ($M_{pre\text{-}test}$ = 6.39, $SD_{pre\text{-}test}$ = 1.09; $Mpost_{\text{-}test}$ = 6.44, $SD_{post\text{-}test}$ = 1.16). This scale demonstrated excellent reliability ($\alpha_{pre\text{-}test}$ = .90; $\alpha_{post\text{-}test}$ = .93)

**Response Efficacy.** Response efficacy was measured in the pre-test and post-test with three items (i.e. "Quitting smoking works for preventing health consequences," "Quitting smoking is effective in preventing health consequences," "If people quit smoking, they are less likely to have severe consequences."). Items one and two had their wording slightly changed from LaVoie (2016) for clarity (i.e. from "its health threat"/"the health threat" to "health consequences"). Items were measured on a seven-point, Likert type scale ranging from 1 = *strongly disagree* to 7 = *strongly agree* ($M_{pre\text{-}test}$ = 6.35, $SD_{pre\text{-}test}$ = 0.91; $M_{post\text{-}test}$ = 6.52, $SD_{post\text{-}test}$ = 1.00). This scale demonstrated excellent reliability ($\alpha_{pre\text{-}test}$ = .86; $\alpha_{post\text{-}test}$ = .97)

***Fear***

Fear reaction to the stimuli was measured using Witte's (2000) Perceived Fear Scale, which was designed for measuring fear in response to health threat messages. The scale includes six items that ask participants how much the messages made them feel frightened, tense, nervous, anxious, uncomfortable, or nauseous. An extension was added to the scale that added nine items: freaked out, terrified, horrified, alarmed, panicked, dread, scared, afraid, and unease. Therefore, in total, the scale contained 15 items. Responses were measured with a seven-point, Likert type scale ranging from 1 = *not at* *all* to 7 = *very much* ($M$ = 3.05, $SD$ = 1.79). This scale demonstrated excellent reliability ($a$ = .98).

***Discrete Emotions***[3]

Emotional responses to the stimuli were measured using Dillard and Shen's (2007) Discrete Emotions Questionnaire. The Discrete Emotions Questionnaire was designed to measure six discrete emotions: surprise, anger, sadness, guilt, happiness, and contentment. The questionnaire asks participants how much the message made them feel emotional adjectives related to these discrete emotions. Each emotion subscale consists of two to four related adjectives, measured on a seven-point, Likert-type scale ranging from 1 = *none of this emotion* to 7 = *a great deal of this emotion.*

Anger was measured with four adjectives (i.e. "irritated," "angry," "annoyed," "aggravated"; $M$ = 2.34, $SD$ = 1.62). Reliability for the anger subscale was excellent ($\alpha$ = .94). Contentment was measured with four adjectives (i.e. "contented," "peaceful," "mellow," "tranquil"; $M$ = 1.70, $SD$ = 1.23). Reliability for the contentment subscale was excellent ($\alpha$ = .92). Guilt was measured with two adjectives (i.e. "guilty," "ashamed"; $M$ = 2.08, $SD$ = 1.49). Reliability for the guilt subscale was good ($\alpha$ = .86). Happiness was measured with four adjectives (i.e. "happy," "elated," "cheerful" and "joyful"; $M$ = 1.52, $SD$ = 1.17). Reliability for the happiness subscale scale was excellent ($\alpha$ = .98). Sadness was measured with three adjectives (i.e. "sad," "dreary," "dismal"; $M$ = 2.95, $SD$ = 1.68). Reliability for the sadness subscale was good ($\alpha$ = .84). Surprise was measured with three adjectives (i.e. "surprised," "startled," "astonished"; $M$ = 2.91, $SD$ = 1.73). Reliability for the surprise subscale was excellent ($\alpha$ = .91).

[3] For definitions of the individual discrete emotions, see Table 1.

***Perceived Manipulation***

Perceived manipulation in the message content, a component of the fear control process, was measured using Witte's (2000) scale. The scale was designed to measure defensive reactions to the stimuli that prompt participants to perceive the stimuli as purposefully manipulative. The scale includes four items that ask participants to what extent the message "was manipulative," "was misleading," "tried to manipulate me," and "was exploitative." Responses were measured with a seven-point, Likert type scale ranging from 1 = *strongly disagree* to 7 = *strongly agree* ($M$ = 2.03, $SD$ = 1.17). This scale demonstrated good reliability ($a$ = .90).

***Message Derogation***

Message derogation, a component of the fear control process, was measured using Witte's (2000) message derogation scale. The scale was designed to measure defensive reactions to the stimuli that prompt participants to perceive the stimuli as purposefully exaggerated. The scale includes four items that ask participants to what extent the message was "exaggerated," "distorted," "overblown," and "overstated." Responses were measured with a seven-point, Likert type scale ranging from 1 = *strongly disagree* to 7 = *strongly agree* ($M$ = 1.86, $SD$ = 1.09). This scale demonstrated excellent reliability ($a$ = .97).

***Defensive Avoidance***

Defensive avoidance, a component of the fear control process, was measured using two items modified from Witte's (2000) defensive avoidance scale to fit the context of the study. The defensive avoidance scale was designed to measure "motivated resistance to the message, such as denial or minimization of the threat" (Witte, 1992, p.

332). The items ask about respondents' instincts while watching the message and the degree to which they "want to protect myself from the negative effects of smoking/not want to protect themselves from the negative effects of smoking" and "want to think about the negative effects of smoking/not want to think about the negative effects of smoking." Responses were measured with a seven-point, semantic differential scale ($M$ = 1.77, $SD$ = 1.30). Higher scores indicate higher instincts to not protect oneself from or think about the negative effects of smoking. This scale demonstrated acceptable reliability ($\alpha = .71$).

**Facial Expression Analysis (FEA)**

Facial expressions of participants who filled out the iMotions survey ($N$ = 44) were coded using iMotions' remote facial expression analysis (FEA) program. Three participants were removed from coding due to low video quality, inadequate lighting, or improper facial framing, resulting in 41 participants being included in data analysis.

As participants watched the stimuli, videos of their facial expressions were recorded by iMotions. During data analysis, videos were run through Affectiva AFFDEX post-processing in iMotions. Affectiva AFFDEX coded facial expressions for seven discrete emotions (i.e. anger, contempt, disgust, fear, joy, sadness, surprise)[4]. In addition, facial expressions were coded for emotional valence (level of positive/negative emotion) and engagement (level of expressiveness). Emotion variables are determined by the Action Units (AUs) of the Facial Action Coding System (FACS; e.g. brow furrow, eye widen, lip pucker; Farnsworth, 2019). Each emotion variable consists of a combination of FACS AUs (Farnsworth, 2019). For more information on the specific AUs coded for each

[4] Note that, due to oversight, the physiological discrete emotions include contempt and disgust, while the self-report discrete emotions include guilt.

emotion, see the variable summaries in the section (*Physiological Emotion Measures)* below.

After the videos were coded by Affectiva AFFDEX, they were analyzed using the Affectiva statistics export. The Affectiva statistics export analyzes Affectiva data based on likelihood thresholds. Threshold values represent the strength of facial expressions, with 25% likelihood indicating a mildly strong expression, 50% likelihood indicating a moderately strong expression, and 75% indicating a strong expression. For this study, unless otherwise noted, threshold values were set at 50%, as this is the default threshold[5]. When a threshold value is selected, Affectiva statistics export records the number of frames where a participant's facial expression (e.g. fear) is above the selected threshold. These data are provided as both a raw frame number and a percentage of frames out of the total number of frames recorded[6]. Values for physiological variables represent the time percentage that participants expressed a particular emotion (e.g. a fear mean of 12.2 means on average, participants expressed fear for 12.2% of the time they were recorded). Time percentages were calculated for threat stimuli alone, efficacy stimuli alone, and the overall stimuli viewing session (for descriptive statistics for each metric, see Table D3).

***Facial Expression Measures***

**Discrete Emotions[7].** Anger was operationalized as the AUs brow lower, upper lid raise, lid tighten, and lip tighten. Participants spent a very low percentage of time expressing anger ($M_{THREAT} = .05$, $SD = .29$; $M_{EFFICACY} = .08$, $SD = .31$; $M_{OVERALL} = .07$,

[5] For negative valence, this threshold value is expressed as -50%. For neutral valence, this threshold value is expressed as -50% to 50%, as neutral valence reflects time when there is no detectable emotion expressed by a participant.
[6] For further explanations of these two metrics, see *Results – Facial Expression Analysis Results – Preliminary Analysis.* Frame count descriptive statistics are provided in Table D4.
[7] For definitions of the individual discrete emotions, see Table 1.

*SD* = .28). Contempt was operationalized as the AUs lip corner pull and dimple. Participants spent a low percentage of time expressing contempt ($M_{THREAT}$ = 1.44, *SD* = 5.12; $M_{EFFICACY}$ = .98, *SD* = 2.79; $M_{OVERALL}$ = 1.21, *SD* = 3.41). Disgust was operationalized as the AUs nose wrinkle, lip corner depressor, and lower lip depressor. Participants spent a very low percentage of time expressing disgust ($M_{THREAT}$ = .05, *SD* = .17; $M_{EFFICACY}$ = .13, *SD* = .79; $M_{OVERALL}$ = .09, *SD* = .24). Fear was operationalized as the AUs inner brow raise, outer brow raise, brow lower, upper lid raise, lid tighten, lip stretch, and jaw drop. Participants spent a very low percentage of time expressing fear ($M_{THREAT}$ = .03, *SD* = .13; $M_{EFFICACY}$ = .37, *SD* = 1.48; $M_{OVERALL}$ = .20, *SD* = .79). Joy was operationalized as the AUs cheek raise and lip corner pull. Participants spent a low percentage of time expressing joy ($M_{THREAT}$ = 2.01, *SD* = 9.67; $M_{EFFICACY}$ = .55, *SD* = 2.29; $M_{OVERALL}$ = 1.28, *SD* = 4.99). Sadness was operationalized as the AUs inner brow raise, brow lower, and lip corner depressor. Participants spent a very low percentage of time expressing joy ($M_{THREAT}$ = .18, *SD* = .99; $M_{EFFICACY}$ = .14, *SD* = .78; $M_{OVERALL}$ = .16, *SD* = .88). Surprise was operationalized as the AUs inner brow raise, outer brow raise, upper lid raise, and jaw drop. Participants spent a very low percentage of time expressing surprise ($M_{THREAT}$ = .77, *SD* = 2.04; $M_{EFFICACY}$ = .62, *SD* = 1.49; $M_{OVERALL}$ = .69, *SD* = 1.28).

**Emotional Valence.** Positive valence was operationalized as the AUs smile and cheek raise. Participants spent a low percentage of time producing positive expressions ($M_{THREAT}$ = 2.02, *SD* = 9.56; $M_{EFFICACY}$ = .63, *SD* = 2.56; $M_{OVERALL}$ = 1.33, *SD* = 5.04). Negative valence was operationalized as the AUs inner brow raise, brow furrow, nose wrinkle, upper lip raise, lip corner depressor, chin raise, lip press, and lip suck.

Participants spent a moderate percentage of time producing negative expressions ($M_{THREAT}$ = 2.91, $SD$ = 7.26; $M_{EFFICACY}$ = 2.00, $SD$ = 2.81; $M_{OVERALL}$ = 2.46, $SD$ = 4.10). Neutral valence reflects the time in which participants did not produce significant positive or negative expressions. Participants spent the majority of stimuli viewing with neutral expressions ($M_{THREAT}$ = 95.07, $SD$ = 11.69; $M_{EFFICACY}$ = 97.36, $SD$ = 4.37; $M_{OVERALL}$ = 96.22, $SD$ = 6.43).

**Engagement.** Engagement reflects the overall level of emotional expressiveness of participants, regardless of positive or negative valence. Engagement was operationalized as the mean of the highest evidence scores from the upper and lower facial regions. Upper region metrics included brow raise, brow furrow, and nose wrinkle. Lower region metrics included lip corner depressor, chin raise, lip pucker, lip press, mouth open, lip suck, and smile. Participants spent a moderate percentage of time expressing emotional engagement ($M_{THREAT}$ = 8.58, $SD$ = 16.70; $M_{EFFICACY}$ = 9.38, $SD$ = 13.16; $M_{OVERALL}$ = 8.98, $SD$ = 13.54).

**Attention.** Attention reflects the amount of focus participants gave to the stimuli, measured based on participants' head position. This measure was included as a manipulation check, to ensure that participants were looking at the screen for the majority of the stimuli period. Participants paid attention to the stimuli for the majority of stimuli viewing ($M_{THREAT}$ = 97.71, $SD$ = 4.89; $M_{EFFICACY}$ = 94.75, $SD$ = 10.91; $M_{OVERALL}$ = 96.23, $SD$ = 6.96).

## IV. RESULTS

### Survey Results

#### *Preliminary Analysis*

Survey data from the two versions of the survey were combined and cleaned in SPSS. Initially, the Qualtrics survey received 107 responses and the iMotions survey received 49 responses, for a total of 156 responses. Five responses were removed from the Qualtrics responses due to participants indicating that the videos did not load or reporting their age as under 18. Five responses were removed from the iMotions responses due to participants not finishing the survey or indicating that they took the survey twice[8]. After cleaning, the final sample size was 146 participants.

ANOVAs were run to determine if survey platform, demographic variables or pre-test variables differed between experimental groups (see Tables E1 and E2). For survey platform, an ANOVA determined that none of the conditions had a significantly higher number of participants who completed the iMotions survey (vs. the Qualtrics survey), $F(3, 142) = .38$, $p = .77$. For demographic variables, a MANOVA determined that age, $F(3, 142) = .91$, $p = .44$, and gender, $F(3, 142) = 1.39$, $p = .25$, did not significantly vary between study conditions.

For pre-test variables, non-smoking behavioral intentions (BI), $F(3, 142) = 2.12$, $p = .10$; severity, $F(3, 142) = .67$, $p = .57$; susceptibility, $F(3, 142) = .84$, $p = .48$; self-efficacy, $F(3, 142) = 1.86$, $p = .14$; and response efficacy, $F(3, 142) = 1.81$, $p = .15$, did not significantly vary between the four study conditions. However, further testing revealed that self-efficacy, $F(1, 144) = 5.53$, $p = .02$, $\eta^2 = .04$, and response efficacy, $F(1,$

[8] For the participant that took the survey twice, both survey responses were removed, as the participant indicated that the videos did not load properly during their first viewing.

144) = 4.59, $p$ = .03, $\eta^2$ = .03, did vary significantly between the high threat stimulus and the low threat stimulus (see Table E2). Pre-test self-efficacy and response efficacy will therefore be entered as covariates in statistical tests that compare message conditions by threat stimuli alone. In addition, sharing information behavioral intentions (BI) varied significantly between study conditions, $F(3, 142) = 3.38$, $p = .02$, $\eta^2 = .07$ (see Table E2). Further analysis revealed that sharing information BI varied by threat stimuli, $F(1, 144) = 7.2$, $p = .008$, $\eta^2 = 0.05$, but not efficacy, $F(1, 144) = .00$, $p = .99$. Sharing information BI will therefore be used as a covariate in statistical tests that compare message conditions by threat stimuli or by threat and efficacy stimuli.

***Power Analysis***

G*Power was used to calculate posthoc power for ANOVA, given an alpha of .05, a sample size of 146, and 4 conditions (Faul et al., 2007). The study design had limited power to detect a small effect ($f$ = .10, power = .15), moderate power to detect a medium effect ($f$ = .25, power = .69), and excellent power to detect a large effect ($f$ = .40, power = .98). G*Power was also used to calculate posthoc power for linear multiple regression, given an alpha of .05, a sample size of 146, and 2 predictors. The study had mild power to detect a small effect ($f$ = .02, power = .31), excellent power to detect a medium effect ($f$ = .15, power = .99), and excellent power to detect a large effect ($f$ = .40, power = 1.00).

***Bivariate Correlations***

Bivariate correlations were calculated to test the relationships between study variables. Correlations of interest are summarized below, except for correlations between discrete emotions and post-test EPPM variables, which are analyzed in *Research Question 2.* For a full breakdown of bivariate correlations, see Appendix F.

**Gender.** Gender was correlated with pre-test severity ($r$ = .22, $p$ = .008), pre-test susceptibility ($r$ = .18, $p$ = .03), perceived manipulation ($r$ = -.28, $p$ = .001), and message derogation ($r$ = -.24, $p$ = .003). To test if there were significant differences between men and women for these variables, a MANOVA was conducted and found significant differences for all four variables (see Table G1). For pre-test severity, $F$(1, 144) = 7.27, $p$ = .008, $\eta^2$ = .05, women reported higher pre-test severity ($M$ = 6.63, $SE$ = .07) than men ($M$ = 6.28, $SE$ = .11, $p$ = .008). For pre-test susceptibility, $F$(1, 144) = 4.75, $p$ = .03, $\eta^2$ = .03, women reported higher pre-test susceptibility ($M$ = 6.72, $SE$ = .06) than men ($M$ = 6.49, $SE$ = .09). For perceived manipulation, $F$(1, 144) = 12.03, $p$ = .001, $\eta^2$ = .08, men reported higher perceived manipulation ($M$ = 2.53, $SE$ = .17) than women ($M$ = 1.82, $SE$ = .11). For message derogation, $F$(1, 144) = 8.85, $p$ = .003, $\eta^2$ = .06, men reported higher message derogation ($M$ = 2.26, $SE$ = .16) than women ($M$ = 1.69, $SE$ = .11). This indicates that the women in the sample had higher existing threat perceptions and lower fear control reactions than the men in the sample.

**Pre-Test Variables.** The pre-test EPPPM variables were correlated with each other, the discrete emotions, and the post-test EPPM variables. For example, pre-test response efficacy was positively correlated with pre-test severity ($r$ = .33, $p$ < .001), pre-test susceptibility ($r$ = .38, $p$ < .001), pre-test self-efficacy ($r$ = .20, $p$ = .01), and pre-test non-smoking BI ($r$ = .19, $p$ = .02). This indicates that pre-existing threat and efficacy perceptions move together, to an extent. For discrete emotions, pre-test severity was positively correlated with fear ($r$ = .24, $p$ = .004), surprise ($r$ = .18, $p$ = .03), anger ($r$ =

.19, $p = .02$), sadness ($r = .19$, $p = .02$), happiness ($r = .19$, $p = .02$). Pre-test susceptibility was also positively correlated with sadness ($r = .21$, $p = .009$). This indicates that higher threat perceptions prior to message presentation are linked to higher emotional response during message viewing. Finally, pre-test EPPM variables were positively correlated with their post-test equivalents and the outcome variables. Interestingly, stronger correlations were observed between pre-test EPPM variables and fear control outcomes than post-test EPPM variables and fear control outcomes. For example, perceived manipulation was more heavily negatively correlated with pre-test severity ($r = -.26$, $p = .002$) than with post-test severity ($r = -.17$, $p = .04$). This may indicate that some participants experienced reactance in response to the stimuli. For further exploration of fear control outcomes, see *Hypothesis 3* and *Hypothesis 6.*

**Post-Test Variables.** The post-test EPPM variables were strongly correlated with each other. For example, post-test severity was positively correlated with post-test susceptibility ($r = .93$, $p < .001$), post-test self-efficacy ($r = .60$, $p < .001$), and post-test response efficacy ($r = .79$, $p < .001$). Significant negative correlations were also observed between post-test threat/efficacy and fear control outcome variables. For example, post-test self-efficacy was negatively correlated with perceived manipulation ($r = -.18$, $p = .03$), message derogation ($r = -.20$, $p = .01$) and defensive avoidance ($r = -.21$, $p = .01$). However, correlations were weak between post-test threat/efficacy and danger control outcome variables. The only correlations observed were between non-smoking BI and post-test severity ($r = .15$, $p = .07$) and post-test self-efficacy ($r = .15$, $p = .08$). This indicates that post-test threat/efficacy perceptions may be better predictors of fear control reactions than the BI (danger control reactions) measured in this study.

### ***Hypothesis 1***

H1 predicted that the high threat video would elicit higher perceptions of threat than the low threat video. A MANCOVA was calculated using the two threat message conditions (high/low) as the independent variable; post-severity and post-susceptibility as the dependent variables; and pre-test self-efficacy, response efficacy, and sharing information BI as covariates (see Table G2). The test was not significant for severity, $F(1, 141) = .47$, $p = .49$, or susceptibility, $F(1, 141) = .72$, $p = .40$. Therefore, H1 was not supported. The high threat video did not significantly increase perceptions of threat.

### ***Hypothesis 2***

H2 predicted that the high efficacy video would elicit higher perceptions of efficacy than the low efficacy video. A MANOVA was calculated using the two efficacy message conditions (high/low) as the independent variable and self-efficacy and response efficacy as the dependent variables (see Table G3). The test was not significant for self-efficacy, $F(1, 144) = 0.04$, $p = .95$, or response efficacy, $F(1, 144) = .26$, $p = .61$. Therefore, H2 was not supported. The high efficacy video did not significantly increase perceptions of efficacy in comparison to the low efficacy video.

### ***Hypothesis 3***

H3 predicted that the high threat/low efficacy condition would elicit significantly higher fear control outcome variables (i.e. perceived manipulation, message derogation, defensive avoidance) than the other conditions. A MANCOVA was conducted using the four message conditions as the independent variable; perceived manipulation, message derogation, and defensive avoidance as the dependent variables; and pre-test sharing information BI as a covariate (see Table G4). The test was not significant for perceived manipulation, $F(3, 141) = .36$, $p = .78$, message derogation, $F(3, 141) = 0.80$, $p = .50$, or defensive avoidance, $F(3, 141) = .46$, $p = .71$. Therefore, H3 was not supported. The high threat/low efficacy message condition did not elicit significantly higher fear control than the other message conditions.

***Hypothesis 4***

H4 predicted that the high threat/high efficacy condition would elicit significantly higher danger control outcome variables (i.e. positive BI) than the other conditions. To test this, a MANCOVA was conducted using the four stimuli conditions as the independent variable; non-smoking BI and sharing information BI as the dependent variables; and pre-test sharing information BI as a covariate (see Table G5). The test approached significance for non-smoking BI, $F(3, 141) = 2.21$, $p = .07$, $\eta^2 = .06$.

A pairwise comparison indicated that the high threat/high efficacy condition elicited significantly higher BI to avoid smoking ($M = 6.67$, $SE = .21$) than the low threat/high efficacy condition ($M = 6.01$, $SE = .20$, $p = .03$). In addition, the low threat/low efficacy condition elicited significantly higher BI to avoid smoking ($M = 6.70$, $SE = .19$) than the low threat/high efficacy condition ($M = 6.01$, $SE = .20$, $p = .01$)[9]. The test was not significant for sharing information BI, $F(3, 141) = .84$, $p = .48$. Therefore, H4 was partially supported. The high threat/high efficacy condition elicited significantly higher intentions to avoid smoking than the low threat/high efficacy condition but did not elicit higher intentions than any of the other stimuli conditions.

[9] Note that although pre-test non-smoking BI was found to not be significantly different between conditions ($p = .10$), the pre-test mean for the low threat/low efficacy condition ($M = 6.77$) was higher than the other three conditions. In addition, the post-test mean for the low threat/low efficacy condition ($M = 6.70$) actually represents a decrease in non-smoking BI. Therefore, while the comparison between high threat/high efficacy and low threat/high efficacy is accurate, the comparison between low threat/low efficacy and low threat/high efficacy may not be accurate.

***Hypotheses 5 and 6***

H5 and H6 predicted that efficacy perceptions would moderate the relationship between threat and outcome variables. H5 specified that threat and danger control outcomes (a. non-smoking BI, b. sharing information BI) would be positively related at high levels of efficacy and negatively related at low levels of efficacy. H6 predicted that threat and fear control outcomes (a. perceived manipulation, b. message derogation, c. defensive avoidance) would be negatively related at high levels of efficacy and positively related at low levels of efficacy.

To test H5 and H6, moderation analysis was conducted using PROCESS (Model 1, see Hayes, 2017). For each of the five outcome variables, five moderation tests were conducted: severity moderated by self-efficacy (test 1), severity moderated by response efficacy (test 2), susceptibility moderated by self-efficacy (test 3), susceptibility moderated by response efficacy (test 4), and overall threat moderated by overall efficacy (test 5)[10]. Full moderation tables are reported in Appendix H, and graphs of key interaction effects are reported in Appendix I. Results for interactions of overall threat and overall efficacy were of primary importance. Interactions are described using the Johnson-Neyman statistic, which marks the moderator values at which there is a statistically significant relationship ($p \leq .05$) between the predictor and outcome variable. Full Johnson-Neyman outputs are reported in Appendix J.

Overall, for H5, results showed that efficacy moderated the relationship between threat and non-smoking BI, but not sharing information BI. However, while effect magnitude increased as efficacy increased, the relationship between threat and danger

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[10] Composite variables were calculated by averaging severity and susceptibility together to calculate overall threat, and averaging self-efficacy and response efficacy to calculate overall efficacy.

control variables was consistently positive. For H6, results showed that efficacy moderated the relationship between threat and perceived manipulation and message derogation. Results for defensive avoidance were mixed and inconclusive. Similar to H5, as efficacy increased, effect sizes increased but remained negative. Therefore, H5 and H6 were partially supported, as significant interactions were observed but did not change direction as efficacy increased. Detailed results for moderation tests are reported below.

**H5a.** For non-smoking BI, only the moderation test for the interaction effect of overall threat and overall efficacy, $b = .11$, $t = 2.17$, $p = .03$, was significant (see Table H1 and Figure I3). The Johnson-Neyman statistic indicated that when the participants' efficacy was above 6.19 (75.34% of participants), the relationship between threat and non-smoking BI was statistically significant and positive (see Figure J5).

Interaction effects for severity by self-efficacy, $b = .08$, $t = 1.80$, $p = .08$, severity by response efficacy, $b = .09$, $t = 1.85$, $p = .07$, susceptibility by self-efficacy, $b = .09$, $t = 1.94$, $p = .06$, and susceptibility by response efficacy $b = .10$, $t = 1.95$, $p = .053$, only approached significance (see Table H1, Figure I1, and Figure I2). As susceptibility by response efficacy was close to significance, the Johnson-Neyman statistic indicated that when the participants' response efficacy was above 4.17 (95.21% of participants), the relationship between threat and non-smoking BI was statistically significant and positive (see Figure J1). Therefore, H5a was partially supported, as the relationship between threat and non-smoking BI remained positive.

**H5b.** Moderation tests were not significant for the interaction effect of threat and efficacy on sharing information BI. The interaction effects for severity by self-efficacy, $b = .09$, $t = .08$, $p = .25$; severity by response efficacy, $b = .13$, $t = 1.44$, $p = .15$;

susceptibility by self-efficacy, $b = .09$, $t = 1.10$, $p = .28$; susceptibility by response efficacy, $b = .11$, $t = 1.19$, $p = .24$; and composite threat by composite efficacy, $b = .12$, $t = 1.29$, $p = .20$, were not significant (see Table H2 and Figures J6-J10). Therefore, H5b was not supported.

**H6a.** Some of the moderation tests were significant for the interaction effect of threat and efficacy on perceived manipulation (see Table H3). The interaction effects for severity by response efficacy, $b = -.09$, $t = -1.95$, $p = .053$, and susceptibility by response efficacy, $b = -.09$, $t = -1.93$, $p = .06$, only approached significance (see Figure I5). The interaction effects for severity by self-efficacy, $b = -.11$, $t = -2.67$, $p = .009$; susceptibility by self-efficacy, $b = -.13$, $t = -3.04$, $p = .003$; and overall threat by overall efficacy, $b = -.13$, $t = -2.85$, $p = .005$, were significant (see Figures I4, I6, and I7).

For severity by self-efficacy, the Johnson-Neyman statistic indicated that when the participants' self-efficacy was above 5.45 (86.30% of participants), the relationship between threat and perceived manipulation was significant and negative (see Figure J11). For susceptibility by self-efficacy, when the participants' self-efficacy was above 5.49 (86.30% of participants), the relationship between threat and perceived manipulation was significant and negative (see Figure J13). For overall threat by overall efficacy, when the participants' efficacy was above 6.93 (54.80% of participants), the relationship between threat and perceived manipulation was significant and negative (see Figure J15). Therefore, H6a was partially supported, as the relationship between threat and perceived manipulation remained negative.

**H6b.** All moderation tests were significant for the interaction effect of threat and efficacy on message derogation. The interaction effects for severity by self-efficacy, $b = -.10$, $t = -2.66$, $p = .009$; severity by response efficacy, $b = -.09$, $t = -2.08$, $p = .04$; susceptibility by self-efficacy, $b = -.11$, $t = -2.86$, $p = .005$; susceptibility by response efficacy, $b = -.10$, $t = 2.12$, $p = .04$; and overall threat by overall efficacy, $b = -.13$, $t = -2.92$, $p = .004$, were significant (see Table H4 and Figures I8-I11).

For severity by self-efficacy, the Johnson-Neyman statistic indicated that when the participants' self-efficacy was above 5.13 (87.67% of participants), the relationship between threat and message derogation was significant and negative (see Figure J16). For severity by response efficacy, when the participants' response efficacy was above 5.34 (90.41% of participants), the relationship between threat and message derogation was significant and negative (see Figure J17). For susceptibility by self-efficacy, when the participants' self-efficacy was above 5.74 (83.56% of participants), the relationship between threat and message derogation was significant and negative (see Figure J18). For susceptibility by response efficacy, there were no values of response efficacy at which the relationship between threat and message derogation was significant (see Figure J19). For overall threat by overall efficacy, when the participants' efficacy was above 6.74 (60.27% of participants), the relationship between threat and perceived manipulation was significant and negative (see Figure J20). Therefore, H6b was partially supported, as the relationship between threat and message derogation remained negative.

**H6c.** Moderation tests for the interaction effect of threat and efficacy on defensive avoidance were inconclusive. The moderation test for the interaction effect of overall threat and overall efficacy was significant, $b = -.12$, $t = -2.36$, $p = .02$ (see Table H5 and

Figure I14). However, there were no values of overall efficacy at which the relationship between threat and defensive avoidance was significant (see Figure J25). Therefore, this test cannot conclusively state that there was an overall interaction, as threat did not have a significant effect on defensive avoidance.

However, the interactions for severity by self-efficacy, $b = -.09$, $t = -1.95$, $p = .053$, and severity by response efficacy, $b = -.10$, $t = -1.92$, $p = .06$, approached significance (see Table H5, Figure I12, and Figure I13) and produced significant Johnson-Neyman outputs. For severity by self-efficacy, when the participants' self-efficacy was above 4.88 (87.67% of participants), the relationship between threat and defensive avoidance was significant and negative (see Figure J21). For severity by response-efficacy, when the participants' response-efficacy was above 5.41 (90.41% of participants), the relationship between threat and defensive avoidance was significant and negative (see Figure J22). Therefore, H6c was partially supported for severity, as the relationship between severity and defensive avoidance remained negative. However, the mixed results for H6c indicate that this sub-hypothesis cannot be conclusively confirmed by the current data set.

### *Research Question 1*

RQ1 asked if there were significant differences in discrete emotions based on message components. To answer this question, differences in discrete emotions were calculated between groups. First, a MANCOVA was conducted using threat condition (high/low) as the independent variable; the self-report discrete emotions (fear, anger, contentment, guilt, happiness, surprise, sadness) as the dependent variables; and pre-test self-efficacy, response efficacy, and sharing information BI as covariates (see Table G6).

Fear, $F(1, 141) = 14.20$, $p < .001$, $\eta^2 = 0.09$, surprise, $F(1, 141) = 9.70$, $p = .002$, $\eta^2 = 0.06$, and sadness, $F(1, 141) = 14.12$, $p < .001$, $\eta^2 = 0.09$, varied significantly by threat condition. Participants who viewed the high threat stimulus reported significantly higher fear ($M = 3.63$, $SE = .21$) than participants who viewed the low threat stimulus ($M = 2.51$, $SE = .20$). High threat participants also experienced higher surprise ($M = 3.38$, $SE = .21$) than low threat participants ($M = 2.46$, $SE = .20$), as well as higher sadness ($M = 3.49$, $SE = .20$) than low threat participants ($M = 2.44$, $SE = .19$).

Second, a MANCOVA was conducted using efficacy condition (high/low) as the independent variable and the discrete emotions as the dependent variables (see Table G6). Only fear varied significantly by efficacy condition, $F(1, 144) = 8.73$, $p = .004$, $\eta^2 = 0.06$. The high efficacy condition elicited significantly lower fear ($M = 2.60$, $SD = .21$) than the low efficacy condition ($M = 3.46$, $SD = .20$).

Finally, a MANCOVA was conducted using the four overall stimuli conditions as the independent variable; the discrete emotions as the dependent variables; and sharing information BI as a covariate (see Table G6). The MANCOVA determined that fear, $F(3, 141) = 7.74$, $p < .001$, $\eta^2 = 0.14$; surprise, $F(3, 141) = 3.23$, $p = .02$, $\eta^2 = 0.06$; and sadness, $F(3, 141) = 5.38$, $p = .002$, $\eta^2 = 0.10$, varied significantly by stimuli condition.

For fear, the high threat/low efficacy condition elicited significantly higher perceptions of fear ($M = 4.01$, $SE = .27$) in comparison to the high threat/high efficacy ($M = 3.12$, $SE = .30$, $p = .03$), low threat/high efficacy ($M = 2.13$, $SE = .28$, $p < .001$) and low threat/low efficacy ($M = 2.92$, $SE = .27$, $p = .005$) conditions. In addition, the high threat/high efficacy condition ($p = .02$) and the low threat/low efficacy condition ($p = .04$) elicited significantly higher fear than the low threat/high efficacy condition.

For sadness, the high threat/low efficacy participants reported significantly higher sadness ($M = 3.72$, $SE = .26$) than the low threat/high efficacy participants ($M = 2.32$, $SE = .27$, $p < .001$) and the low threat/low efficacy participants ($M = 2.60$, $SE = .26$, $p = .003$). In addition, the high threat/high efficacy participants reported significantly higher sadness ($M = 3.17$, $SE = .29$) than the low threat/high efficacy participants ($p = .04$).

For surprise, the high threat/high efficacy participants reported significantly higher surprise ($M = 3.49$, $SE = .30$) than the low threat/high efficacy participants ($M = 2.62$, $SE = .29$, $p = .04$) and the low threat/low efficacy participants ($M = 2.38$, $SE = .27$, $p = .007$). In addition, the high threat/low efficacy participants reported significantly higher surprise ($M = 3.22$, $SE = .28$) than the low threat/low efficacy participants ($p = .03$).

Therefore, fear, surprise, and sadness varied significantly between conditions. For fear, results aligned with the predictions of H3, which predicted that the high threat/low efficacy condition would elicit higher fear control. Although H3 itself was not confirmed, this finding shows that fear, at least, followed the predicted pattern. For sadness and surprise, results showed that the high threat/high efficacy and high threat/low efficacy conditions elicited higher levels of these emotions, although specific patterns varied between the two emotions. Overall, results showed that threat and efficacy content in messages affected the emotions that participants experienced during message viewing.

***Research Question 2***

RQ2 asked if the discrete emotions were related to EPPM perceptions and outcomes. First, bivariate correlations were examined for significant relationships between discrete emotions and EPPM variables. None of the post-test threat/efficacy variables were correlated with any of the self-report discrete emotions (see Appendix F). However, some of the discrete emotions were correlated with EPPM outcome variables. Fear was positively correlated with sharing information BI ($r = .20$, $p = .02$), surprise was negatively correlated with defensive avoidance ($r = -.20$, $p = .02$), and guilt was positively correlated with perceived manipulation ($r = .21$, $p = .01$).

As RQ1 revealed that there were some significant differences in discrete emotions between message conditions, and correlations revealed that some of the discrete emotions were related to EPPM outcome variables, mediation tests were conducted using PROCESS (Model 4, see Hayes, 2017). A total of 126 tests were run, with threat stimuli or efficacy stimuli as the predictor, each of the EPPM post-test variables as the dependent variable (non-smoking BI, sharing information BI, perceived manipulation, message derogation, defensive avoidance, severity, susceptibility, self-efficacy, response efficacy), and each of the discrete emotions as the mediator (fear, anger, contentment, guilt, happiness, sadness, surprise). For brevity, only significant mediation tests are reported.

Efficacy stimuli significantly negatively predicted fear (coefficient = -.85, $SE$ = .29, $t$ = -2.95, $p$ = .004), which in turn significantly positively predicted sharing information BI (coefficient = .24, $SE$ = .10, $t$ = 2.37, $p$ = .02). The indirect effect was tested using a percentile bootstrap estimation approach with 5000 samples and was found to be significant (coefficient = -.21, $SE$ = .12, 95% CI [-.4667, -.0204]). There was not a significant effect of efficacy stimuli on sharing information BI before controlling for the mediator (coefficient = -.17, $SE$ = .36, $t$ = -.48, $p$ = .64) and after controlling for the mediator (coefficient = .04, $SE$ = .36, $t$ = .10, $p$ = .92), consistent with indirect-only mediation (Zhao et al., 2010). Therefore, fear mediated the relationship between efficacy stimuli and sharing information BI, such that high efficacy stimulus led to lower fear, which in turn led to lower sharing information BI (see Figure K1). This finding partially confirms previous assertions that fear mediates between stimuli presentation and behavioral intentions.

Threat stimuli significantly positively predicted surprise (coefficient = .80, *SE* = .28, *t* = 2.88, *p* = .005), which in turn significantly negatively predicted defensive avoidance (coefficient = -.15, *SE* = .06, *t* = -2.38, *p* = .02). The indirect effect was tested using a percentile bootstrap estimation approach with 5000 samples and was found to be significant (coefficient = -.12, *SE* = .07, 95% CI [-.2716, -.0145]). There was not a significant effect of threat stimuli on defensive avoidance before controlling for the mediator (coefficient = -.07, *SE* = .22, *t* = -.31, *p* = .75) and after controlling for the mediator (coefficient = .05, *SE* = .22, *t* = .25, *p* = .81), consistent with indirect-only mediation (Zhao et al., 2010). Therefore, surprise mediated the relationship between threat stimuli and defensive avoidance, such that the high threat stimulus led to higher surprise, which in turn led to lower defensive avoidance (see Figure K2). This finding offers evidence that emotions beyond fear have a role as mediators in the EPPM.

## Facial Expression Analysis Results

### *Manipulation Checks*

After data cleaning (see *Methods – Facial Expression Analysis)*, physiological data were comprised of 41 facial expression analysis videos. Manipulation checks were conducted before physiological data were analyzed, to determine if there were any relevant differences between participants who filled out the Qualtrics survey and participants who recorded physiological data with the iMotions survey. First, a

MANOVA was conducted to determine if there were significant differences in demographic variables between the two survey groups[11]. The MANOVA determined that age, $F(1, 144) = .36$, $p = 0.55$, and gender, $F(1, 144) = 1.15$, $p = .29$, did not vary significantly between the two surveys (see Table L1).

Second, a MANOVA was conducted to determine if there were significant differences in pre-test and post-test EPPM variables between the two survey groups. The MANOVA determined that pre-test non-smoking BI, $F(1, 144) = .03$, $p = .86$; pre-test sharing information BI, $F(1, 144) = 2.65$, $p = .11$; pre-test severity, $F(1, 144) = .44$, $p = .51$; pre-test susceptibility, $F(1, 144) = .10$, $p = .75$; pre-test self-efficacy, $F(1, 144) = 2.39$, $p = .12$; and pre-test response efficacy, $F(1, 144) = .14$, $p = .71$, did not vary significantly between the two surveys (see Table L2).

Third, a MANCOVA was conducted to determine if there were significant differences in post-test EPPM variables between the two survey groups. The MANOVA determined that post-test non-smoking BI, $F(1, 144) = .44$, $p = .51$; post-test sharing information BI, $F(1, 144) = 1.10$, $p = .30$; post-test severity, $F(1, 144) = .20$, $p = .65$; post-test susceptibility, $F(1, 144) = .03$ $p = .88$; post-test self-efficacy, $F(1, 144) = 3.34$, $p = .07$[12]; post-test response efficacy, $F(1, 144) = .05$, $p = .83$, perceived manipulation, $F(1, 144) = .59$, $p = .44$; message derogation, $F(1, 144) = .62$, $p = .43$; and defensive avoidance, $F(1, 144) = .01$, $p = .92$; did not vary significantly between the two surveys (see Tables L3 and L4).

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[11] Manipulation check results reported in text are based on which survey version participants filled out (Qualtrics vs. iMotions). The three participants whose videos were removed from coding were still considered part of the iMotions group for these manipulation checks, as their survey answers may have been affected by completing the survey through iMotions. Manipulation checks were also run based on whether participants had video data that was included in physiological analysis. Overall results did not differ between calculation approaches. Tables E3-E7 report both calculations, for comparison.

[12] For comparison between video data groups, $p = .13$.

Finally, a MANCOVA was conducted to determine if there were significant differences in self-report discrete emotions between the two survey groups (see Table L5). The MANCOVA determined that guilt, $F(1, 144) = 2.43$, $p = 0.12$; happiness, $F(1, 144) = .17$, $p = .68$; and contentment, $F(1, 144) = .06$, $p = .81$, did not vary significantly between the two surveys. However, fear, $F(1, 144) = 20.98$, $p < .001$, $\eta^2 = 0.13$; surprise, $F(1, 144) = 9.62$, $p = .002$, $\eta^2 = 0.06$; anger, $F(1, 144) = 5.86$, $p = .02$, $\eta^2 = 0.04$; and sadness, $F(1, 144) = 11.22$, $p = .001$, $\eta^2 = 0.07$, did vary significantly between the two surveys.

Participants who filled out the iMotions survey reported significantly lower levels of these discrete emotions ($M_{FEAR} = 2.09$, $SE_{FEAR} = .25$; $M_{SURPRISE} = 2.25$, $SE_{SURPRISE} = .25$; $M_{ANGER} = 1.86$, $SE_{ANGER} = .24$; $M_{SADNESS} = 2.27$, $SE_{SADNESS} = .25$) than participants who filled out the Qualtrics survey ($M_{FEAR} = 3.47$, $SE_{FEAR} = .17$; $M_{SURPRISE} = 3.19$, $SE_{SURPRISE} = .17$; $M_{ANGER} = 2.55$, $SE_{ANGER} = .16$; $M_{SADNESS} = 3.25$, $SE_{SADNESS} = .16$). It is unclear if differences in self-report emotions reflect individual differences or an effect of differences in survey procedure. Therefore, findings in this section of the results that refer to fear, surprise, anger, or sadness may not extend to the sample as a whole. However, they can provide a basis for future physiological research with a larger sample.

***Power Analysis***

G*Power was used to calculate posthoc power for ANOVA, given an alpha of .05, a sample size of 41, and 4 conditions (Faul et al., 2007). The study design had limited power to detect a small effect ($f = .10$, power = .07), mild power to detect a medium effect ($f = .25$, power = .22), and moderate power to detect a large effect ($f = .40$, power = .51). G*Power was also used to calculate posthoc power for linear multiple regression, given an alpha of .05, a sample size of 41, and 2 predictors. The study had limited power to detect a small effect (*f* = .02, power = .11), moderate power to detect a medium effect (*f* = .15, power = .56), and excellent power to detect a large effect (*f* = .40, power = .95).

### *Preliminary Analysis*

As described in the *Methods* section, facial expression data can be analyzed in iMotions in terms of how much time participants demonstrated a facial movement above a set likelihood threshold. Threshold values were set at 50% likelihood, so that Affectiva recorded all frames that registered a moderately strong facial response. For emotional valence, threshold values were set at 50% for positive valence and -50% for negative valence. After the physiological data were exported, survey data from the iMotions participants were separated from the general data sample. The survey data were then combined with the physiological data, linked by respondent IDs provided by iMotions. Each participant had two sets of physiological data for each facial movement: one for threat stimuli and one for efficacy stimuli. These data was expressed as both a raw frame count and a time percentage. Data for both metrics were averaged between threat and efficacy stimuli, so that each participant had an overall time percentage/frame count for each facial movement.

Frame counts can be used to compare the total time that participants expressed an emotion, and time percentages can be used to compare the relative amount of time that participants expressed an emotion. As the high threat/efficacy stimuli in this study were three times the length of the low threat/efficacy stimuli, time percentages were much higher in the low threat/efficacy conditions, even when frame counts were similar (see

Tables L6-L14 for means comparison tables for time percentages and frame counts). However, if only frame counts are used, the analysis does not take into account the fact that the high threat/efficacy stimuli provided more time to express emotions. Frame counts and time percentages therefore both face issues with equal comparison between study groups.

As there were only 41 videos included in the analysis, there were too few participants to draw conclusions about differences between conditions, so correlations and regressions are the primary forms of analysis reported. Time percentage was therefore used as the primary metric, as it does standardize the data between participants, even if this standardization is imperfect. Identical tests were run with frame counts, but for the sake of brevity, these results were only be reported in appendix tables, as they did not differ from time percentage findings in terms of significance or direction.

***Research Question 3***

RQ3 asked how self-report measures of emotion compare to physiological measures of emotion. Bivariate correlations were calculated between self-report measures (i.e. anger, contentment, fear, guilt, happiness, sadness, surprise) and physiological measures (i.e. anger, contempt, disgust, fear, joy, sadness, surprise, positive valence, negative valence, neutral valence, engagement)[13]. For physiological emotions, values for threat stimuli, efficacy stimuli, and overall stimuli viewing were considered, as self-report measures did not ask participants to separate emotion ratings by stimuli.

[13] Unfortunately, due to oversight during the study planning process, the sets of emotions measured by each method are not entirely equivalent. Happiness and joy are considered equivalent by iMotions, which refers to the variable with either name interchangeably. Contentment is not directly equivalent to joy, but can still be compared to it and positive valence. However, guilt, contempt, and disgust do not have direct equivalents, and cannot be compared between survey and physiological methods. Correlations between the self-report discrete emotions and physiological contempt and disgust are reported in Tables M7 and M8.

First, emotions with identical or similar constructs in both sets of data were analyzed for significant correlations (see Tables M1, M2, and M3 for time percentage, see Tables M4, M5, and M6 for frame count). Self-report anger and physiological anger were not correlated ($r_{OVERALL} = .02$, $p_{OVERALL} = .90$). The same result was observed for self-report sadness and physiological sadness ($r_{OVERALL} = -.16$., $p_{OVERALL} = .31$) and self-report fear and physiological fear ($r_{OVERALL} = -.04$., $p_{OVERALL} = .82$). However, self-report happiness and physiological joy were significantly correlated ($r_{THREAT} = .46$, $p_{THREAT} = .003$; $r_{EFFICACY} = .48$, $p_{EFFICACY} = .002$; $r_{OVERALL} = .55$, $p_{OVERALL} < .001$). Similarly, self-report contentment and physiological joy were strongly correlated ($r_{THREAT} = .36$, $p_{THREAT} = .02$; $r_{EFFICACY} = .71$, $p_{EFFICACY} < .001$; $r_{OVERALL} = .51$, $p_{OVERALL} = .001$). The same was true for positive valence and happiness ($r_{THREAT} = .47$, $p_{THREAT} = .002$; $r_{EFFICACY} = .52$, $p_{EFFICACY} < .001$; $r_{OVERALL} = .58$, $p_{OVERALL} < .001$) and positive valence and contentment ($r_{THREAT} = .38$, $p_{THREAT} = .01$; $r_{EFFICACY} = .72$, $p_{EFFICACY} < .001$; $r_{OVERALL} = .54$, $p_{OVERALL} < .001$). Contrastingly, negative correlations between self-report surprise and physiological surprise approached significance for overall surprise ($r_{OVERALL} = -.31$., $p_{OVERALL} = .051$) and efficacy-stimuli surprise ($r_{EFFICACY} = -.27$, $p_{EFFICACY} = .09$). Therefore, self-reports of happiness and contentment were significantly positively related facial expressions of joy and positive valence, and self-reports of surprise were slightly negatively related to facial expressions of surprise. As self-report surprise differed significantly between the iMotions survey and Qualtrics survey (see *Facial Expression Analysis Results - Manipulation Checks*), and correlations only approached significance, further analysis for surprise was not conducted.

Second, significant correlations between variables were further examined with linear regressions (see Tables N1 and N2 for time percentage, see Tables N3 and N4 for frame count). Overall physiological joy significantly predicted self-report happiness, $F(1, 39) = 17.29$, $p < .001$, $r^2 = .31$, and self-report contentment, $F(1, 39) = 13.67$, $p = .001$, $r^2 = .26$. Similarly, overall positive valence significantly predicted self-report happiness, $F(1, 39) = 19.41$, $p < .001$, $r^2 = .33$, and self-report contentment, $F(1, 39) = 16.34$, $p = .001$, $r^2 = .30$. As contentment had stronger correlations with efficacy-stimuli emotions than overall emotions, additional regressions were calculated. Efficacy-stimuli joy significantly predicted self-report contentment, $F(1, 39) = 38.84$, $p < .001$, $r^2 = .50$, and efficacy-stimuli positive valence also significantly predicted self-report contentment, $F(1, 39) = 42.41$ $p = .001$, $r^2 = .52$. Therefore, joy and positive valence that are measured with facial expression analysis can be used to predict perceived happiness and contentment. Furthermore, for contentment, joy and positive valence are more robust predictors when values during efficacy stimuli viewing are utilized. For happiness, overall joy and overall positive valence are the strongest predictors.

## V. DISCUSSION

This study demonstrated that many of the fundamental tenets of the EPPM apply to anti-smoking messaging. While some hypotheses were not confirmed, significant results were found for the effects of threat and efficacy on message outcomes, in terms of both individual perceptions and message components. For perceptions, the effects of threat perceptions on non-smoking BI, perceived manipulation, and message derogation were moderated by efficacy perceptions. For message components, fear mediated the association between efficacy stimuli and sharing information BI, and surprise mediated between the relationship between threat stimuli and defensive avoidance. This result, along with the finding that fear, surprise, and sadness varied by message condition, demonstrates that emotions deserve greater consideration within the EPPM. Finally, facial expression analysis revealed that facial joy and positive valence predict self-report happiness and contentment. Overall, findings showed that the EPPM explained some of the effects of anti-smoking fear appeals, but that extensions to the original EPPM could potentially expand scholars' understanding to an even greater degree.

Perceptions, as opposed to message features, enacted the most significant effects on EPPM outcomes. Moderation tests for H5 and H6 demonstrated that threat and efficacy perceptions interact to influence outcomes. These effects were most significant for perceived manipulation and message derogation, as these variables were affected by the interactions of individual threat/efficacy components (e.g. severity and self-efficacy) and composite threat/efficacy. In contrast, non-smoking BI was not affected by the interaction, sharing information BI was only fully significant for the interaction of composite threat and efficacy, and defensive avoidance demonstrated mixed significance.

Perceptions of threat and efficacy in a predominately non-smoking sample, therefore, may enact a greater influence on attitudes towards a message than on behavioral intentions or defensive avoidance.

The specific findings of the significant moderation tests bear closer examination, as they may contradict some of the assertions of the EPPM. Proposition 2 of the EPPM asserts that “as perceived threat increases when perceived efficacy is high, so will message acceptance” (Witte, 1992, p. 339). Proposition 2 was confirmed, because when efficacy was one standard deviation above the mean, increases in threat decreased perceived manipulation and message derogation (e.g. Figure I7). However, proposition 4 of the EPPM argues that “as perceived threat increases when perceived efficacy is low, people will do the opposite of what is advocated” (Witte, 1992, p. 341), and was not upheld. Instead, when efficacy was one standard deviation below the mean, increases in threat did not increase maladaptive outcomes (e.g. Figure I11). Instead, for both low perceived efficacy and high perceived efficacy, as threat increased, adaptive outcomes increased (or maladaptive outcomes decreased). Therefore, Proposition 4 was not supported, but this result may be due to the constraints of the current study.

Means for threat and efficacy components were all greater than six on a seven-point scale, indicating that perceived efficacy may not have been low enough to properly test Proposition 4. High means could have been a result of the majority of the sample being non-smokers, as non-smokers have been shown to perceive higher severity, susceptibility, and self-efficacy than smokers (Wehbe et al., 2017). In addition, prior knowledge could have played a role. The EPPM has been criticized for failing to address how prior exposure to fear appeal messages influences message processing (Popova, 2012). For a topic like smoking, which has been covered by health campaigns since the 1990s (Yale University Library, 2020), participants' prior knowledge may play a significant role in determining message outcomes.

This assertion is strengthened by the research of Underwood and Yang (2018), in which college students' prior subjective (self-judged) knowledge and objective (actual) knowledge of the risks of e-cigarettes influenced perceptions and behavior intentions in different ways. In particular, high subjective knowledge predicted higher susceptibility, lower self-efficacy, and higher intentions to vape, while high objective knowledge predicted higher severity and response efficacy, and lower intentions to vape (Underwood & Yang, 2018). These findings demonstrate that prior knowledge can be helpful if participants actually understand a health topic but can be hurtful if participants overestimate their understanding. In addition, a study focused on spinal meningitis and sleep deprivation fear appeals demonstrated that participants with low prior knowledge experienced higher fear in response to fear appeals than participants with high prior knowledge (Averbeck et al., 2011). As the adaptive or maladaptive role of fear is still under debate (So, 2013), future research should include measures of prior knowledge that incorporate both subjective and objective prior knowledge and examine their role in influencing EPPM perceptions and outcomes.

It is also possible that this study accurately captured the interactive effects of threat and efficacy, as studies with less dramatically skewed data have demonstrated similar results. Proposition 4 has been contradicted by some EPPM studies. For example, Smalec and Klingle (2000) demonstrated support for Proposition 4 for the outcome of cognitive message acceptance (thinking about seeking help for bulimia) but not behavioral message acceptance (actually seeking help for bulimia) or message rejection. Threat and behavioral message acceptance were positively related at both low and high efficacy, and threat and message rejection were negatively related at both low and high efficacy (Smalec & Klingle, 2000), mirroring the results of this study. In addition, Popova (2014) found that at low levels of efficacy, threat was not a predictor of perceived manipulation and message derogation. Although Popova (2014) did not test this relationship at high levels of efficacy, the context of the study makes their findings particularly relevant. Popova (2014) presented smokers with fear appeals designed to discourage the adoption of new smokeless tobacco projects, a situation which is at least somewhat comparable with discouraging non-smokers from trying cigarettes. Therefore, while this study cannot come to definite conclusions regarding the validity of Proposition 4, previous studies bolster the assertion that future research should fully investigate Proposition 4 in an anti-smoking context.

Tests of hypotheses focused on differences in outcomes based on message features mostly returned null results. Comparisons of the high threat and low threat stimuli, the high efficacy and low efficacy stimuli, and the four overall stimuli conditions did not find significant differences in participants' perceptions of severity, susceptibility, self-efficacy, response efficacy, sharing information BI, perceived manipulation, message derogation, or defensive avoidance. While H4 found significant differences for non-smoking BI, results may have been skewed by differences between conditions for pre-test non-smoking BI, which approached significance ($p = .10$; see Tables E2 and G5 to compare pre-test and post-test means by condition). While the lack of differences between groups is disappointing, it is not unprecedented, as LaVoie (2016), the dissertation from which this study's threat/efficacy measures were adapted, observed a similar result with her smoking stimuli. This result may indicate that the stimuli were not properly manipulated to have different levels of threat and efficacy content. However, the significant findings for the effects of message features on emotions may indicate that threat and efficacy content acted on participants more indirectly, through emotional rather than cognitive mechanisms.

Message features were found to have a significant result on emotions. Fear, surprise, and sadness were all found to be significantly different across study conditions, although the specific differences observed varied between emotions. The high threat stimulus elicited higher fear, surprise, and sadness than the low threat stimulus, and the low efficacy stimulus elicited higher fear than the high efficacy stimulus. For fear and sadness, means were highest in the high threat/low efficacy condition. For surprise, means were highest in the high threat/high efficacy condition. In addition, mediation tests revealed that the stimuli had hidden, indirect effects on behavioral intentions and defensive avoidance. Fear mediated between efficacy stimuli and sharing information BI, such that the high efficacy stimulus decreased fear, which in turn lowered sharing information BI. Surprise mediated between threat stimuli and defensive avoidance, such that the high threat stimulus increased surprise, which in turn lowered defensive avoidance. These results are supported by previous studies that have demonstrated that fear appeals evoke these emotions in particular (Dillard & Shen, 1996; Ooms et al., 2017; Ooms et al., 2020; Timmers & van der Wijst, 2007). As such, each individual emotion has implications for fear appeal research.

The ANOVA results for fear align with the EPPM's assertions surrounding fear's relationship to threat and efficacy. Of course, this study primarily considered the EPPM's assertions about levels of threat/efficacy through the lens of perceptions. But, if these assertions are evaluated in terms of message features, the results for fear match Witte's (1992) argument that threat evaluations prompt experiences of fear, which are then heightened if efficacy is evaluated as low. As reported in Table G6, the fear means for the two student groups who saw the high threat stimulus (high threat/high efficacy and high threat/low efficacy) were higher than the means for the two student groups that saw the low threat stimulus (low threat/high efficacy and low threat/low efficacy). However, the high threat/high efficacy and low threat/low efficacy conditions had comparable means, while the high threat/low efficacy condition was significantly higher in fear than the other conditions, and the low threat/low efficacy condition was significantly lower in fear than the other conditions. This suggests that the threat stimuli put participants at a high or low level of fear, and the efficacy stimuli then increased or decreased that fear. The decrease in fear from the high efficacy stimulus and the increase in fear from the low efficacy stimulus resulted in comparable means for the high threat/high efficacy and low threat/low efficacy conditions. Therefore, this study confirms the EPPM's proposed relationships between threat/efficacy content and fear.

The mediation findings for fear are more complicated to parse. The indirect associations for fear as a mediator between stimuli and sharing information BI were only significant for the efficacy stimuli (see Figure K1). Pre-test sharing information BI had to be added as a covariate for the threat stimuli test[14], which changed the indirect effect

[14] Because the participants that viewed the low threat stimulus reported significantly higher pre-test sharing information BI than the participants that viewed the high threat stimulus (see Table E2).

from significant to only approaching significance. There was not a similar issue for the efficacy stimuli, and it is unlikely that the positive relationship between fear and post-test sharing information BI was affected by the issues with pre-test sharing information BI. The low threat stimulus group reported lower fear and higher post-test sharing information BI than the high threat stimulus group when ANOVAs were calculated without pre-test sharing information BI as a covariate (Fear: $M_{low} = 2.62$, $M_{high} = 3.52$; BI: $M_{low} = 4.85$, $M_{high} = 4.01$), so the positive relationship between the two variables in the efficacy stimuli mediation test may have actually been artificially deflated. The efficacy stimuli mediation results are therefore valid despite significant differences in pre-test sharing information BI between threat stimuli, but said differences made it impossible to form conclusions for threat stimuli.

Few EPPM studies have tested fear as a mediator, and none of the studies located in the literature search for this study used efficacy stimuli or perceptions as the predictor variable (Byrne et al., 2015; Meadows, 2020; Pokharel et al., 2019; Wong et al., 2013; Zhang et al., 2015), so results cannot be directly compared. However, the four studies that used message feature manipulations as the predictor in the mediation relationship (i.e. color and text content on cigarette warning labels, Byrne et al., 2015; UV photos compared to non-UV photos, Pokharel et al., 2019; secondhand smoke vs. smoking addiction message content, gain/loss framing, Wong et al., 2013; media use about H1N1 flu, Zhang et al., 2015) all found a significant mediation pathway that included a positive relationship between fear and adaptive outcomes (i.e. positive behavior intentions or message evaluations). These results, along with the results of this study, contradict Proposition 7 of the EPPM, which states that "fear causes maladaptive responses" (Witte, 1992, p. 343). While the effect size observed for fear was small (effect = .24), this study adds to a greater body of evidence that fear acts as a motivator of adaptive responses.

The particular adaptive response motivated by fear, sharing information BI, offers particularly interesting evidence that should be examined more fully in future research. Sharing information BI measured participants' intentions to talk to friends and/or family in the next month about quitting or reducing smoking to prevent smoking-related disease. The mediation pathway functioned so that the high efficacy stimulus prompted lower fear responses, which lowered sharing information BI. The high efficacy stimulus in this study provided extensive information surrounding the positive health effects of quitting smoking (see Appendix B for stimuli transcripts). In particular, the high efficacy stimulus emphasized that quitting smoking significantly reduces a smokers' risk of diseases like cancer over time, so that ten to 15 years post-quitting these risks are half that of a non-smoker or even identical to that of a non-smoker. The low efficacy stimulus simply stated that quitting smoking reduces these health risks, without providing specifics on the exact magnitude of risk reduction.

The high efficacy stimulus may have therefore been too optimistic about the response efficacy of quitting smoking. Assuming that participants' emotions were stemming from their fear for their friends or family who smoke, it makes sense that participants who saw the high efficacy stimulus might feel less inclined to immediately have a difficult discussion, as they may have felt less afraid that the health consequences depicted in the threat stimuli would affect their loved ones. As additional context, Wong and colleagues (2013) sampled non-smokers and used a similar outcome measure to compare emotional responses to PSAs that emphasized the dangers of secondhand smoke and PSAs that emphasized the dangers of smoking addiction. Results showed that fear of secondhand smoke exposure mediated the relationship between viewing secondhand smoke PSAs and intentions to talk to friends about smoking cessation (Wong et al., 2013). Wong and colleagues (2013) noted that "although secondhand smoke PSAs may be designed to elicit guilt among smokers… the same message likely elicits fear… among nonsmokers" (p. 1416). The findings from Wong and colleagues (2013) corroborate the idea that PSAs designed for smokers can motivate nonsmokers to help their loved ones quit smoking. However, fear for oneself may be a stronger motivator than fear for others. Future research should use multiple fear measures that measure different triggers of fear and investigate if efficacy information has different effects on self-oriented vs. other-oriented fear.

Sadness varied by threat and overall conditions but was not a significant predictor of outcome variables. Participants in the high threat/low efficacy condition reported the highest sadness, followed by high threat/high efficacy, low threat/low efficacy, and low threat/high efficacy (see Table G6). Sadness, therefore, followed the same pattern as fear, indicating that the two emotions may be related responses to fear appeals. Ooms and colleagues (2017) measured multiple emotional responses to narrative fear appeals and found similar results – sadness and fear were related to one another, but only fear predicted behavior intentions. As their study was focused on cancer narratives, and only a quarter of their participants knew someone with cancer, Ooms and colleagues (2017) suggested that participants might experience "a 'diluted' version of sadness" (p. 4939) that has a weaker link to behavior intentions. This may also have been the case for the nonsmokers in this study. Other studies that measured sadness in response to health PSAs have found positive relationships between sadness and perceptions/cognitions, including perceptions of persuasiveness (Dillard et al., 1996), reflection on one's own smoking behavior (Timmers & van der Wijst, 2007), and perceptions of the health risks of smoking (Gali, 2018). As few studies have examined sadness's relationship to smoking outcomes (Gali, 2018), future studies should investigate the relationship between fear and sadness in response to antismoking appeals, in order to determine how each emotion functions to impact message outcomes.

Surprise also varied by threat and overall conditions, and mediated between threat stimuli and defensive avoidance, such that the higher threat condition increased surprise, which decreased defensive avoidance (see Table G6 and Figure K2). Surprise is a measure of arousal in response to a novel stimulus (see Table 1; Paul Ekman Group, 2021E). It therefore makes sense that the high threat stimulus, which covered more specific information on the devastating effects of smoking, would be more novel and surprising than the low threat stimulus, which focused on difficulty breathing (see Appendix B for stimuli transcripts). While the effect of surprise on defensive avoidance was small (effect = -.15), this result demonstrates that increased novelty can motivate participants to think more deeply about the effects of smoking, rather than blocking out the topic. Previous fear appeal studies have demonstrated similar results, namely, that surprise increased message acceptance (Dillard et al., 1996) and increased reflection on one's own smoking behavior (Timmers & van der Wijst, 2007). Surprising content, therefore, may be a useful component for fear appeals, as it appears to reduce defensive reactions to threatening information. Note, however, that this content should not be so surprising that confuses viewers, as Dillard and colleagues (1996) also observed that puzzlement decreased message acceptance. Therefore, future research should further investigate the effects of surprising content on message processing, with a particular focus on whether increasing levels of novelty increase or decrease adaptive outcomes.

Further research into the role of surprise could also be enhanced by the usage of the physiological measures Galvanic Skin Response (GSR) and functional magnetic resonance imaging (fMRI). GSR measures participants' skin conductance as an arousal response, as skin conductance increases as sweat in the sweat glands increases, and sweat responses are controlled by the sympathetic nervous system (Ravaja, 2004). Surprise has been shown to increase GSR response (Jang et al., 2015; Kreibig, 2010), so GSR would be an effective way to link perceived surprise to actual bodily arousal. fMRI is a neuroimaging technique that can be used to identify and compare areas of the brain that respond to different stimuli (Weber et al., 2015). As an example, Mostafa (2013) used fMRI to measure responses to surrealistic imagery in advertising, in order to investigate responses to imagery that violates expectations. Mostafa (2013) found that surrealistic stimuli "elicits more activation in brain areas associated with episodic-memory retrieval" (p. 352) because "the violation of expectations caused by incongruous Surrealistic stimuli elicits a surprise response that enhances contextual cues available for later recall" (p. 352). Therefore, fMRI could be used to confirm that surprise decreases defensive avoidance by causing participants to focus on processing novel information.

The physiological measure used in this study, facial expression analysis (FEA), did not provide deeper insight into surprise processes. Self-report surprise, along with fear, anger, and sadness, was significantly lower in the iMotions group than the Qualtrics group, which limited the applicability of physiological findings for these four emotions.

Perhaps as a result, surprise was the only one of these four emotions that exhibited correlations that approached significance between self-report and physiological measures (see Tables M2 and M3). Oddly, this correlation was negative, which could simply be explained as a spurious correlation caused by the smaller, more skewed iMotions sample. Alternatively, this could be explained by flaws in Affectiva's emotion detection system. A recent validation study used iMotions' Affectiva and FACET modules to code over 600 photos of facial expressions (i.e. anger, contempt, disgust, fear, happiness, sadness, and surprise) taken from three public databases, and found that Affectiva almost always confused fear with surprise, so that almost all of the fear photos were falsely identified as surprise (Stöckli et al., 2018). Affectiva also often confused fear (underprediction) with contempt (overprediction) and anger (underprediction) with sadness (overprediction; Stöckli et al., 2018). In addition, these issues would have also tainted results for negative valence, as surprise is not included in negative valence measures (Stöckli et al., 2018). The nonsignificant results for fear, anger, sadness, surprise, and negative valence, therefore, may be at least partly attributable to Affectiva's difficulties in correctly identifying these emotions. Therefore, FEA may not be an effective method of separating negative and neutral emotional variables for analysis.

Fortunately, FEA was highly effective at identifying positive discrete emotions and positive emotional valence. Self-report contentment and happiness were heavily correlated with physiological joy and positive valence during efficacy stimuli and the overall stimuli session (see Table M1). When these relationships were tested with regressions, joy and positive valence were significant predictors of happiness and contentment (see Tables N1 and N2). Furthermore, overall joy and positive valence were slightly stronger predictors of happiness than efficacy-stimuli joy and positive valence, while efficacy-stimuli joy and positive valence were much stronger predictors of contentment. As self-report measures did not evaluate each stimulus separately, the regression results offer extra insight into the emotions experienced by participants. Contentment is passive satisfaction with life, often due to the absence of a threat (see Table 1; Dillard & Shen, 2007). Positive facial expressions during efficacy stimuli viewing predicted self-report contentment, which could indicate that participants who smiled more during efficacy stimuli were experiencing increased passive satisfaction because the efficacy stimuli reduced the threat communicated by the threat stimuli.

Happiness is pleasure or satisfaction due to a pleasing event or life circumstance (see Table 1; Paul Ekman Group, 2021C). Overall positive facial expressions were slightly more predictive of self-report happiness than efficacy-stimuli positive facial expressions, indicating that positive facial expressions during threat stimuli played a small role in determining perceived happiness. As participants who saw the high threat stimulus expressed joy/positive valence for an average of 0.0% to 0.2% of overall viewing time, regardless of which efficacy stimulus they viewed (see Tables L13 and L14), the high threat stimulus may have been so negative that participants were unable to feel pleased by the optimistic information in the efficacy stimuli. Differences between groups for positive emotions were not statistically significant for either self-report or physiological measures, so this assertion (along with the previous assertion for contentment) is offered simply as a suggestion of a jumping-off point for future research.

Based on the physiological evidence recorded, this study can solidly conclude that positive facial expressions while watching anti-smoking PSAs predict perceived happiness and contentment. As additional support, Stöckli and colleagues' (2018) found that Affectiva is highly accurate at identifying facial expressions of happiness, indicating that the positive facial expressions recorded in this study were not a miscoding of another discrete emotion. Therefore, future communication research could use facial expression analysis to measure positive emotions during experiments, either as a verification method for self-report emotions if researchers are worried about common method variance (see *Literature Review – Physiological Methods in Social Science Research*; Mahler, 2015) or as a standalone measure. This approach may not offer much utility for fear appeal studies, as this study did not find any significant relationships between happiness or contentment and EPPM variables (see Tables F1 and F2). However, as Nabi and Myrick (2019) found that hope in response to sun-safety fear appeals was positively related to self-efficacy and sun-safety intentions and behavior, positive emotions may play a significant role in EPPM outcomes that was simply not uncovered in the scope of this study. Future EPPM research could therefore measure multiple types of positive emotions with self-report and physiological measures in response to a variety of fear appeal topics (e.g. smoking, HPV vaccination, HIV/AIDS).

**Limitations**

One of the major limitations in this study was a mistake made in the selection of self-report and physiological measures of emotion. One self-report measure (guilt) had no physiological equivalent, and two physiological measures (contempt and disgust) had no self-report equivalent. As a result, no conclusions could be drawn about the relationships between self-report and physiological measures for all of these variables, and disgust and contempt could not be linked to EPPM variables in the overall survey sample.

This is particularly unfortunate for disgust, as few studies have investigated the effects of disgust on smoking outcomes, despite the fact that disgusting imagery is a common visual tactic in anti-smoking messaging (Gali, 2018; Swanson, 2016). In particular, messages that elicit disgust often include “a novel and unsettling health consequence, which appears irreparable and spurs a visceral reaction” (Swanson, 2016, p. 73), like “deformed lungs or rotting teeth” (Gali, 2018, p. 15). A previous study that showed ninth-grade students anti-smoking appeals found that the anti-smoking appeals increased disgust, which increased anti-tobacco-industry sentiment, which in turn reduced intentions to smoke (Pechmann & Reibling, 2006). However, some studies that have measured fear and disgust together have noted that too much fear and disgust in combination can negatively impact message encoding and memory (Leshner et al., 2011; Yang, 2017). In addition, perceived disgust, although not the manipulation of disgusting content in message conditions, predicted increased reactance (Yang, 2017). Contrastingly, Newell (2015) studied disgust and avoidance, and found that disgust increased avoidance when participants were presented with a disgusting disease screening, but not disgusting symptoms. Newell (2015) concluded that “disgust may affect avoidance only when disgust is elicited by an immediate, concrete experience” (p. 56). Therefore, an increased focus should be put on researching disgust in response to fear appeals, with particular emphasis on how fear and disgust interact and affect reactance.

The other major limitation of this study was the low number of smokers (current or former) in the study sample. It is, of course, fantastic that very few participants were current smokers ($n = 9$, 6.16% of the sample, see Table A5), as this indicates that smoking rates continue to drop among young adults. In addition, the average age that current and former smokers began smoking was 16-17 years old (see Table D1), which aligns with data that shows that most smokers begin smoking at young ages (Centers for Disease Control and Prevention, 2019b). However, as the sample of smokers was so small, the smoking data in this study cannot be used to generalize larger conclusions about smoking behavior in young adults, the effects of the Tobacco 21 law that banned tobacco purchases under the age of 21, or the effects of smoking on fear appeal outcomes. In terms of this study's approach to measuring smoking behavior, the Global Adult Tobacco Survey worked well for breaking smokers into specific and comparable categories. However, future studies should ask participants to self-report how long they have been smoking. This study attempted to calculate smoking length by subtracting the age that participants began smoking from their current age, but those values were identical for many participants, so this analysis had to be scrapped. Overall, this study's approach to measuring smoking behavior provided interesting data, so future studies could use a similar method (albeit one with more detailed smoking behavior data) and sample equal numbers of current smokers, former smokers, and never smokers, in order to comprehensively compare fear appeal outcomes between groups. Alternatively, future studies could use similar sampling approaches, but modify measures and stimuli to address vaping, as this may result in a larger number of nicotine users in the sample.

A few minor limitations also warrant consideration. First, due to the COVID-19 pandemic, this project had to be adapted for remote delivery. As a result, the original plan to use GSR to measure physiological arousal alongside FEA in-lab had to be changed to only remote FEA. In addition, time constraints and ethics concerns surrounding filming students in their homes led to the FEA being optional for participants, which limited the pool of physiological data. Future studies should use multiple physiological measures and collect a larger physiological sample, in order to increase the possibilities for generalization from physiological data.

Second, the high threat/efficacy stimuli were longer than the low threat/efficacy stimuli, which created issues with time percentage and frame count metrics for FEA. This resulted in the removal of an additional research question, which asked about the relationship between physiological emotions and EPPM variables, as it was too difficult to determine which correlations were real and which were a result of unbalanced stimuli lengths and significant differences in pre-test variables between experimental groups. Future studies that use FEA should ensure that stimuli times are identical, to avoid this issue.

Third, self-report discrete emotions were measured for the overall stimuli session, which provided less-detailed data on the effects of each individual stimulus on emotions. Future research could ask participants to rate their emotions after each stimulus. Fourth, while this study did include two kinds of behavioral intention measures, the analysis could have been enhanced by including behavioral intentions to seek further information. As an example, So and colleagues (2016) observed that fear and anxiety in response to a vaccination fear appeal increased motivation to seek protection-related information, which in turn predicted intentions to seek vaccination. So and colleagues (2016) recommended that EPPM studies should investigate many different aspects of the coping appraisal process, including information-seeking, as emotions may have different effects on different kinds of behavior intentions. In the context of smoking fear appeals, researchers could, for example, measure intentions to seek quitting information, intentions to avoid smoking around others, or intentions to avoid friends who smoke.

Finally, this study was, of course, limited by its quantitative approach. In particular, this study was not able to provide in-depth analysis on the effects of Tobacco 21 on young adults' attitudes towards smoking and smoking behavior. A future qualitative study of young adults, ages 18-21, would be immensely helpful for investigating this question.

## Implications for Health Communication Professionals

This study offers two suggestions for health communication professionals who design anti-smoking campaigns or perform other outreach efforts. First, this study demonstrated that as efficacy perceptions increase, the relationship between threat perceptions and outcomes is strengthened. In particular, threat perceptions more strongly reduce negative message evaluations like perceived manipulation and message derogation. Therefore, when designing health campaigns, professionals should include efficacy messaging and utilize efficacy scales when evaluating campaign effects. Second, the high threat stimuli lowered defensive avoidance by evoking greater surprise. This indicates that including novel, surprising information in health campaigns can reduce defensive reactions. Health communication professionals should make an effort to present the negative effects of smoking from new angles, as this may help young adults remain engaged with a familiar topic.

## Conclusion

This anti-smoking EPPM study demonstrated that threat and efficacy perceptions interact to influence adaptive and maladaptive outcomes, threat and efficacy message content influences outcomes through discrete emotions, and physiological positive emotions predict perceived positive emotions. These results offer significant implications for EPPM research. First, threat and efficacy perceptions and message features both enacted significant effects on outcomes, indicating that researchers should consider both to be significant predictors when investigating the EPPM's propositions. Second, as fear was found to be a mediator, researchers should continue to test fear as both a direct and indirect predictor of EPPM outcomes. Finally, significant results for sadness and surprise, as well as strong correlations between physiological and self-report positive emotions, indicate that there are still unknown emotional mechanisms that may influence the effects of fear appeals. Therefore, this study has made a significant contribution to fear appeal research by extending the EPPM beyond the restrictions of the original model and, hopefully, inspiring future exploration of the persuasive factors that can be used to prevent an addictive, deadly behavior.

# APPENDIX SECTION

## Appendix A: Demographic Information

**Table A1.** *Gender Frequencies and Descriptive Statistics*

| | | *Frequency* | *Percent* | *Valid Percent* | *Cumulative Percent* |
|---|---|---|---|---|---|
| Valid | Male | 44 | 30.2 | 30.1 | 30.1 |
| | Female | 102 | 69.9 | 69.9 | 100.0 |
| | Total | 146 | 100.0 | 100.0 | |

**Table A2.** *Race/Ethnicity Frequencies and Descriptive Statistics - Overall*

| | | *Frequency* | *Percent* | *Valid Percent* | *Cumulative Percent* |
|---|---|---|---|---|---|
| Valid | White | 115 | 78.8 | 78.8 | 78.8 |
| | Black or African American | 18 | 12.3 | 12.3 | 91.1 |
| | American Indian or Alaska Native | 4 | 2.7 | 2.7 | 93.8 |
| | Asian Indian | 0 | 0.0 | 0.0 | 93.8 |
| | Japanese | 1 | 0.7 | 0.7 | 94.5 |
| | Native Hawaiian | 0 | 0.0 | 0.0 | 94.5 |
| | Chinese | 1 | 0.7 | 0.7 | 95.2 |
| | Korean | 2 | 1.4 | 1.4 | 96.6 |
| | Guamanian or Chamorro | 0 | 0.0 | 0.0 | 96.6 |
| | Filipino | 2 | 1.4 | 1.4 | 97.9 |
| | Vietnamese | 3 | 2.1 | 2.1 | 100.0 |
| | Samoan | 0 | 0.0 | 0.0 | 100.0 |
| | Other Asian | 2 | 1.4 | 1.4 | 101.4 |
| | Other Pacific Islander | 0 | 0.0 | 0.0 | 101.4 |
| | Some other race | 12 | 8.2 | 8.2 | 109.6 |
| | Total | 146 | 109.6 | 109.6 | |

*Note:* Participants could select multiple answer choices. Percentages add up to >100%

**Table A3.** *Race/Ethnicity Frequencies and Descriptive Statistics - Some Other Race (Text Entry)*

| | | *Frequency* | *Percent* | *Valid Percent* | *Cumulative Percent* |
|---|---|---|---|---|---|
| Valid | Arab | 1 | 8.3 | 8.3 | 8.3 |
| | Egyptian | 1 | 8.3 | 8.3 | 16.7 |
| | Hispanic | 5 | 41.7 | 41.7 | 58.3 |
| | Hispanic/Mexican American | 1 | 8.3 | 8.3 | 66.7 |
| | Hispanic or Latino | 1 | 8.3 | 8.3 | 75.0 |
| | Mexican | 2 | 16.7 | 16.7 | 91.7 |
| | Puerto Rican | 1 | 8.3 | 8.3 | 100.0 |
| | Total | 12 | 100.0 | 100.0 | |

**Table A4.** *Hispanic/Latinx Frequencies and Descriptive Statistics*

| | | *Frequency* | *Percent* | *Valid Percent* | *Cumulative Percent* |
|---|---|---|---|---|---|
| Valid | No, not of Hispanic, Latinx, or Spanish origin | 94 | 64.4 | 64.4 | 64.4 |
| | Yes, Mexican, Mexican American, Chicano | 46 | 31.5 | 31.5 | 95.9 |
| | Yes, Puerto Rican | 2 | 1.4 | 1.4 | 97.3 |
| | Yes, Cuban | 1 | 0.7 | 0.7 | 97.9 |
| | Yes, another Hispanic, Latinx, or Spanish Origin (print origin - for example, Argentinean, Colombian, Dominican, Nicaraguan, Salvadoran, Spaniard, etc.) | 3 | 2.1 | 2.1 | 100.0 |
| | Total | 146 | 100.0 | 100.0 | |

**Table A5.** *Current smoking behavior * Past smoking behavior (GATS) Crosstabulation*

| | | Past smoking behavior | | | | |
|---|---|---|---|---|---|---|
| | | Daily | Less than daily | Not at all | Don't know | Total |
| Current smoking behavior | Daily | 1 | 1 | 0 | 0 | 2 |
| | Less than daily | 2 | 2 | 3 | 0 | 7 |
| | Not at all | 3 | 7 | 126 | 1 | 137 |
| Total | | 6 | 10 | 129 | 1 | 146 |

## Appendix B: Stimuli Descriptions and Transcripts

### High Threat Stimulus

- **Link to video**: https://www.youtube.com/watch?v=FllVFCmQiRg
- **Video description from the CDC:** "Michael smoked for more than 40 years and developed COPD. Breathing became so difficult that he had to give up many of his favorite activities. He lies awake at night regretting all he's lost because of smoking."
- **Video summary:** The video is 1 minute and 32 seconds long. The video portrays a personal narrative, narrated by Michael, a long-term smoker who developed COPD. Michael's narrative is portrayed with clips of him talking, as well as clips of his daily life, including using his oxygen machine and wheelchair. He talks about how he has smoked since he was 12 years old and emphasizes that smoking became part of his life. He has been diagnosed with stage 4 COPD and expects to die from it. He has had to give up many things that he enjoyed in his life because of his COPD. Images of these activities are shown, contrasted with an image of Michael in a wheelchair. He expresses that his world just keeps shrinking, and when he lays in bed at night, everything weighs on him.
- **Transcript:** [Michael] I started smoking probably around 11 or 12 years old. You know, and then within a couple of years, of course, it's just part of your life. I quit in 2012, on May 2nd, about 1 o'clock in the afternoon in the parking lot of the hospital I was about to get admitted to because my left lung had collapsed. I was in the hospital for over 2 months. And then I was home with a tube coming out of my chest for about 6 weeks after that. So, and that's when I was diagnosed with stage 4. And eventually, I will probably die from COPD. Um, I worked in the construction industry. I loved to build things. In our old home, it was a fun place. And I built it all with my own hands: the walls, the ceiling, the floors. And - and that got taken away. We owned a boat and I had to give it up. I couldn't physically handle it anymore. Um, so we thought, well, let's maybe try to travel a little bit. So, we bought a camper. And I had to give that up because I just couldn't, you know, it's physically demanding. So, your world just keeps shrinking. When you lay in bed at night by yourself, that's when it weighs on you.

### Low Threat Stimulus

- **Link to video**: https://www.youtube.com/watch?v=XyDeDOsv0TE
- **Video description from the CDC:** "Because he smoked and has COPD, Michael struggles for breath when he walks. He used to tell his co-workers small lies to keep his health condition a secret. Michael now realizes he told himself the biggest lie: that smoking wasn't dangerous."
- **Video summary**: The video is 30 seconds long. The video portrays a personal narrative, narrated by Michael, a long-term smoker who developed COPD. Michael's narrative is portrayed with clips of him talking, as well as clips of his

daily life, including using his oxygen machine and wheelchair. Michael expresses that when you get COPD from smoking, you learn to lie and make up excuses about how tired COPD makes you feel. He used to lie all the time, but his lies don't work anymore. Michael is shown in a wheelchair to drive home the point. He gives the audience the tip that the worst lies are the lies you tell yourself, like that smoking isn't that dangerous.

- **Transcript**: [Michael] When smoking gives you COPD, you learn to lie a little bit. You make up excuses like "I have to get my keys; you guys go on." Anything so you can walk at your own pace. I used to do that all the time. Those lies don't work anymore. My tip is, the worst lies are the lies you tell yourself, like smoking isn't that dangerous. [Announcer] You can quit. For free help, visit CDC.gov/Tips.

**High Efficacy Stimulus**

- **Link to video**: https://www.youtube.com/watch?v=vN1vzXQ-O2s
- **Video description from the American Lung Association**: "Quitting smoking is the single most important step you can take to improve the length and quality of your life, and the health benefits can be seen within minutes and long-term. Learn more at Lung.org/stop-smoking."
- **Video summary**: The video is 1 minute and 26 seconds long. It portrays information on the health benefits of quitting smoking, presented by Kristina Hamilton of the American Lung Association. For the first 18 seconds, Kristina is filmed while talking, then the video switches to her voice over a series of slides summarizing what she is saying. Kristina expresses that quitting smoking is the single most important step a smoker can take to improve their health, and that effects can be seen in the short and long term. Kristina goes over the health benefits in different time segments: 20 minutes, 2 weeks-3 months, 1-9 months, 10 years, and 15 years. The health benefits cover heart and lung benefits. At 0:57, the video switches back to Kristina's face. Kristina repeats that there are lots of benefits to quitting, and that the American Lung Association has resources to help people quit.
- **Transcript**: [Kristina] Quitting smoking is the single most important step that a smoker can take to improving their health. And the effects can be seen just within minutes or they can be seen really long term. Twenty minutes after quitting smoking a person's heart rate becomes normal. Two weeks to three months after a smoker quits, their risk of a heart attack drops and their lung function increases. One to nine months after quitting the person's shortness of breath goes away. Ten years after quitting your risk of dying from lung cancer is cut in half. Your risk of getting bladder cancer is half that of a smoker's. Fifteen years after quitting smoking your risk of coronary heart disease is the same as a non-smoker. So it's safe to say that there are a lot of benefits to quitting smoking. It's really just a

critical important step to improving many aspects of your life. At the American Lung Association, we are here for you to support you on your quit process. So, feel free to visit the American Lung Association's website at Lung.org for more resources and tips to help you be successful on your quit journey.

**Low Efficacy Stimulus**

- **Link to video:** https://youtu.be/2UzcfUzDU_A
- **Video description from the CDC:** "No matter how old you are or how long you've been smoking, quitting is the most important thing you can do to improve your health. Call 1-800-QUIT-NOW to get started. cdc.gov/quit."
- **Video summary:** The video is 29 seconds long. It portrays the U.S. Surgeon General, Dr. Jerome Adams. Dr. Adams is shown talking to the audience in his uniform, then the audience is shown a couple talking to a doctor, the Dr. Adams is seen again for the conclusion to the video. Dr. Adams expresses that the best thing smokers can do for their health is quit, no matter their age or length of smoking. Quitting reduces the risk of heart and lung diseases, cancer, and many other illnesses. Dr. Adams tells the audience to talk to their doctor or nurse or call the CDC quit line if they are ready to quit smoking.
- **Transcript:** [Dr. Jerome Adams] I'm U.S. Surgeon General, Dr. Jerome Adams. If you smoke, the most important thing you can do to improve your health is to quit – no matter how old you are or how long you've been smoking. By quitting, you reduce your risk for heart and lung diseases, cancer, and many other illnesses. If you're ready to quit, talk to your doctor or nurse or call the quit line, a free telephone service where you can get confidential coaching and resources to help you quit. Call 1-800-QUIT-NOW to get started.

## Appendix C: Survey Measures

### Demographics

*Instructions: First, we're going to ask you to tell us a little bit about yourself.*

1. Please enter your age. [Text entry]
2. What is your gender?
    a. Male
    b. Female
    c. Non-binary
    d. Other: [Text entry]
3. Please specify your race (select all that apply)
    a. White
    b. Black or African American
    c. American Indian or Alaska Native
    d. Asian Indian
    e. Japanese
    f. Native Hawaiian
    g. Chinese
    h. Korean
    i. Guamanian or Chamorro
    j. Filipino
    k. Vietnamese
    l. Samoan
    m. Other Asian
    n. Other Pacific Islander
    o. Some other race (please specify) [Text entry]
4. Are you of Hispanic, Latinx, or Spanish origin?
    a. No, not of Hispanic, Latinx, or Spanish origin
    b. Yes, Mexican, Mexican American, Chicano
    c. Yes, Puerto Rican
    d. Yes, Cuban
    e. Yes, another Hispanic, Latinx, or Spanish Origin (print origin - for example, Argentinean, Colombian, Dominican, Nicaraguan, Salvadoran, Spaniard, etc.) [Text entry]

**Global Adult Tobacco Survey (GATS; Global Adult Tobacco Survey Collaborative Group, 2011)**
*Instructions: Next, we will ask you some questions about your current and past use of cigarettes.*

1. Do you currently smoke cigarettes on a daily basis, less than daily, or not at all?
   a. Daily
   b. Less than daily
   c. Not at all
   d. Don't know
2. In the past, have you smoked cigarettes on a daily basis, less than daily, or not at all?
   a. Daily
   b. Less than daily
   c. Not at all
   d. Don't know

**Heaviness of Smoking Index (HSI, Heatherton et al., 1989)**

1. On the days that you smoke, how soon after you wake up do you have your first cigarette?
   a. Within 5 minutes
   b. 6 to 30 minutes
   c. 31 to 60 minutes
   d. After 60 minutes
2. How many cigarettes do you typically smoke per day?
   a. 10 or fewer
   b. 11 to 20
   c. 21 to 30
   d. 31 or more

**Smoking Duration**

1. How old were you when you first smoked cigarettes? [Text entry]
2. How old were you when you quit smoking cigarettes? [Text entry]

**Past Quit Attempts (Hummel et al., 2018)**

1. Have you made any attempts to quit smoking in the past year?
   a. Yes
   b. No

## Behavioral Intentions

***Quitting (Hummel et al., 2018)***

1. Are you planning to quit smoking within the next 6 months?
    a. Very unlikely
    b. Unlikely
    c. Maybe, maybe not
    d. Likely
    e. Very likely

***Smoking (Dietrich, 2012)***

*Instructions: During the next month…*

| | *Very unlikely* | | | | | | *Very likely* |
|---|---|---|---|---|---|---|---|
| 1. I intend not to smoke. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. I will try to not smoke. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. I plan to not smoke. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4. I expect to not smoke. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

***Sharing Information (Choi et al., 2005)***

*Instructions: During the next month…*

| | *Strongly disagree* | | | | | | *Strongly agree* |
|---|---|---|---|---|---|---|---|
| 1. I intend to talk to my friends and/or family about quitting smoking cigarettes to prevent smoking-related disease. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. I intend to talk to my friends and/or family about reducing smoking cigarettes to prevent smoking-related disease. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

## Threat and Efficacy (Witte et al., 1995; LaVoie, 2016)

***Severity***

*Instructions: How much do you agree/disagree with the following statements?*

| | *Strongly disagree* | | | | | | *Strongly agree* |
|---|---|---|---|---|---|---|---|
| 1. I believe that the threat from smoking is severe. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. I believe that the threat from smoking is serious. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. I believe that the threat from smoking is significant. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

***Susceptibility***
*Instructions: How much do you agree/disagree with the following statements?*

| | *Strongly disagree* | | | | | | *Strongly agree* |
|---|---|---|---|---|---|---|---|
| 1. People who smoke are putting their health at risk. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. It is likely that people who smoke will suffer health consequences. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. It is possible that people who smoke will suffer health consequences. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

***Self-Efficacy***
*Instructions: How much do you agree/disagree with the following statements?*

| | *Strongly disagree* | | | | | | *Strongly agree* |
|---|---|---|---|---|---|---|---|
| 1. I am able to quit (and/or avoid) smoking to prevent health consequences. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. I can easily quit (and/or avoid) smoking to prevent health consequences. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. I have what it takes to quit (and/or avoid) smoking to prevent health consequences. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

***Response Efficacy***
*Instructions: How much do you agree/disagree with the following statements?*

| | *Strongly disagree* | | | | | | *Strongly agree* |
|---|---|---|---|---|---|---|---|
| 1. Quitting smoking works for preventing health consequences. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. Quitting smoking is effective in preventing health consequences. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. If people quit smoking, they are less likely to have severe consequences. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**Fear (Witte, 2000)**
*Instructions: Please answer the following questions with the videos you just saw in mind. How much did this message make you feel…*

| | *Not at all* | | | | | | *Very much* |
|---|---|---|---|---|---|---|---|
| 1. … frightened? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. … tense? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. … nervous? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4. … anxious? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 5. …uncomfortable? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 6. … freaked out? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 7. … nauseous? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8. … terrified? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 9. … horrified? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 10. … alarmed? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 11. … panicked? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 12. … dread? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 13. … scared? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 14. … afraid? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 15. … unease? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**Discrete Emotions (Dillard & Shen, 2007)**
*Instructions: Please answer the following questions with the videos you just saw in mind. How much did this message make you feel…*

***Surprise***

| | *None of this emotion* | | | | | | *A great deal of this emotion* |
|---|---|---|---|---|---|---|---|
| 1. … surprised | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. … startled | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. … astonished | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

***Anger***

| | *None of this emotion* | | | | | | *A great deal of this emotion* |
|---|---|---|---|---|---|---|---|
| 1. … irritated | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. … angry | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. … annoyed | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4. … aggravated | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

***Sadness***

| | *None of this emotion* | | | | | | *A great deal of this emotion* |
|---|---|---|---|---|---|---|---|
| 1. … sad | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. … dreary | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. … dismal | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

***Guilt***

| | *None of this emotion* | | | | | | *A great deal of this emotion* |
|---|---|---|---|---|---|---|---|
| 1. … guilty | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. … ashamed | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

***Happiness***

| | *None of this emotion* | | | | | | *A great deal of this emotion* |
|---|---|---|---|---|---|---|---|
| 1. … happy | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. … elated | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. … cheerful | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4. … joyful | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

***Contentment***

| | *None of this emotion* | | | | | | *A great deal of this emotion* |
|---|---|---|---|---|---|---|---|
| 1. … contented | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. … peaceful | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. … mellow | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4. … tranquil | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**Perceived Manipulation (Witte, 2000)**
*Instructions: Please answer the following questions with the videos you just saw in mind. How much do you agree/disagree with the following statements?*

| | *Strongly disagree* | | | | | | *Strongly agree* |
|---|---|---|---|---|---|---|---|
| 1. This message was manipulative. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. This message was misleading. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. This message tried to manipulate me. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4. This message was exploitative. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**Message Derogation (Witte, 2000)**
*Instructions: How much do you agree/disagree with the following statements?*

| | *Strongly disagree* | | | | | | *Strongly agree* |
|---|---|---|---|---|---|---|---|
| 1. This message was exaggerated. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. This message was distorted. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. This message was overblown. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4. This message was overstated. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**Defensive Avoidance (Witte, 2000)**
*Instructions: Please answer the following questions with the videos you just saw in mind. When I was watching the message, my instinct was to:*

| | | |
|---|---|---|
| 1. Want to protect myself from the negative effects of smoking. | 1 2 3 4 5 6 7 | Not want to protect myself from the negative effects of smoking. |
| 2. Want to think about the negative effects of smoking. | 1 2 3 4 5 6 7 | Not want to think about the negative effects of smoking. |

## Appendix D: Descriptive Statistics and Reliability

**Table D1.** *Survey Descriptive Statistics*

| | *N* | *Range* | *Minimum* | *Maximum* | *Mean* | *Std. Deviation* |
|---|---|---|---|---|---|---|
| Age | 146 | 22.00 | 18.00 | 40.00 | 19.73 | 2.68 |
| Age began smoking (current/former smokers) | 19 | 9.00 | 12.00 | 21.00 | 16.73 | 2.79 |
| Age quit smoking (former smokers) | 10 | 7.00 | 14.00 | 21.00 | 18.20 | 2.30 |
| Heaviness of Smoking Index (HSI; current smokers) | 9 | 2.00 | 0.00 | 2.00 | 0.22 | 0.67 |
| Behavioral intentions pre-test (non-smoking) | 146 | 6.00 | 1.00 | 7.00 | 6.32 | 1.43 |
| Behavioral intentions post-test (non-smoking) | 146 | 6.00 | 1.00 | 7.00 | 6.48 | 1.21 |
| Behavioral intentions pre-test (sharing info) | 146 | 6.00 | 1.00 | 7.00 | 3.94 | 2.15 |
| Behavioral intentions post-test (sharing info) | 146 | 6.00 | 1.00 | 7.00 | 4.45 | 2.16 |
| Behavioral intentions pre-test (quitting; current smokers) | 9 | 2.00 | 3.00 | 5.00 | 4.00 | 1.00 |
| Behavioral intentions post-test (quitting; current smokers) | 8 | 3.00 | 2.00 | 5.00 | 3.75 | 1.04 |
| Severity pre-test | 146 | 4.00 | 3.00 | 7.00 | 6.52 | 0.73 |
| Severity post-test | 146 | 6.00 | 1.00 | 7.00 | 6.52 | 1.07 |
| Susceptibility pre-test | 146 | 3.67 | 3.33 | 7.00 | 6.65 | 0.59 |
| Susceptibility post-test | 146 | 6.00 | 1.00 | 7.00 | 6.60 | 0.98 |
| Self-efficacy pre-test | 146 | 4.00 | 3.00 | 7.00 | 6.39 | 1.09 |
| Self-efficacy post-test | 146 | 6.00 | 1.00 | 7.00 | 6.44 | 1.16 |
| Response efficacy pre-test | 146 | 3.67 | 3.33 | 7.00 | 6.35 | 0.91 |
| Response efficacy post-test | 146 | 6.00 | 1.00 | 7.00 | 6.52 | 1.00 |
| Fear | 146 | 6.00 | 1.00 | 7.00 | 3.05 | 1.79 |
| Surprise (discrete emotions) | 146 | 6.00 | 1.00 | 7.00 | 2.91 | 1.73 |
| Anger (discrete emotions) | 146 | 6.00 | 1.00 | 7.00 | 2.34 | 1.62 |
| Sadness (discrete emotions) | 146 | 6.00 | 1.00 | 7.00 | 2.95 | 1.68 |
| Guilt (discrete emotions) | 146 | 6.00 | 1.00 | 7.00 | 2.08 | 1.49 |
| Happiness (discrete emotions) | 146 | 6.00 | 1.00 | 7.00 | 1.52 | 1.17 |
| Contentment (discrete emotions) | 146 | 6.00 | 1.00 | 7.00 | 1.70 | 1.23 |
| Perceived manipulation | 146 | 4.75 | 1.00 | 5.75 | 2.03 | 1.17 |
| Message derogation | 146 | 5.00 | 1.00 | 6.00 | 1.86 | 1.09 |
| Defensive avoidance | 146 | 6.00 | 1.00 | 7.00 | 1.77 | 1.30 |

**Table D2.** *Survey Reliability*

| *Measure* | *Cronbach's Alpha* | *N items* |
|---|---|---|
| Behavioral intentions pre-test (smoking) | 0.85 | 4 |
| Behavioral intentions post-test (smoking) | 0.92 | 4 |
| Behavioral intentions pre-test (sharing info) | 0.98 | 2 |
| Behavioral intentions post-test (sharing info) | 0.99 | 2 |
| Severity pre-test | 0.92 | 3 |
| Severity post-test | 0.98 | 3 |
| Susceptibility pre-test | 0.87 | 3 |
| Susceptibility post-test | 0.98 | 3 |
| Self-efficacy pre-test | 0.90 | 3 |
| Self-efficacy post-test | 0.93 | 3 |
| Response efficacy pre-test | 0.86 | 3 |
| Response efficacy post-test | 0.97 | 3 |
| Fear | 0.98 | 15 |
| Surprise (discrete emotions) | 0.91 | 3 |
| Anger (discrete emotions) | 0.94 | 4 |
| Fear (discrete emotions) | 0.97 | 3 |
| Sadness (discrete emotions) | 0.84 | 3 |
| Guilt (discrete emotions) | 0.86 | 2 |
| Happiness (discrete emotions) | 0.98 | 4 |
| Contentment (discrete emotions) | 0.92 | 4 |
| Narrative transportation | 0.86 | 6 |
| Perceived manipulation | 0.90 | 4 |
| Message derogation | 0.97 | 4 |
| Defensive avoidance | 0.71 | 2 |

**Table D3.** *Physiological Descriptive Statistics (Time Percentage)*

| | *N* | *Range* | *Minimum* | *Maximum* | *Mean* | *Std. Deviation* |
|---|---|---|---|---|---|---|
| Anger (threat) | 41 | 1.87 | 0 | 1.87 | 0.05 | 0.29 |
| Anger (efficacy) | 41 | 1.46 | 0 | 1.46 | 0.08 | 0.31 |
| Anger (overall) | 41 | 1.67 | 0 | 1.67 | 0.07 | 0.28 |
| Contempt (threat) | 41 | 30.34 | 0 | 30.34 | 1.44 | 5.12 |
| Contempt (efficacy) | 41 | 15.24 | 0 | 15.24 | 0.98 | 2.79 |
| Contempt (overall) | 41 | 17.68 | 0 | 17.68 | 1.21 | 3.41 |
| Disgust (threat) | 41 | 0.72 | 0 | 0.72 | 0.05 | 0.17 |
| Disgust (efficacy) | 41 | 2.22 | 0 | 2.22 | 0.13 | 0.40 |
| Disgust (overall) | 41 | 1.38 | 0 | 1.38 | 0.09 | 0.24 |
| Fear (threat) | 41 | 0.77 | 0 | 0.77 | 0.03 | 0.13 |
| Fear (efficacy) | 41 | 7.83 | 0 | 7.83 | 0.37 | 1.48 |
| Fear (overall) | 41 | 4.3 | 0 | 4.3 | 0.20 | 0.79 |
| Joy (threat) | 41 | 61.06 | 0 | 61.06 | 2.01 | 9.67 |
| Joy (efficacy) | 41 | 10.62 | 0 | 10.62 | 0.55 | 2.29 |
| Joy (overall) | 41 | 30.53 | 0 | 30.53 | 1.28 | 4.99 |
| Sadness (threat) | 41 | 6.28 | 0 | 6.28 | 0.18 | 0.99 |
| Sadness (efficacy) | 41 | 4.95 | 0 | 4.95 | 0.14 | 0.78 |
| Sadness (overall) | 41 | 5.62 | 0 | 5.62 | 0.16 | 0.88 |
| Surprise (threat) | 41 | 10.62 | 0 | 10.62 | 0.77 | 2.04 |
| Surprise (efficacy) | 41 | 8.37 | 0 | 8.37 | 0.62 | 1.49 |
| Surprise (overall) | 41 | 5.31 | 0 | 5.31 | 0.69 | 1.28 |
| Positive valence (threat) | 41 | 59.62 | 0 | 59.62 | 2.02 | 9.56 |
| Positive valence (efficacy) | 41 | 12.05 | 0 | 12.05 | 0.63 | 2.56 |
| Positive valence (overall) | 41 | 30.21 | 0 | 30.21 | 1.33 | 5.04 |
| Negative valence (threat) | 41 | 39.31 | 0 | 39.31 | 2.91 | 7.26 |
| Negative valence (efficacy) | 41 | 10.71 | 0 | 10.71 | 2.00 | 2.81 |
| Negative valence (overall) | 41 | 20.34 | 0 | 20.34 | 2.46 | 4.10 |
| Neutral valence (threat) | 41 | 59.62 | 40.38 | 100 | 95.07 | 11.69 |
| Neutral valence (efficacy) | 41 | 22.76 | 77.24 | 100 | 97.36 | 4.37 |
| Neutral valence (overall) | 41 | 31.05 | 68.95 | 100 | 96.22 | 6.43 |
| Engagement (threat) | 41 | 72.47 | 0 | 72.47 | 8.58 | 16.70 |
| Engagement (efficacy) | 41 | 57.01 | 0 | 57.01 | 9.38 | 13.16 |
| Engagement (overall) | 41 | 62.47 | 0 | 62.47 | 8.98 | 13.54 |
| Attention (threat) | 41 | 26.74 | 73.26 | 100 | 97.71 | 4.89 |
| Attention (efficacy) | 41 | 56.96 | 43.04 | 100 | 94.75 | 10.91 |
| Attention (overall) | 41 | 28.92 | 71.08 | 100 | 96.23 | 6.96 |

*Notes.* Calculated using the time percentage that participants demonstrated facial expressions.

**Table D4.** *Physiological Descriptive Statistics (Frame Count)*

| | *N* | *Range* | *Minimum* | *Maximum* | *Mean* | *Std. Deviation* |
|---|---|---|---|---|---|---|
| Anger (threat) | 41 | 17.0 | 0.0 | 17.0 | 0.41 | 2.65 |
| Anger (efficacy) | 41 | 38.0 | 0.0 | 38.0 | 1.59 | 6.79 |
| Anger (overall) | 41 | 27.5 | 0.0 | 27.5 | 1.00 | 4.58 |
| Contempt (threat) | 41 | 272.0 | 0.0 | 272.0 | 16.46 | 53.58 |
| Contempt (efficacy) | 41 | 184.0 | 0.0 | 184.0 | 16.29 | 42.08 |
| Contempt (overall) | 41 | 136.0 | 0.0 | 136.0 | 16.38 | 35.65 |
| Disgust (threat) | 41 | 20.0 | 0.0 | 20.0 | 0.78 | 3.28 |
| Disgust (efficacy) | 41 | 46.0 | 0.0 | 46.0 | 2.41 | 8.46 |
| Disgust (overall) | 41 | 24.5 | 0.0 | 24.5 | 1.60 | 4.73 |
| Fear (threat) | 41 | 10.0 | 0.0 | 10.0 | 0.41 | 1.88 |
| Fear (efficacy) | 41 | 204.0 | 0.0 | 204.0 | 9.93 | 39.77 |
| Fear (overall) | 41 | 105.5 | 0.0 | 105.5 | 5.17 | 20.30 |
| Joy (threat) | 41 | 552.0 | 0.0 | 552.0 | 18.41 | 87.45 |
| Joy (efficacy) | 41 | 269.0 | 0.0 | 269.0 | 9.76 | 44.35 |
| Joy (overall) | 41 | 276.0 | 0.0 | 276.0 | 14.09 | 49.79 |
| Sadness (threat) | 41 | 57.0 | 0.0 | 57.0 | 1.73 | 8.99 |
| Sadness (efficacy) | 41 | 129.0 | 0.0 | 129.0 | 3.56 | 20.25 |
| Sadness (overall) | 41 | 93.0 | 0.0 | 93.0 | 2.65 | 14.54 |
| Surprise (threat) | 41 | 98.0 | 0.0 | 98.0 | 8.63 | 20.68 |
| Surprise (efficacy) | 41 | 96.0 | 0.0 | 96.0 | 10.95 | 23.62 |
| Surprise (overall) | 41 | 69.0 | 0.0 | 69.0 | 9.79 | 16.65 |
| Positive valence (threat) | 41 | 539.0 | 0.0 | 539.0 | 18.27 | 86.46 |
| Positive valence (efficacy) | 41 | 314.0 | 0.0 | 314.0 | 11.34 | 51.32 |
| Positive valence (overall) | 41 | 273.0 | 0.0 | 273.0 | 14.80 | 52.03 |
| Negative valence (threat) | 41 | 362.0 | 0.0 | 362.0 | 27.22 | 62.92 |
| Negative valence (efficacy) | 41 | 279.0 | 0.0 | 279.0 | 36.98 | 62.02 |
| Negative valence (overall) | 41 | 183.0 | 0.0 | 183.0 | 32.10 | 47.61 |
| Neutral valence (threat) | 41 | 3114.0 | 334.0 | 3448.0 | 1491.34 | 985.73 |
| Neutral valence (efficacy) | 41 | 2474.0 | 288.0 | 2762.0 | 1519.27 | 874.40 |
| Neutral valence (overall) | 41 | 2610.0 | 356.5 | 2966.5 | 1505.30 | 695.53 |
| Engagement (threat) | 41 | 658.0 | 0.0 | 658.0 | 83.68 | 145.53 |
| Engagement (efficacy) | 41 | 999.0 | 0.0 | 999.0 | 140.78 | 220.87 |
| Engagement (overall) | 41 | 703.0 | 0.0 | 703.0 | 112.23 | 163.88 |
| Attention (threat) | 41 | 3000.0 | 400.0 | 3400.0 | 1507.90 | 951.97 |
| Attention (efficacy) | 41 | 2375.0 | 246.0 | 2621.0 | 1482.88 | 873.46 |
| Attention (overall) | 41 | 2586.5 | 356.0 | 2942.5 | 1495.39 | 684.42 |

*Notes.* Calculated using the total frame count that participants demonstrated facial expressions.

## Appendix E: Survey and Physiological Manipulation Checks

**Table E1.** *Survey Manipulation Checks – Platform, Age, and Gender*

| | | Survey Platform[a] | Age | Gender[b] |
|---|---|---|---|---|
| Threat conditions | High | 1.71(.06) | 20.01(.32) | 1.70(.06) |
| | Low | 1.69(.05) | 19.45(.31) | 1.69(.05) |
| Efficacy conditions | High | 1.68(.06) | 19.61(.32) | 1.75(.06) |
| | Low | 1.71(.05) | 19.83(.31) | 1.65(.05) |
| Overall conditions | High threat/high efficacy | 1.73(.08) | 19.67 (.47) | 1.70(.08) |
| | High threat/low efficacy | 1.68(.08) | 20.32 (.44) | 1.71(.07) |
| | Low threat/high efficacy | 1.64(.08) | 19.56 (.45) | 1.81(.08) |
| | Low threat/low efficacy | 1.74(.07) | 19.36 (.43) | 1.59(.07) |

*Note:* Means that do not share a common superscript are significantly different at $p < .05$.
[a]iMotions was indicated with a value of 1 and Qualtrics was indicated with a value of 2.
[b] Males were indicated with a value of 1 and females were indicated with a value of 2.

**Table E2.** *Survey Manipulation Checks – Pre-test EPPM Variables*

| | | Pre-Severity | Pre-Susceptibility | Pre-Self-Efficacy | Pre-Response Efficacy | Pre-Non-Smoking BI | Pre-Sharing Information BI |
|---|---|---|---|---|---|---|---|
| Threat conditions | High | 6.47(.09) | 6.62(.07) | 6.18(.13)$^{a}$ | 6.19(.11)$^{a}$ | 6.26(.17) | 3.46(.25)$^{a}$ |
| | Low | 6.57(.08) | 6.68(.07) | 6.60(.12)$^{b}$ | 6.51(.10)$^{b}$ | 6.38(.17) | 4.39(.24)$^{b}$ |
| Efficacy conditions | High | 6.47(.09) | 6.62(.09) | 6.38(.13) | 6.29(.11) | 6.09(.17) | 3.94(.26) |
| | Low | 6.57(.08) | 6.68(.07) | 6.41(.12) | 6.41(.10) | 6.53(.16) | 3.94(.25) |
| Overall conditions | High threat/high efficacy | 6.36(.13) | 6.52(.10) | 6.13(.19) | 6.14(.16) | 6.23(.25) | 3.12(.37)$^{a}$ |
| | High threat/low efficacy | 6.57(.12) | 6.71(.10) | 6.22(.18) | 6.23(.15) | 6.28(.23) | 3.75(.34)$^{ab}$ |
| | Low threat/high efficacy | 6.57(.12) | 6.71(.10) | 6.60(.18) | 6.42(.15) | 5.97(.24) | 4.68(.35)$^{b}$ |
| | Low threat/low efficacy | 6.57(.12) | 6.66(.10) | 6.59(.17) | 6.59 (.14) | 6.77(.23) | 4.13(.34)$^{b}$ |

*Note:* Means that do not share a common superscript are significantly different at $p < .05$. BI = behavior intentions.

## Appendix F: Survey Correlation Tables

**Table F1.** *Correlations – Demographics, Pre-Test EPPM Variables, and Discrete Emotions*

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Age | ---- | | | | | | | | | | | | | |
| 2 | Gender | .02 | ---- | | | | | | | | | | | | |
| 3 | Pre-Severity | .09 | .22** | ---- | | | | | | | | | | | |
| 4 | Pre-Susceptibility | -.07 | .18* | .63*** | ---- | | | | | | | | | | |
| 5 | Pre-Self-Efficacy | -.04 | .12 | .18* | .04 | ---- | | | | | | | | | |
| 6 | Pre-Response Efficacy | -.02 | -.03 | .33*** | .38*** | .20* | ---- | | | | | | | | |
| 7 | Pre-Non-Smoking BI | .08 | .04 | .05 | -.03 | .19* | .19* | ---- | | | | | | | |
| 8 | Pre-Sharing-Information BI | -.11 | -.06 | .19* | .12 | .18* | .11 | .19* | ---- | | | | | | |
| 9 | Fear | .01 | .02 | .24** | .16† | -.03 | .09 | -.02 | .14 | ---- | | | | | |
| 10 | Anger | .01 | -.02 | .19* | .12 | -.02 | .08 | .00 | .10 | .58*** | ---- | | | | |
| 11 | Contentment | -.03 | -.05 | .13 | .06 | .08 | .14 | .06 | .12 | .12 | .31*** | ---- | | | |
| 12 | Guilt | .03 | -.14† | .07 | .06 | -.15† | .02 | -.08 | -.05 | .51*** | .53*** | .38*** | ---- | | |
| 13 | Happiness | .01 | -.08 | .19* | .16† | .05 | .12 | .05 | .15† | .19* | .36*** | .82*** | .46*** | ---- | |
| 14 | Sadness | .06 | .06 | .19* | .21** | -.06 | .06 | -.02 | -.04 | .78*** | .55*** | .19* | .64*** | .27** | ---- |
| 15 | Surprise | .07 | .05 | .18* | .09 | -.02 | .07 | -.07 | .02 | .68*** | .58*** | .20* | .41*** | .25** | .72*** |

*Notes.* BI = behavior intentions. Gender was coded so that 1 = male and 2 = female, so positive correlations indicate that a variable was greater in female participants, and negative correlations indicate that a variable was greater in male participants. †$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$

**Table F2.** *Correlations – Demographics, Discrete Emotions and Post-Test Threat/Efficacy*

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Age | ---- | | | | | | | | | | | |
| 2 | Gender | .02 | ---- | | | | | | | | | | |
| 3 | Fear | .01 | .02 | ---- | | | | | | | | | |
| 4 | Anger | .01 | -.02 | .58*** | ---- | | | | | | | | |
| 5 | Contentment | -.03 | -.05 | .12 | .31*** | ---- | | | | | | | |
| 6 | Guilt | .03 | -.14† | .51*** | .53*** | .38*** | ---- | | | | | | |
| 7 | Happiness | .01 | -.08 | .19* | .36*** | .82*** | .46*** | ---- | | | | | |
| 8 | Sadness | .06 | .06 | .78*** | .55*** | .19* | .64*** | .27** | ---- | | | | |
| 9 | Surprise | .07 | .05 | .68*** | .58*** | .20* | .41*** | .25** | .72*** | ---- | | | |
| 10 | Post-Severity | -.02 | .10 | .11 | -.11 | .04 | -.04 | .07 | .03 | .10 | ---- | | |
| 11 | Post-Susceptibility | -.06 | .04 | .10 | -.10 | .07 | -.03 | .11 | .06 | .09 | .93*** | ---- | |
| 12 | Post-Self-Efficacy | -.03 | .10 | .06 | -.05 | .10 | -.11 | .04 | -.02 | .11 | .60*** | .55*** | ---- |
| 13 | Post-Response Efficacy | -.10 | .05 | .07 | -.05 | .08 | .04 | .11 | -.01 | .09 | .79*** | .80*** | .54*** |

*Notes.* BI = behavior intentions. Gender was coded so that 1 = male and 2 = female, so positive correlations indicate that a variable was greater in female participants, and negative correlations indicate that a variable was greater in male participants. †$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$

**Table F3.** *Correlations – Demographics, Discrete Emotions and Post-Test Outcome Variables*

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Age | ---- | | | | | | | | | | | | |
| 2 | Gender | .02 | ---- | | | | | | | | | | | |
| 3 | Fear | .01 | .02 | ---- | | | | | | | | | | |
| 4 | Anger | .01 | -.02 | .58*** | ---- | | | | | | | | | |
| 5 | Contentment | -.03 | -.05 | .12 | .31*** | ---- | | | | | | | | |
| 6 | Guilt | .03 | -.14† | .51*** | .53*** | .38*** | ---- | | | | | | | |
| 7 | Happiness | .01 | -.08 | .19* | .36*** | .82*** | .46*** | ---- | | | | | | |
| 8 | Sadness | .06 | .06 | .78*** | .55*** | .19* | .64*** | .27** | ---- | | | | | |
| 9 | Surprise | .07 | .05 | .68*** | .58*** | .20* | .41*** | .25** | .72*** | ---- | | | | |
| 10 | Post-Non-Smoking BI | -.01 | .08 | -.05 | -.09 | .08 | -.13 | .08 | -.04 | .00 | ---- | | | |
| 11 | Post-Sharing Info BI | -.06 | .07 | .20* | .12 | .04 | -.02 | .09 | .03 | .06 | .12 | ---- | | |
| 12 | Perceived Manipulation | .09 | -.28** | .09 | .16† | .08 | .21* | .14 | .07 | .08 | .02 | -.04 | ---- | |
| 13 | Message Derogation | -.06 | -.24** | .07 | .04 | .04 | .16† | .08 | .06 | .10 | .05 | -.11 | .74*** | ---- |
| 14 | Defensive Avoidance | .01 | -.13 | -.14† | -.14† | -.02 | .06 | -.01 | -.08 | -.20* | -.20* | -.08 | .09 | .20* |

*Notes.* BI = behavior intentions. Gender was coded so that 1 = male and 2 = female, so positive correlations indicate that a variable was greater in female participants, and negative correlations indicate that a variable was greater in male participants. †$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$

**Table F4.** *Correlations – Pre-Test and Post-Test EPPM Variables*

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Pre-Severity | ---- | | | | | | | | | | | | | |
| 2 | Pre-Susceptibility | .63*** | ---- | | | | | | | | | | | | |
| 3 | Pre-Self-Efficacy | .18* | .04 | ---- | | | | | | | | | | | |
| 4 | Pre-Response Efficacy | .33*** | .38*** | .20* | ---- | | | | | | | | | | |
| 5 | Pre-Non-Smoking BI | .05 | -.03 | .19* | .19* | ---- | | | | | | | | | |
| 6 | Pre-Sharing-Information BI | .19* | .12 | .18* | .11 | .19* | ---- | | | | | | | | |
| 7 | Post-Severity | .44*** | .36*** | .14† | .27** | .07 | .05 | ---- | | | | | | | |
| 8 | Post-Susceptibility | .34*** | .40*** | .05 | .21* | .09 | .03 | .93*** | ---- | | | | | | |
| 9 | Post-Self-Efficacy | .16† | .03 | .54*** | .11 | .01 | .05 | .60*** | .55*** | ---- | | | | | |
| 10 | Post-Response Efficacy | .26** | .30*** | .02 | .42*** | .05 | .02 | .79*** | .80*** | .54*** | ---- | | | | |
| 11 | Post-Non-Smoking BI | .20* | .01 | .29*** | .17* | .43*** | .10 | .15† | .12 | .15† | .03 | ---- | | | |
| 12 | Post-Sharing Information BI | .20* | .16† | .14 | .13 | .15† | .80*** | .13 | .08 | .03 | .02 | .12 | ---- | | |
| 13 | Perceived Manipulation | -.26** | -.27** | -.20* | -.12 | .06 | -.01 | -.17* | -.14† | -.18* | -.14 | .02 | -.04 | ---- | |
| 14 | Message Derogation | -.27** | -.29*** | -.19* | -.12 | .04 | -.06 | -.20* | -.14† | -.20* | -.15† | .05 | -.11 | .74*** | ---- |
| 15 | Defensive Avoidance | -.26** | -.10 | -.20* | -.17* | -.04 | -.03 | -.23** | -.14† | -.21* | -.19* | -.20* | -.08 | .09 | .20* |

*Notes.* BI = behavior intentions. Gender was coded so that 1 = male and 2 = female, so positive correlations indicate that a variable was greater in female participants, and negative correlations indicate that a variable was greater in male participants. †$p$ < .10; *$p$ < .05; **$p$ < .01; ***$p$ < .001

## Appendix G: ANOVA Tables for Bivariate Correlations, Hypotheses 1-4, and RQ1

**Table G1.** *Mean Comparisons - Variables that are Significantly Correlated with Gender*

| | | Pre-Severity | Pre-Susceptibility | Perceived Manipulation | Message Derogation |
|---|---|---|---|---|---|
| Gender | Male | 6.28(.11)[a] | 6.49(.09)[a] | 2.53(.17)[a] | 2.26(.16)[a] |
| | Female | 6.63(.07)[b] | 6.72(.06)[b] | 1.82(.11)[b] | 1.69(.11)[b] |

*Note:* Means that do not share a common superscript are significantly different at p < .05.

**Table G2.** *Mean Comparisons – Post-Severity and Post-Susceptibility (H1)*

| | | Post-Severity | Post-Susceptibility |
|---|---|---|---|
| Threat conditions | High | 6.59(.13) | 6.68(.12) |
| | Low | 6.46(.12) | 6.53(.11) |
| Efficacy conditions | High | 6.60(.13) | 6.64(.12) |
| | Low | 6.46(.12) | 6.57(.11) |
| Overall conditions | High threat/high efficacy | 6.61(.19) | 6.66(.18) |
| | High threat/low efficacy | 6.45(.18) | 6.62(.16) |
| | Low threat/high efficacy | 6.59(.18) | 6.62(.17) |
| | Low threat/low efficacy | 6.46(.17) | 6.53(.16) |

*Note:* Means that do not share a common superscript are significantly different at p < .05. Threat conditions ANOVA covariates: pre-self-efficacy, pre-response-efficacy, and pre-sharing information behavior intentions. Overall conditions ANOVA covariates: pre-sharing information behavior intentions.

**Table G3.** *Mean Comparisons – Post-Self-Efficacy and Post-Response Efficacy (H2)*

| | | Post-Self-Efficacy | Post-Response Efficacy |
|---|---|---|---|
| Threat conditions | High | 6.43(.12) | 6.53(.11) |
| | Low | 6.44(.12) | 6.52(.11) |
| Efficacy conditions | High | 6.43(.14) | 6.57(.12) |
| | Low | 6.44(.13) | 6.49(.11) |
| Overall conditions | High threat/high efficacy | 6.38(.21) | 6.57(.18) |
| | High threat/low efficacy | 6.28(.19) | 6.39(.16) |
| | Low threat/high efficacy | 6.48(.20) | 6.57(.17) |
| | Low threat/low efficacy | 6.60(.19) | 6.58(.16) |

*Note:* Means that do not share a common superscript are significantly different at p < .05. Threat conditions ANCOVA covariates: pre-self-efficacy, pre-response-efficacy, and pre-sharing information behavior intentions. Overall conditions ANCOVA covariates: pre-sharing information behavior intentions.

**Table G4.** *Mean Comparisons – Fear Control Outcomes (H3)*

| | | Perceived Manipulation | Message Derogation | Defensive Avoidance |
|---|---|---|---|---|
| Threat conditions | High | 2.02(.14) | 1.92(.13) | 1.65(.15) |
| | Low | 2.05(.14) | 1.80(.13) | 1.88(.15) |
| Efficacy conditions | High | 2.01(.14) | 1.96(.13) | 1.73(.16) |
| | Low | 2.06(.13) | 1.77(.12) | 1.81(.15) |
| Overall conditions | High threat/high efficacy | 1.94(.21) | 2.04(.19) | 1.81(.23) |
| | High threat/low efficacy | 2.18(.19) | 1.89(.18) | 1.66(.21) |
| | Low threat/high efficacy | 2.07(.20) | 1.89(.19) | 1.65(.22) |
| | Low threat/low efficacy | 1.94(.19) | 1.65(.18) | 1.95(.21) |

*Note:* Means that do not share a common superscript are significantly different at p < .05. Threat conditions ANCOVA covariates: pre-self-efficacy, pre-response-efficacy, and pre-sharing information behavior intentions. Overall conditions ANCOVA covariates: pre-sharing information behavior intentions.

**Table G5.** *Mean Comparisons – Danger Control Outcomes (H4)*

| | | Post-Non-Smoking BI | Post-Sharing Information BI |
|---|---|---|---|
| Threat conditions | High | 6.67(.14) | 4.41(.16) |
| | Low | 6.30(.14) | 4.48(.15) |
| Efficacy conditions | High | 6.33(.15) | 4.36(.26) |
| | Low | 6.61(.14) | 4.53(.25) |
| Overall conditions | High threat/high efficacy | 6.67(.21)[a] | 4.15(.23) |
| | High threat/low efficacy | 6.53(.19)[ab] | 4.61(.21) |
| | Low threat/high efficacy | 6.01(.20)[b] | 4.55(.22) |
| | Low threat/low efficacy | 6.70(.19)[a] | 4.44(.21) |

*Note:* Means that do not share a common superscript are significantly different at p < .05. Threat conditions ANCOVA covariates: pre-self-efficacy, pre-response-efficacy, and pre-sharing information behavior intentions. Overall conditions ANCOVA covariates: pre-sharing information behavior intentions.

**Table G6.** *Mean Comparisons – Self-Report Emotions (RQ1)*

| | | Fear | Anger | Contentment | Guilt | Happiness | Sadness | Surprise |
|---|---|---|---|---|---|---|---|---|
| Threat conditions | High | 3.56(.21)$^{a}$ | 2.55(.20) | 1.60(.15) | 2.23(.18) | 1.48(.14) | 3.38(.21)$^{a}$ | 3.38(.21)$^{a}$ |
| | Low | 2.57(.20)$^{b}$ | 2.15(.19) | 1.78(.14) | 1.93(.18) | 1.56(.14) | 2.44(.19)$^{b}$ | 2.46(.20)$^{b}$ |
| Efficacy conditions | High | 2.60(.21)$^{a}$ | 2.18(.20) | 1.63(.15) | 1.94(.18) | 1.44(.14) | 2.73(.20) | 3.03(.21) |
| | Low | 3.46(.20)$^{b}$ | 2.49(.18) | 1.76(.14) | 2.20(.17) | 1.59(.13) | 3.15(.19) | 2.79(.20) |
| Overall conditions | High threat/high efficacy | 3.12(.30)$^{a}$ | 2.38(.29) | 1.45(.22) | 2.07(.27) | 1.32(.21) | 3.17(.29)$^{ab}$ | 3.49(.30)$^{a}$ |
| | High threat/low efficacy | 4.01(.27)$^{b}$ | 2.68(.26) | 1.69(.20) | 2.40(.24) | 1.57(.19) | 3.72(.26)$^{a}$ | 3.22(.28)$^{ab}$ |
| | Low threat/high efficacy | 2.13(.28)$^{c}$ | 2.00(.27) | 1.79(.21) | 1.82(.25) | 1.55(.20) | 2.32.(27)$^{c}$ | 2.62(.29)$^{bc}$ |
| | Low threat/low efficacy | 2.92(.27)$^{a}$ | 2.32(.26) | 1.82(.20) | 1.99(.24) | 1.62(.19) | 2.60(.26)$^{bc}$ | 2.37(.27)$^{c}$ |

*Note:* Means that do not share a common superscript are significantly different at $p < .05$. Threat conditions ANCOVA covariates: pre-self-efficacy, pre-response-efficacy, and pre-sharing information behavior intentions. Overall conditions ANCOVA covariates: pre-sharing information behavior intentions.

# Appendix H: Moderation Tables for Hypotheses 5 and 6

**Table H1.** *Interaction Effect of Threat and Efficacy Perceptions on Non-Smoking Behavior Intentions (H5a)*

| | | Non-Smoking Behavior Intentions | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Interaction effect | | | | | | Overall model | | | |
| *Predictor (X)* | *Moderator (W)* | *B* (SE) | *t* | *p* | *F* | *df* | $R^2\Delta$ | $R^2$ | *F* | *df* | *p* |
| Severity | Self-efficacy | .08 (.04) | 1.796 | .075 | 3.227 | 1, 142 | .022 | .049 | 2.427 | 3, 142 | .068 |
| | Response efficacy | .09 (.05) | 1.847 | .067 | 3.410 | 1, 142 | .023 | .064 | 3.222 | 3, 142 | .025 |
| Susceptibility | Self-efficacy | .09 (.04) | 1.938 | .055 | 3.756 | 1, 142 | .025 | .049 | 2.417 | 3, 142 | .069 |
| | Response efficacy | .10 (.05) | 1.950 | .053 | 3.801 | 1, 142 | .025 | .050 | 2.464 | 3, 142 | .065 |
| Overall threat | Overall efficacy | .11 (.05) | 2.170 | .032 | 4.709 | 1, 142 | .032 | .050 | 2.485 | 3, 142 | .063 |



**Table H2.** *Interaction Effect of Threat and Efficacy Perceptions on Sharing Information Behavior Intentions (H5b)*

| | | Sharing Information Behavior Intentions | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Interaction effect | | | | | | Overall model | | | |
| *Predictor (X)* | *Moderator (W)* | *B* (SE) | *t* | *p* | *F* | *df* | $R^2\Delta$ | $R^2$ | *F* | *df* | *p* |
| Severity | Self-efficacy | .09 (.08) | 0.079 | .247 | 1.351 | 1, 142 | .009 | .028 | 1.362 | 3, 142 | .257 |
| | Response efficacy | .13 (.09) | 1.444 | .151 | 2.085 | 1, 142 | .014 | .045 | 2.249 | 3, 142 | .085 |
| Susceptibility | Self-efficacy | .09 (.08) | 1.095 | .276 | 1.198 | 1, 142 | .008 | .016 | 0.744 | 3, 142 | .528 |
| | Response efficacy | .11 (.09) | 1.189 | .237 | 1.412 | 1, 142 | .010 | .022 | 1.064 | 3, 142 | .366 |
| Overall threat | Overall efficacy | .12 (.09) | 1.291 | .199 | 1.666 | 1, 142 | .011 | .030 | 1.462 | 3, 142 | .228 |

**Table H3.** *Interaction Effect of Threat and Efficacy Perceptions on Perceived Manipulation (H6a)*

| | | Perceived Manipulation | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Interaction effect | | | | | | Overall model | | | |
| *Predictor (X)* | *Moderator (W)* | *B* (SE) | *t* | *p* | *F* | *df* | $R^2\Delta$ | $R^2$ | *F* | *df* | *p* |
| Severity | Self-efficacy | -.11 (.04) | -2.670 | .009 | 7.126 | 1, 142 | .046 | .085 | 4.404 | 3, 142 | .005 |
| | Response efficacy | -.09 (.05) | -1.951 | .053 | 3.805 | 1, 142 | .025 | .054 | 2.696 | 3, 142 | .048 |
| Susceptibility | Self-efficacy | -.13 (.04) | -3.038 | .003 | 9.231 | 1, 142 | .059 | .095 | 4.956 | 3, 142 | .003 |
| | Response efficacy | -.09 (.05) | -1.933 | .055 | 3.736 | 1, 142 | .025 | .046 | 2.288 | 3, 142 | .081 |
| Overall threat | Overall efficacy | -.13 (.05) | -2.849 | .005 | 8.116 | 1, 142 | .052 | .087 | 4.497 | 3, 142 | .005 |

**Table H4.** *Interaction Effect of Threat and Efficacy Perceptions on Message Derogation (H6b)*

| | | Message Derogation | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Interaction effect | | | | | | Overall model | | | |
| *Predictor (X)* | *Moderator (W)* | *B* (SE) | *t* | *p* | *F* | *df* | $R^2\Delta$ | $R^2$ | *F* | *df* | *p* |
| Severity | Self-efficacy | -.10 (.04) | -2.658 | .009 | 7.065 | 1, 142 | .045 | .095 | 4.954 | 3, 142 | .003 |
| | Response efficacy | -.09 (.04) | -2.077 | .040 | 4.314 | 1, 142 | .028 | .066 | 3.364 | 3, 142 | .021 |
| Susceptibility | Self-efficacy | -.11 (.04) | -2.862 | .005 | 8.191 | 1, 142 | .052 | .095 | 4.986 | 3, 142 | .003 |
| | Response efficacy | -.10 (.05) | -2.118 | .036 | 4.487 | 1, 142 | .030 | .054 | 2.697 | 3, 142 | .048 |
| Overall threat | Overall efficacy | -.13 (.04) | -2.918 | .004 | 8.517 | 1, 142 | .054 | .096 | 5.036 | 3, 142 | .002 |

**Table H5.** *Interaction Effect of Threat and Efficacy Perceptions on Defensive Avoidance (H6c)*

| | | Defensive Avoidance | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Interaction effect | | | | | | Overall model | | | |
| *Predictor (X)* | *Moderator (W)* | *B* (SE) | *t* | *p* | *F* | *df* | $R^2\Delta$ | $R^2$ | *F* | *df* | *p* |
| Severity | Self-efficacy | -.09 (.05) | -1.953 | .053 | 3.815 | 1, 142 | .025 | .085 | 4.389 | 3, 142 | .006 |
| | Response efficacy | -.10 (.05) | -1.915 | .058 | 3.666 | 1, 142 | .024 | .075 | 3.844 | 3, 142 | .011 |
| Susceptibility | Self-efficacy | -.09 (.05) | -1.956 | .053 | 3.824 | 1, 142 | .025 | .071 | 3.631 | 3, 142 | .015 |
| | Response efficacy | -.09 (.05) | -1.720 | .088 | 2.959 | 1, 142 | .020 | .056 | 2.780 | 3, 142 | .043 |
| Overall threat | Overall efficacy | -.12 (.05) | -2.357 | .020 | 5.556 | 1, 142 | .036 | .089 | 4.606 | 3, 142 | .004 |

## Appendix I: Moderation Figures for Hypotheses 5 and 6

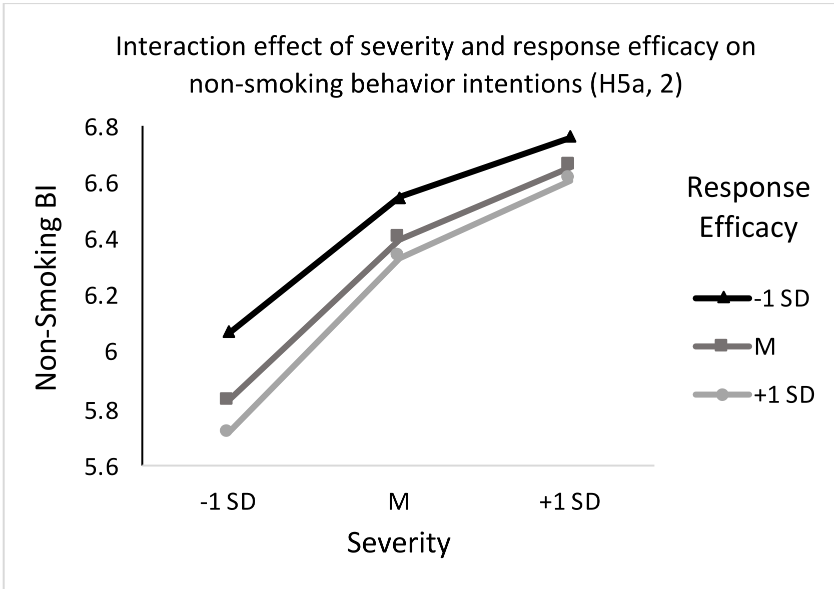



**Figure I1.** *Interaction of Severity and Response Efficacy on Non-Smoking Behavior Intentions (H5a, 2) (p= .07)*

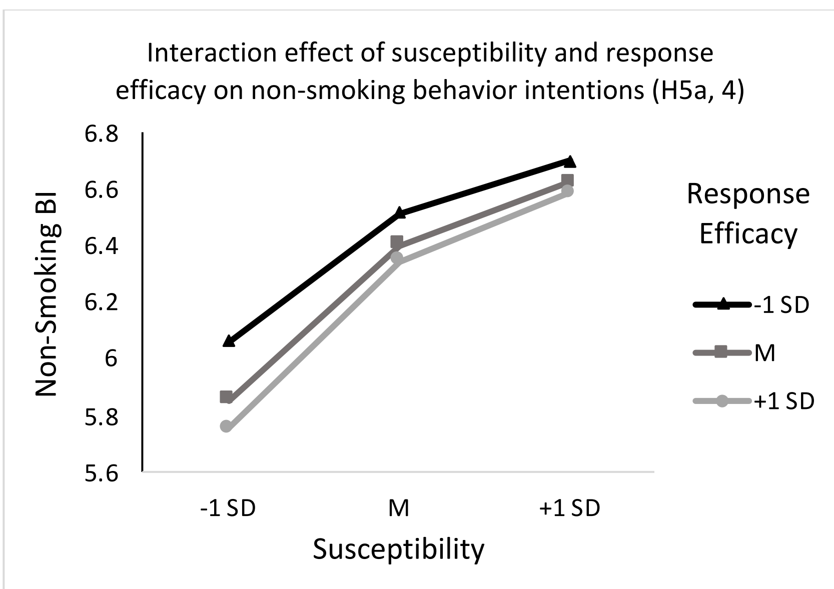



**Figure I2.** *Interaction of Susceptibility and Response Efficacy on Non-Smoking Behavior Intentions (H5a, 4) (p= .053)*

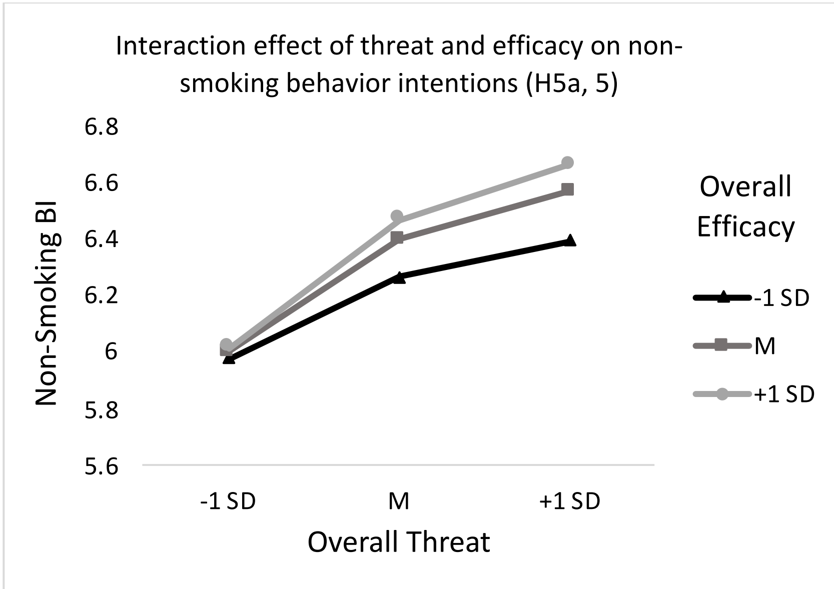



**Figure I3.** *Interaction of Overall Threat and Efficacy on Non-Smoking Behavior Intentions (H5a, 5) (p= .03)*

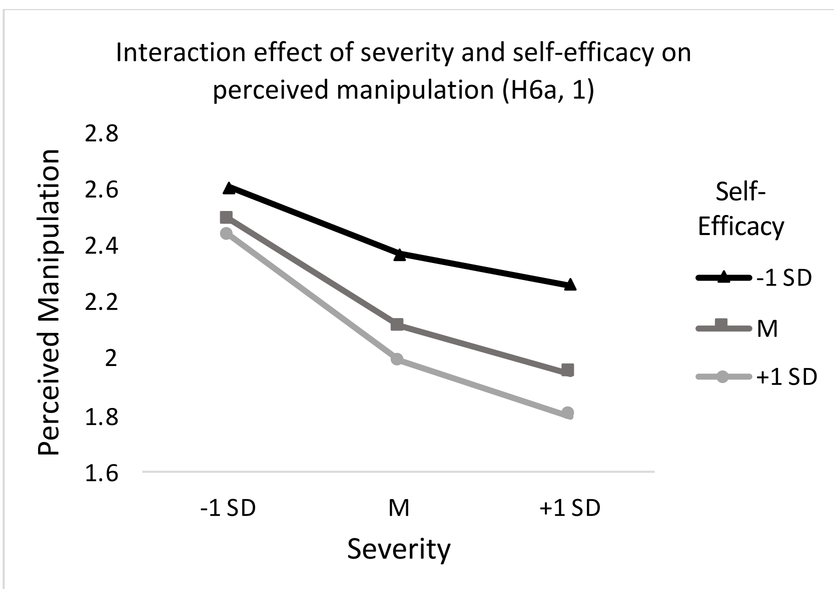



**Figure I4.** *Interaction of Severity and Self-Efficacy on Perceived Manipulation (H6a, 1) (p= .009)*

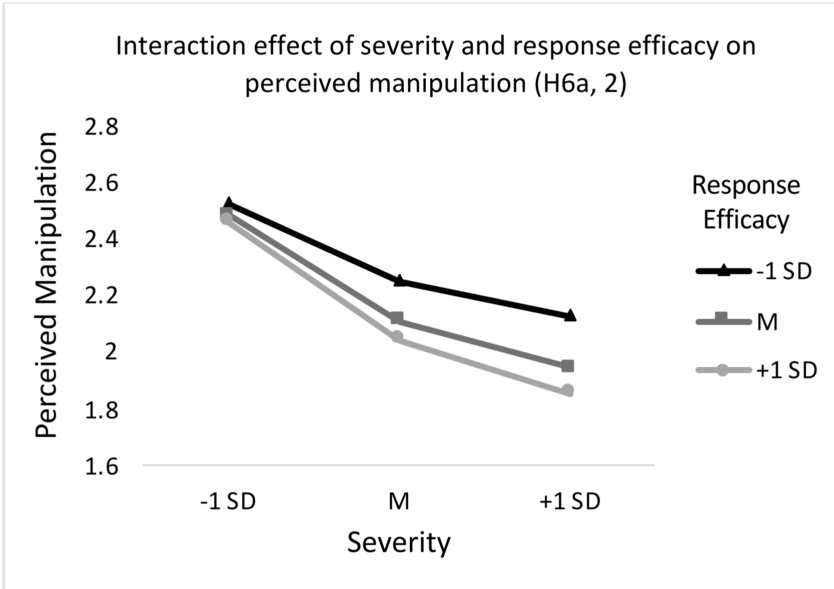



**Figure I5.** *Interaction of Severity and Response Efficacy on Perceived Manipulation (H6a, 2) (p= .053)*

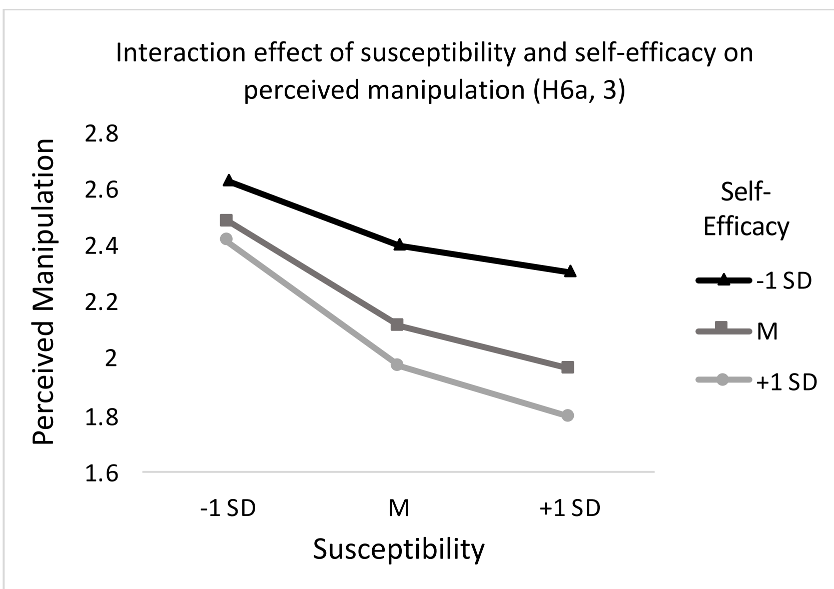



**Figure I6.** *Interaction of Susceptibility and Self-Efficacy on Perceived Manipulation (H6a, 3) (p= .003)*

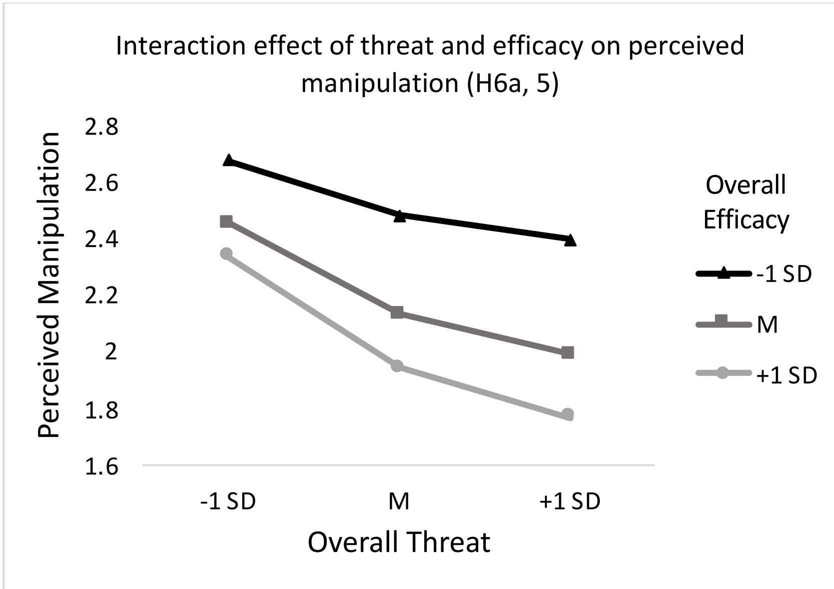



**Figure I7.** *Interaction of Overall Threat and Efficacy on Perceived Manipulation (H6a, 5) (p= .005)*

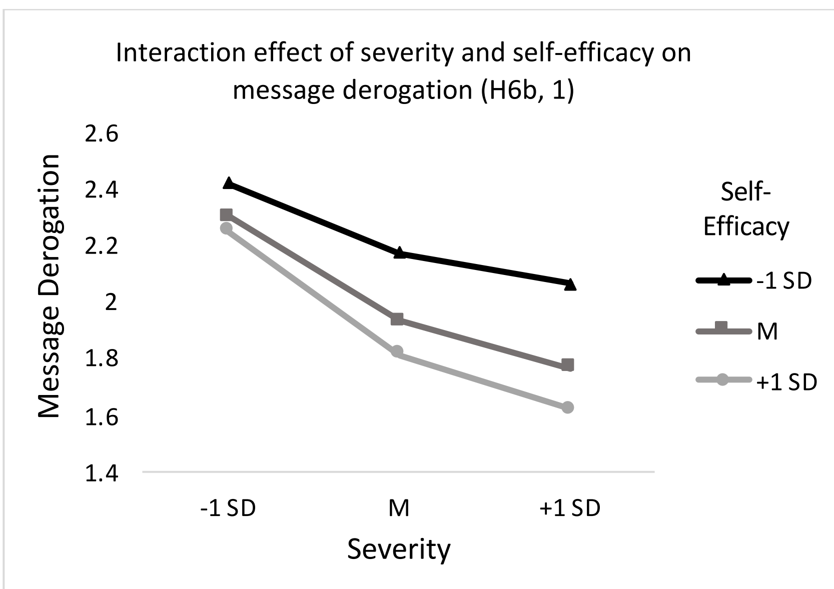



**Figure I8.** *Interaction of Severity and Self-Efficacy on Message Derogation (H6b, 1) (p= .009)*

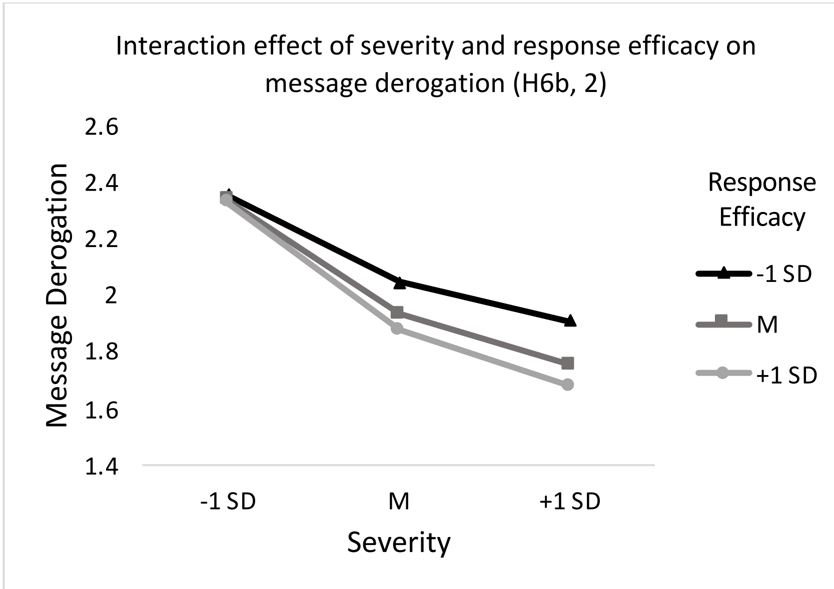



**Figure I9.** *Interaction of Severity and Response Efficacy on Message Derogation (H6b, 2) (p= .04)*

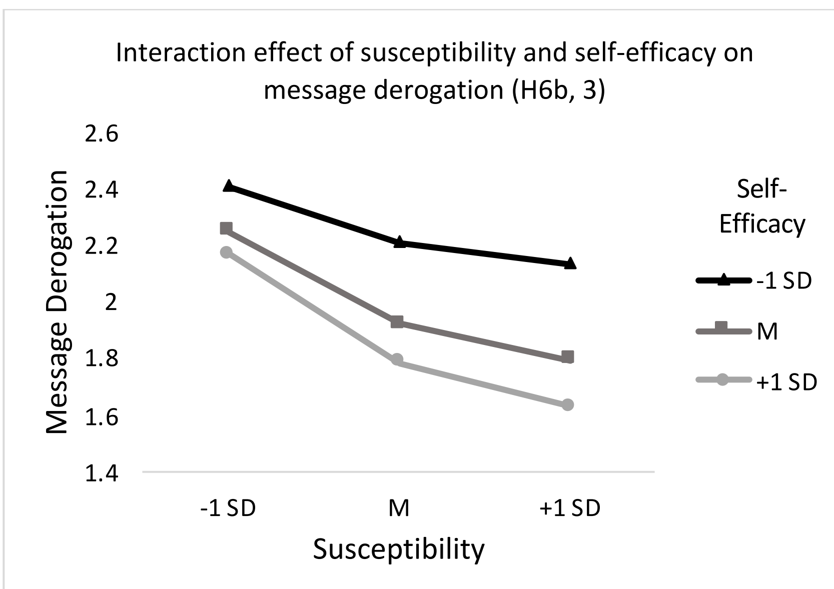



**Figure I10.** *Interaction of Susceptibility and Self-Efficacy on Message Derogation (H6b, 3) (p= .005)*

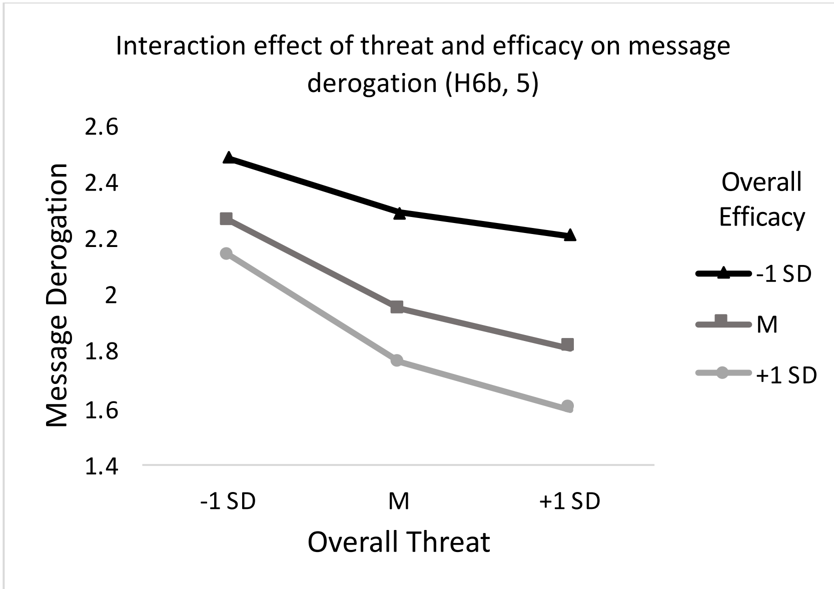



**Figure I11.** *Interaction of Overall Threat and Efficacy on Message Derogation (H6b, 5) (p= .004)*

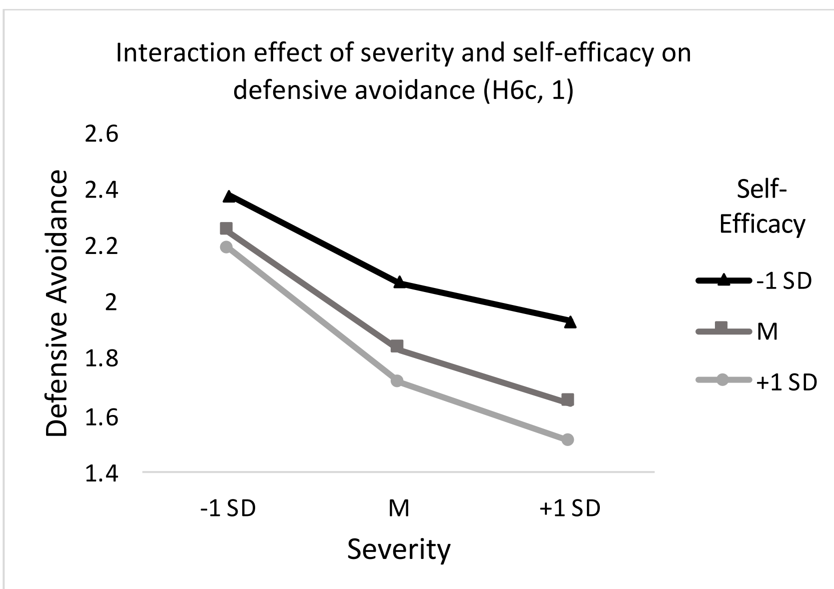



**Figure I12.** *Interaction of Severity and Self-Efficacy on Defensive Avoidance (H6c, 1) (p= .053)*

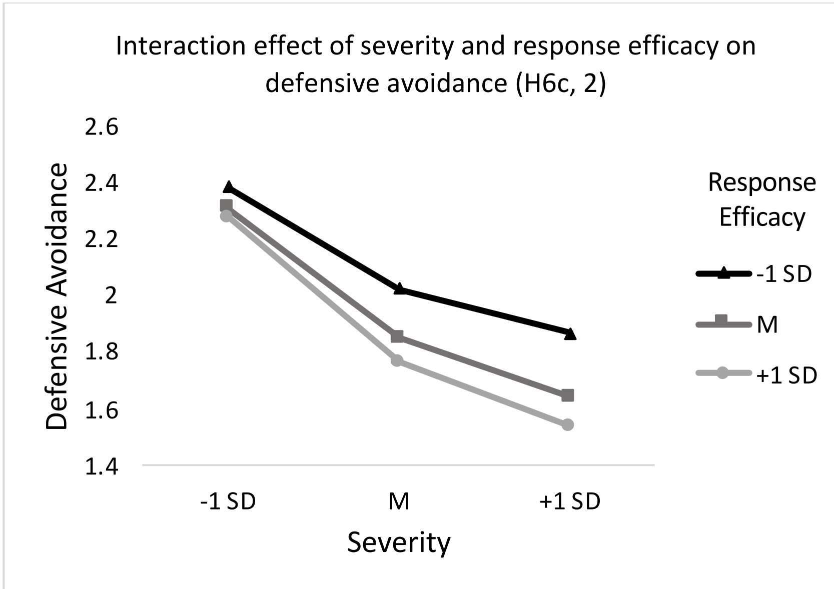



**Figure I13.** *Interaction of Severity and Response Efficacy on Defensive Avoidance (H6c, 2) (p= .058)*

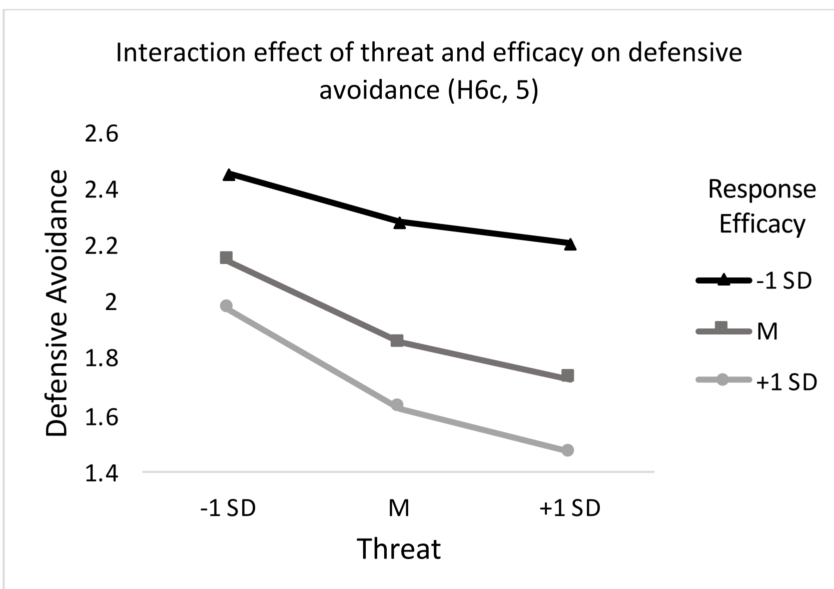



**Figure I14.** *Interaction of Overall Threat and Efficacy on Defensive Avoidance (H6c, 5) (p= .02)*

## Appendix J: Johnson-Neyman Outputs for Hypotheses 5 and 6

```
There are no statistical significance transition points within the
observed range of the moderator found using the Johnson-Neyman method.

Conditional effect of focal predictor at values of the moderator:
Self-Eff    Effect     se         t         p          LLCI        ULCI
1.0000     -.1389     .1798     -.7728    .4409     -.4943       .2164
1.3000     -.1155     .1700     -.6791    .4982     -.4516       .2207
1.6000     -.0920     .1608     -.5722    .5681     -.4098       .2258
1.9000     -.0685     .1521     -.4507    .6529     -.3692       .2321
2.2000     -.0451     .1440     -.3130    .7548     -.3298       .2397
2.5000     -.0216     .1368     -.1580    .8746     -.2920       .2488
2.8000      .0018     .1304      .0141    .9887     -.2560       .2597
3.1000      .0253     .1251      .2022    .8400     -.2221       .2727
3.4000      .0488     .1210      .4030    .6875     -.1904       .2880
3.7000      .0722     .1182      .6111    .5421     -.1614       .3059
4.0000      .0957     .1168      .8194    .4139     -.1351       .3265
4.3000      .1192     .1168     1.0200    .3094     -.1118       .3501
4.6000      .1426     .1183     1.2056    .2300     -.0912       .3765
4.9000      .1661     .1212     1.3705    .1727     -.0735       .4056
5.2000      .1895     .1254     1.5119    .1328     -.0583       .4374
5.5000      .2130     .1307     1.6293    .1055     -.0454       .4714
5.8000      .2365     .1371     1.7244    .0868     -.0346       .5075
6.1000      .2599     .1444     1.7997    .0740     -.0256       .5454
6.4000      .2834     .1525     1.8583    .0652     -.0181       .5848
6.7000      .3068     .1612     1.9032    .0590     -.0119       .6256
7.0000      .3303     .1705     1.9372    .0547     -.0068       .6674
```

**Figure J1.** *Conditional effect of focal predictor (severity) on outcome (non-smoking behavior intentions) at values of the moderator (self-efficacy) (H5a, 1).*

Moderator value(s) defining Johnson-Neyman significance region(s):

| Value | % below | % above |
|---|---|---|
| 3.8750 | 2.7397 | 97.2603 |

Conditional effect of focal predictor at values of the moderator:

| Resp Eff | Effect | se | t | p | LLCI | ULCI |
|---|---|---|---|---|---|---|
| 1.0000 | .0494 | .2285 | .2163 | .8291 | -.4024 | .5012 |
| 1.3000 | .0759 | .2179 | .3485 | .7280 | -.3548 | .5066 |
| 1.6000 | .1024 | .2077 | .4932 | .6226 | -.3081 | .5129 |
| 1.9000 | .1289 | .1980 | .6512 | .5160 | -.2624 | .5202 |
| 2.2000 | .1554 | .1888 | .8229 | .4119 | -.2179 | .5287 |
| 2.5000 | .1819 | .1804 | 1.0083 | .3150 | -.1747 | .5385 |
| 2.8000 | .2084 | .1728 | 1.2063 | .2297 | -.1331 | .5499 |
| 3.1000 | .2349 | .1660 | 1.4150 | .1593 | -.0933 | .5630 |
| 3.4000 | .2614 | .1602 | 1.6312 | .1051 | -.0554 | .5782 |
| 3.7000 | .2879 | .1556 | 1.8501 | .0664 | -.0197 | .5955 |
| **3.8750** | **.3033** | **.1535** | **1.9768** | **.0500** | **.0000** | **.6067** |
| 4.0000 | .3144 | .1522 | 2.0659 | .0407 | .0136 | .6152 |
| 4.3000 | .3409 | .1500 | 2.2718 | .0246 | .0443 | .6375 |
| 4.6000 | .3674 | .1493 | 2.4610 | .0151 | .0723 | .6625 |
| 4.9000 | .3939 | .1499 | 2.6279 | .0095 | .0976 | .6901 |
| 5.2000 | .4204 | .1518 | 2.7684 | .0064 | .1202 | .7205 |
| 5.5000 | .4469 | .1551 | 2.8809 | .0046 | .1402 | .7535 |
| 5.8000 | .4733 | .1596 | 2.9657 | .0035 | .1578 | .7889 |
| 6.1000 | .4998 | .1652 | 3.0251 | .0030 | .1732 | .8265 |
| 6.4000 | .5263 | .1719 | 3.0623 | .0026 | .1866 | .8661 |
| 6.7000 | .5528 | .1794 | 3.0812 | .0025 | .1982 | .9075 |
| 7.0000 | .5793 | .1878 | 3.0855 | .0024 | .2082 | .9505 |

**Figure J2.** *Conditional effect of focal predictor (severity) on outcome (non-smoking behavior intentions) at values of the moderator (response efficacy) (H5a, 2).*

There are no statistical significance transition points within the observed range of the moderator found using the Johnson-Neyman method.

Conditional effect of focal predictor at values of the moderator:

| Self-Eff | Effect | se | t | p | LLCI | ULCI |
|---|---|---|---|---|---|---|
| 1.0000 | -.1867 | .1774 | -1.0521 | .2945 | -.5375 | .1641 |
| 1.3000 | -.1610 | .1680 | -.9582 | .3396 | -.4931 | .1711 |
| 1.6000 | -.1353 | .1591 | -.8502 | .3967 | -.4499 | .1793 |
| 1.9000 | -.1096 | .1509 | -.7262 | .4689 | -.4079 | .1887 |
| 2.2000 | -.0839 | .1434 | -.5849 | .5595 | -.3674 | .1996 |
| 2.5000 | -.0582 | .1368 | -.4252 | .6713 | -.3286 | .2123 |
| 2.8000 | -.0325 | .1312 | -.2474 | .8049 | -.2918 | .2269 |
| 3.1000 | -.0068 | .1268 | -.0533 | .9575 | -.2573 | .2438 |
| 3.4000 | .0189 | .1236 | .1533 | .8784 | -.2254 | .2632 |
| 3.7000 | .0446 | .1218 | .3667 | .7144 | -.1961 | .2854 |
| 4.0000 | .0704 | .1214 | .5796 | .5631 | -.1696 | .3103 |
| 4.3000 | .0961 | .1225 | .7844 | .4341 | -.1460 | .3381 |
| 4.6000 | .1218 | .1249 | .9746 | .3314 | -.1252 | .3687 |
| 4.9000 | .1475 | .1287 | 1.1455 | .2539 | -.1070 | .4020 |
| 5.2000 | .1732 | .1337 | 1.2948 | .1975 | -.0912 | .4376 |
| 5.5000 | .1989 | .1398 | 1.4222 | .1572 | -.0776 | .4753 |
| 5.8000 | .2246 | .1469 | 1.5290 | .1285 | -.0658 | .5150 |
| 6.1000 | .2503 | .1547 | 1.6174 | .1080 | -.0556 | .5562 |
| 6.4000 | .2760 | .1633 | 1.6900 | .0932 | -.0468 | .5988 |
| 6.7000 | .3017 | .1725 | 1.7493 | .0824 | -.0392 | .6426 |
| 7.0000 | .3274 | .1821 | 1.7977 | .0744 | -.0326 | .6874 |

**Figure J3.** *Conditional effect of focal predictor (susceptibility) on outcome (non-smoking behavior intentions) at values of the moderator (self-efficacy) (H5a, 3).*

Moderator value(s) defining Johnson-Neyman significance region(s):

| Value | % below | % above |
|---|---|---|
| 4.1698 | 4.7945 | 95.2055 |

Conditional effect of focal predictor at values of the moderator:

| Resp Eff | Effect | se | t | p | LLCI | ULCI |
|---|---|---|---|---|---|---|
| 1.0000 | .0230 | .2229 | .1030 | .9181 | -.4177 | .4636 |
| 1.3000 | .0521 | .2133 | .2443 | .8073 | -.3696 | .4738 |
| 1.6000 | .0813 | .2044 | .3978 | .6914 | -.3227 | .4853 |
| 1.9000 | .1105 | .1961 | .5631 | .5742 | -.2773 | .4982 |
| 2.2000 | .1396 | .1888 | .7397 | .4607 | -.2335 | .5128 |
| 2.5000 | .1688 | .1823 | .9260 | .3560 | -.1916 | .5291 |
| 2.8000 | .1980 | .1769 | 1.1193 | .2649 | -.1517 | .5476 |
| 3.1000 | .2271 | .1726 | 1.3163 | .1902 | -.1140 | .5682 |
| 3.4000 | .2563 | .1695 | 1.5123 | .1327 | -.0787 | .5913 |
| 3.7000 | .2855 | .1677 | 1.7025 | .0908 | -.0460 | .6169 |
| 4.0000 | .3146 | .1672 | 1.8819 | .0619 | -.0159 | .6452 |
| **4.1698** | **.3312** | **.1675** | **1.9768** | **.0500** | **.0000** | **.6623** |
| 4.3000 | .3438 | .1681 | 2.0458 | .0426 | .0116 | .6760 |
| 4.6000 | .3730 | .1702 | 2.1910 | .0301 | .0365 | .7095 |
| 4.9000 | .4021 | .1737 | 2.3156 | .0220 | .0588 | .7455 |
| 5.2000 | .4313 | .1783 | 2.4190 | .0168 | .0788 | .7838 |
| 5.5000 | .4605 | .1840 | 2.5021 | .0135 | .0967 | .8243 |
| 5.8000 | .4896 | .1908 | 2.5666 | .0113 | .1125 | .8668 |
| 6.1000 | .5188 | .1984 | 2.6147 | .0099 | .1266 | .9111 |
| 6.4000 | .5480 | .2069 | 2.6490 | .0090 | .1391 | .9569 |
| 6.7000 | .5772 | .2160 | 2.6718 | .0084 | .1501 | 1.0042 |
| 7.0000 | .6063 | .2258 | 2.6854 | .0081 | .1600 | 1.0527 |

**Figure J4.** *Conditional effect of focal predictor (susceptibility) on outcome (non-smoking behavior intentions) at values of the moderator (response efficacy) (H5a, 4).*

Moderator value(s) defining Johnson-Neyman significance region(s):

| Value | % below | % above |
|---|---|---|
| 6.1874 | 24.6575 | 75.3425 |

Conditional effect of focal predictor at values of the moderator:

| Efficacy | Effect | se | t | p | LLCI | ULCI |
|---|---|---|---|---|---|---|
| 1.0000 | -.1945 | .2288 | -.8501 | .3967 | -.6467 | .2578 |
| 1.3000 | -.1623 | .2183 | -.7433 | .4585 | -.5939 | .2693 |
| 1.6000 | -.1301 | .2084 | -.6242 | .5335 | -.5421 | .2819 |
| 1.9000 | -.0979 | .1991 | -.4917 | .6237 | -.4915 | .2957 |
| 2.2000 | -.0657 | .1905 | -.3449 | .7307 | -.4423 | .3109 |
| 2.5000 | -.0335 | .1827 | -.1834 | .8547 | -.3947 | .3277 |
| 2.8000 | -.0013 | .1758 | -.0076 | .9940 | -.3489 | .3463 |
| 3.1000 | .0309 | .1700 | .1816 | .8562 | -.3051 | .3668 |
| 3.4000 | .0631 | .1652 | .3816 | .7033 | -.2636 | .3897 |
| 3.7000 | .0952 | .1617 | .5890 | .5568 | -.2244 | .4149 |
| 4.0000 | .1274 | .1595 | .7990 | .4256 | -.1878 | .4427 |
| 4.3000 | .1596 | .1586 | 1.0062 | .3160 | -.1540 | .4732 |
| 4.6000 | .1918 | .1592 | 1.2051 | .2302 | -.1228 | .5065 |
| 4.9000 | .2240 | .1611 | 1.3907 | .1665 | -.0944 | .5424 |
| 5.2000 | .2562 | .1643 | 1.5593 | .1212 | -.0686 | .5810 |
| 5.5000 | .2884 | .1688 | 1.7086 | .0897 | -.0453 | .6221 |
| 5.8000 | .3206 | .1744 | 1.8381 | .0681 | -.0242 | .6654 |
| 6.1000 | .3528 | .1811 | 1.9482 | .0534 | -.0052 | .7107 |
| **6.1874** | **.3622** | **.1832** | **1.9768** | **.0500** | **.0000** | **.7243** |
| 6.4000 | .3850 | .1887 | 2.0403 | .0432 | .0120 | .7580 |
| 6.7000 | .4172 | .1971 | 2.1164 | .0361 | .0275 | .8068 |
| 7.0000 | .4494 | .2063 | 2.1786 | .0310 | .0416 | .8571 |

**Figure J5.** *Conditional effect of focal predictor (overall threat) on outcome (non-smoking behavior intentions) at values of the moderator (overall efficacy) (H5a, 5).*

| Severity | Self-Eff | Sharing Info BI |
|---|---|---|
| 5.4565 | 5.2717 | 3.9703 |
| 6.5228 | 5.2717 | 4.4405 |
| 7.0000 | 5.2717 | 4.6509 |
| 5.4565 | 6.4361 | 3.7937 |
| 6.5228 | 6.4361 | 4.3772 |
| 7.0000 | 6.4361 | 4.6383 |
| 5.4565 | 7.0000 | 3.7082 |
| 6.5228 | 7.0000 | 4.3466 |
| 7.0000 | 7.0000 | 4.6323 |

*Note:* The p-value of the interaction was > .10, so a Johnson-Neyman output was not calculated. Data for visualizing the conditional effect of the focal predictor are provided as an alternative.

**Figure J6.** *Conditional effect of focal predictor (severity) on outcome (sharing information behavior intentions) at values of the moderator (self-efficacy) (H5b, 1).*

| Severity | Resp Eff | Sharing Info BI |
|---|---|---|
| 5.4565 | 5.5233 | 3.8637 |
| 6.5228 | 5.5233 | 4.5985 |
| 7.0000 | 5.5233 | 4.9273 |
| 5.4565 | 6.5251 | 3.4736 |
| 6.5228 | 6.5251 | 4.3414 |
| 7.0000 | 6.5251 | 4.7297 |
| 5.4565 | 7.0000 | 3.2887 |
| 6.5228 | 7.0000 | 4.2195 |
| 7.0000 | 7.0000 | 4.6360 |

*Note:* The p-value of the interaction was > .10, so a Johnson-Neyman output was not calculated. Data for visualizing the conditional effect of the focal predictor are provided as an alternative.

**Figure J7.** *Conditional effect of focal predictor (severity) on outcome (sharing information behavior intentions) at values of the moderator (response efficacy) (H5b, 2).*

| Suscept | Self-Eff | Sharing Info BI |
|---|---|---|
| 5.6254 | 5.2717 | 4.0393 |
| 6.6027 | 5.2717 | 4.3563 |
| 7.0000 | 5.2717 | 4.4852 |
| 5.6254 | 6.4361 | 3.9735 |
| 6.6027 | 6.4361 | 4.3907 |
| 7.0000 | 6.4361 | 4.5602 |
| 5.6254 | 7.0000 | 3.9417 |
| 6.6027 | 7.0000 | 4.4073 |
| 7.0000 | 7.0000 | 4.5965 |

*Note:* The p-value of the interaction was > .10, so a Johnson-Neyman output was not calculated. Data for visualizing the conditional effect of the focal predictor are provided as an alternative.

**Figure J8.** *Conditional effect of focal predictor (susceptibility) on outcome (sharing information behavior intentions) at values of the moderator (self-efficacy) (H5b, 3).*

| Suscept | Resp Eff | Sharing Info BI |
|---|---|---|
| 5.6254 | 5.5233 | 3.9725 |
| 6.6027 | 5.5233 | 4.5237 |
| 7.0000 | 5.5233 | 4.7478 |
| 5.6254 | 6.5251 | 3.7059 |
| 6.6027 | 6.5251 | 4.3622 |
| 7.0000 | 6.5251 | 4.6290 |
| 5.6254 | 7.0000 | 3.5795 |
| 6.6027 | 7.0000 | 4.2856 |
| 7.0000 | 7.0000 | 4.5727 |

*Note:* The p-value of the interaction was > .10, so a Johnson-Neyman output was not calculated. Data for visualizing the conditional effect of the focal predictor are provided as an alternative.

**Figure J9.** *Conditional effect of focal predictor (susceptibility) on outcome (sharing information behavior intentions) at values of the moderator (response efficacy) (H5b, 4).*

| Threat | Efficacy | Sharing Info BI |
|---|---|---|
| 5.5580 | 5.5300 | 3.9143 |
| 6.5628 | 5.5300 | 4.5138 |
| 7.0000 | 5.5300 | 4.7746 |
| 5.5580 | 6.4806 | 3.6502 |
| 6.5628 | 6.4806 | 4.3597 |
| 7.0000 | 6.4806 | 4.6683 |
| 5.5580 | 7.0000 | 3.5059 |
| 6.5628 | 7.0000 | 4.2754 |
| 7.0000 | 7.0000 | 4.6103 |

*Note:* The p-value of the interaction was > .10, so a Johnson-Neyman output was not calculated. Data for visualizing the conditional effect of the focal predictor are provided as an alternative.

**Figure J10.** *Conditional effect of focal predictor (overall threat) on outcome (sharing information behavior intentions) at values of the moderator (overall efficacy) (H5b, 5).*

Moderator value(s) defining Johnson-Neyman significance region(s):

| Value | % below | % above |
|---|---|---|
| 5.4479 | 13.6986 | 86.3014 |

Conditional effect of focal predictor at values of the moderator:

| Self-Eff | Effect | se | t | p | LLCI | ULCI |
|---|---|---|---|---|---|---|
| 1.0000 | .2474 | .1708 | 1.4490 | .1495 | -.0901 | .5850 |
| 1.3000 | .2143 | .1615 | 1.3269 | .1867 | -.1050 | .5336 |
| 1.6000 | .1812 | .1527 | 1.1864 | .2374 | -.1207 | .4831 |
| 1.9000 | .1481 | .1445 | 1.0250 | .3071 | -.1375 | .4336 |
| 2.2000 | .1150 | .1368 | .8401 | .4022 | -.1555 | .3854 |
| 2.5000 | .0818 | .1299 | .6298 | .5298 | -.1750 | .3387 |
| 2.8000 | .0487 | .1239 | .3932 | .6947 | -.1962 | .2936 |
| 3.1000 | .0156 | .1189 | .1313 | .8957 | -.2194 | .2506 |
| 3.4000 | -.0175 | .1149 | -.1524 | .8791 | -.2447 | .2097 |
| 3.7000 | -.0506 | .1123 | -.4510 | .6527 | -.2726 | .1713 |
| 4.0000 | -.0837 | .1109 | -.7550 | .4515 | -.3030 | .1355 |
| 4.3000 | -.1169 | .1110 | -1.0533 | .2940 | -.3362 | .1025 |
| 4.6000 | -.1500 | .1124 | -1.3347 | .1841 | -.3721 | .0721 |
| 4.9000 | -.1831 | .1151 | -1.5907 | .1139 | -.4106 | .0444 |
| 5.2000 | -.2162 | .1191 | -1.8157 | .0715 | -.4516 | .0192 |
| **5.4479** | **-.2436** | **.1232** | **-1.9768** | **.0500** | **-.4871** | **.0000** |
| 5.5000 | -.2493 | .1242 | -2.0079 | .0466 | -.4948 | -.0039 |
| 5.8000 | -.2824 | .1303 | -2.1684 | .0318 | -.5399 | -.0250 |
| 6.1000 | -.3156 | .1372 | -2.3002 | .0229 | -.5868 | -.0444 |
| 6.4000 | -.3487 | .1449 | -2.4071 | .0174 | -.6350 | -.0623 |
| 6.7000 | -.3818 | .1531 | -2.4931 | .0138 | -.6845 | -.0791 |
| 7.0000 | -.4149 | .1620 | -2.5618 | .0115 | -.7351 | -.0947 |

**Figure J11.** *Conditional effect of focal predictor (severity) on outcome (perceived manipulation) at values of the moderator (self-efficacy) (H6a, 1).*

Moderator value(s) defining Johnson-Neyman significance region(s):

| Value | % below | % above |
|---|---|---|
| 6.2350 | 23.9726 | 76.0274 |

Conditional effect of focal predictor at values of the moderator:

| Resp Eff | Effect | se | t | p | LLCI | ULCI |
|---|---|---|---|---|---|---|
| 1.0000 | .1520 | .2225 | .6830 | .4957 | -.2879 | .5918 |
| 1.3000 | .1247 | .2121 | .5879 | .5575 | -.2946 | .5441 |
| 1.6000 | .0975 | .2022 | .4821 | .6305 | -.3022 | .4972 |
| 1.9000 | .0702 | .1927 | .3643 | .7161 | -.3108 | .4512 |
| 2.2000 | .0430 | .1839 | .2337 | .8155 | -.3205 | .4064 |
| 2.5000 | .0157 | .1757 | .0895 | .9288 | -.3315 | .3630 |
| 2.8000 | -.0115 | .1682 | -.0685 | .9455 | -.3440 | .3210 |
| 3.1000 | -.0388 | .1616 | -.2399 | .8107 | -.3583 | .2807 |
| 3.4000 | -.0660 | .1560 | -.4232 | .6728 | -.3745 | .2424 |
| 3.7000 | -.0933 | .1515 | -.6157 | .5391 | -.3928 | .2062 |
| 4.0000 | -.1205 | .1482 | -.8135 | .4173 | -.4134 | .1724 |
| 4.3000 | -.1478 | .1461 | -1.0116 | .3135 | -.4366 | .1410 |
| 4.6000 | -.1750 | .1453 | -1.2043 | .2305 | -.4623 | .1123 |
| 4.9000 | -.2023 | .1459 | -1.3862 | .1679 | -.4908 | .0862 |
| 5.2000 | -.2295 | .1478 | -1.5526 | .1227 | -.5218 | .0627 |
| 5.5000 | -.2568 | .1510 | -1.7003 | .0913 | -.5553 | .0418 |
| 5.8000 | -.2840 | .1554 | -1.8277 | .0697 | -.5912 | .0232 |
| 6.1000 | -.3113 | .1609 | -1.9349 | .0550 | -.6293 | .0067 |
| **6.2350** | **-.3235** | **.1637** | **-1.9768** | **.0500** | **-.6471** | **.0000** |
| 6.4000 | -.3385 | .1673 | -2.0230 | .0450 | -.6693 | -.0077 |
| 6.7000 | -.3658 | .1747 | -2.0939 | .0380 | -.7111 | -.0205 |
| 7.0000 | -.3930 | .1828 | -2.1500 | .0333 | -.7544 | -.0317 |

**Figure J12.** *Conditional effect of focal predictor (severity) on outcome (perceived manipulation) at values of the moderator (response efficacy) (H6a, 2).*

Moderator value(s) defining Johnson-Neyman significance region(s):

| Value | % below | % above |
|---|---|---|
| 5.4847 | 13.6986 | 86.3014 |

Conditional effect of focal predictor at values of the moderator:

| Self-Eff | Effect | se | t | p | LLCI | ULCI |
|---|---|---|---|---|---|---|
| 1.0000 | .3086 | .1676 | 1.8407 | .0677 | -.0228 | .6400 |
| 1.3000 | .2705 | .1587 | 1.7042 | .0905 | -.0433 | .5843 |
| 1.6000 | .2324 | .1503 | 1.5462 | .1243 | -.0647 | .5296 |
| 1.9000 | .1944 | .1426 | 1.3635 | .1749 | -.0874 | .4762 |
| 2.2000 | .1563 | .1355 | 1.1537 | .2506 | -.1115 | .4241 |
| 2.5000 | .1182 | .1292 | .9148 | .3618 | -.1373 | .3737 |
| 2.8000 | .0802 | .1240 | .6467 | .5189 | -.1649 | .3252 |
| 3.1000 | .0421 | .1198 | .3515 | .7258 | -.1946 | .2788 |
| 3.4000 | .0040 | .1168 | .0344 | .9726 | -.2268 | .2348 |
| 3.7000 | -.0341 | .1150 | -.2960 | .7676 | -.2615 | .1934 |
| 4.0000 | -.0721 | .1147 | -.6289 | .5304 | -.2988 | .1546 |
| 4.3000 | -.1102 | .1157 | -.9525 | .3425 | -.3389 | .1185 |
| 4.6000 | -.1483 | .1180 | -1.2562 | .2111 | -.3816 | .0851 |
| 4.9000 | -.1863 | .1216 | -1.5322 | .1277 | -.4268 | .0541 |
| 5.2000 | -.2244 | .1264 | -1.7760 | .0779 | -.4742 | .0254 |
| **5.4847** | **-.2605** | **.1318** | **-1.9768** | **.0500** | **-.5211** | **.0000** |
| 5.5000 | -.2625 | .1321 | -1.9868 | .0489 | -.5237 | -.0013 |
| 5.8000 | -.3006 | .1388 | -2.1659 | .0320 | -.5749 | -.0262 |
| 6.1000 | -.3386 | .1462 | -2.3163 | .0220 | -.6276 | -.0496 |
| 6.4000 | -.3767 | .1543 | -2.4416 | .0159 | -.6817 | -.0717 |
| 6.7000 | -.4148 | .1629 | -2.5456 | .0120 | -.7369 | -.0927 |
| 7.0000 | -.4528 | .1721 | -2.6318 | .0094 | -.7930 | -.1127 |

**Figure J13.** *Conditional effect of focal predictor (susceptibility) on outcome (perceived manipulation) at values of the moderator (self-efficacy) (H6a, 3).*

There are no statistical significance transition points within the observed range of the moderator found using the Johnson-Neyman method.

Conditional effect of focal predictor at values of the moderator:

| Resp Eff | Effect | se | t | p | LLCI | ULCI |
|---|---|---|---|---|---|---|
| 1.0000 | .1811 | .2163 | .8374 | .4038 | -.2465 | .6087 |
| 1.3000 | .1531 | .2070 | .7396 | .4608 | -.2561 | .5622 |
| 1.6000 | .1250 | .1983 | .6305 | .5294 | -.2670 | .5170 |
| 1.9000 | .0970 | .1903 | .5095 | .6112 | -.2793 | .4732 |
| 2.2000 | .0689 | .1831 | .3762 | .7073 | -.2931 | .4309 |
| 2.5000 | .0408 | .1769 | .2309 | .8177 | -.3088 | .3905 |
| 2.8000 | .0128 | .1716 | .0745 | .9407 | -.3264 | .3520 |
| 3.1000 | -.0153 | .1674 | -.0912 | .9275 | -.3462 | .3157 |
| 3.4000 | -.0433 | .1644 | -.2635 | .7926 | -.3684 | .2817 |
| 3.7000 | -.0714 | .1627 | -.4388 | .6615 | -.3930 | .2502 |
| 4.0000 | -.0994 | .1622 | -.6130 | .5409 | -.4201 | .2212 |
| 4.3000 | -.1275 | .1631 | -.7819 | .4356 | -.4498 | .1948 |
| 4.6000 | -.1556 | .1652 | -.9418 | .3479 | -.4821 | .1709 |
| 4.9000 | -.1836 | .1685 | -1.0897 | .2777 | -.5167 | .1495 |
| 5.2000 | -.2117 | .1730 | -1.2235 | .2232 | -.5537 | .1303 |
| 5.5000 | -.2397 | .1786 | -1.3425 | .1816 | -.5927 | .1133 |
| 5.8000 | -.2678 | .1851 | -1.4467 | .1502 | -.6337 | .0981 |
| 6.1000 | -.2958 | .1925 | -1.5367 | .1266 | -.6764 | .0847 |
| 6.4000 | -.3239 | .2007 | -1.6138 | .1088 | -.7207 | .0729 |
| 6.7000 | -.3520 | .2096 | -1.6793 | .0953 | -.7663 | .0624 |
| 7.0000 | -.3800 | .2191 | -1.7347 | .0850 | -.8131 | .0531 |

**Figure J14.** *Conditional effect of focal predictor (susceptibility) on outcome (perceived manipulation) at values of the moderator (response efficacy) (H6a, 4).*

```
Moderator value(s) defining Johnson-Neyman significance region(s):
      Value    % below    % above
     6.9337    45.2055    54.7945
```

Conditional effect of focal predictor at values of the moderator:

| Efficacy | Effect | se | t | p | LLCI | ULCI |
|---|---|---|---|---|---|---|
| 1.0000 | .4104 | .2172 | 1.8893 | .0609 | -.0190 | .8399 |
| 1.3000 | .3703 | .2073 | 1.7862 | .0762 | -.0395 | .7802 |
| 1.6000 | .3302 | .1979 | 1.6684 | .0974 | -.0610 | .7214 |
| 1.9000 | .2901 | .1891 | 1.5341 | .1272 | -.0837 | .6638 |
| 2.2000 | .2499 | .1809 | 1.3815 | .1693 | -.1077 | .6076 |
| 2.5000 | .2098 | .1735 | 1.2092 | .2286 | -.1332 | .5528 |
| 2.8000 | .1697 | .1670 | 1.0162 | .3113 | -.1604 | .4997 |
| 3.1000 | .1295 | .1614 | .8027 | .4235 | -.1895 | .4486 |
| 3.4000 | .0894 | .1569 | .5699 | .5696 | -.2207 | .3995 |
| 3.7000 | .0493 | .1535 | .3210 | .7487 | -.2542 | .3528 |
| 4.0000 | .0092 | .1514 | .0604 | .9519 | -.2902 | .3085 |
| 4.3000 | -.0310 | .1506 | -.2056 | .8374 | -.3288 | .2668 |
| 4.6000 | -.0711 | .1511 | -.4704 | .6388 | -.3699 | .2277 |
| 4.9000 | -.1112 | .1530 | -.7272 | .4683 | -.4136 | .1911 |
| 5.2000 | -.1514 | .1560 | -.9701 | .3336 | -.4598 | .1571 |
| 5.5000 | -.1915 | .1603 | -1.1948 | .2342 | -.5083 | .1253 |
| 5.8000 | -.2316 | .1656 | -1.3986 | .1641 | -.5590 | .0958 |
| 6.1000 | -.2717 | .1719 | -1.5804 | .1162 | -.6117 | .0682 |
| 6.4000 | -.3119 | .1792 | -1.7407 | .0839 | -.6661 | .0423 |
| 6.7000 | -.3520 | .1872 | -1.8807 | .0621 | -.7220 | .0180 |
| **6.9337** | **-.3833** | **.1939** | **-1.9768** | **.0500** | **-.7665** | **.0000** |
| 7.0000 | -.3921 | .1959 | -2.0022 | .0472 | -.7793 | -.0050 |

**Figure J15.** *Conditional effect of focal predictor (overall threat) on outcome (perceived manipulation) at values of the moderator (overall efficacy) (H6a, 5).*

Moderator value(s) defining Johnson-Neyman significance region(s):

| Value | % below | % above |
|---|---|---|
| 5.1328 | 12.3288 | 87.6712 |

Conditional effect of focal predictor at values of the moderator:

| Self-Eff | Effect | se | t | p | LLCI | ULCI |
|---|---|---|---|---|---|---|
| 1.0000 | .2040 | .1578 | 1.2932 | .1980 | -.1079 | .5159 |
| 1.3000 | .1736 | .1492 | 1.1631 | .2468 | -.1214 | .4686 |
| 1.6000 | .1431 | .1411 | 1.0141 | .3123 | -.1359 | .4221 |
| 1.9000 | .1126 | .1335 | .8438 | .4002 | -.1512 | .3765 |
| 2.2000 | .0822 | .1264 | .6499 | .5168 | -.1678 | .3321 |
| 2.5000 | .0517 | .1201 | .4306 | .6674 | -.1856 | .2890 |
| 2.8000 | .0212 | .1145 | .1854 | .8532 | -.2051 | .2475 |
| 3.1000 | -.0092 | .1098 | -.0842 | .9331 | -.2264 | .2079 |
| 3.4000 | -.0397 | .1062 | -.3739 | .7090 | -.2497 | .1702 |
| 3.7000 | -.0702 | .1037 | -.6765 | .4998 | -.2752 | .1349 |
| 4.0000 | -.1007 | .1025 | -.9820 | .3278 | -.3033 | .1020 |
| 4.3000 | -.1311 | .1025 | -1.2789 | .2030 | -.3338 | .0716 |
| 4.6000 | -.1616 | .1038 | -1.5563 | .1219 | -.3668 | .0437 |
| 4.9000 | -.1921 | .1064 | -1.8057 | .0731 | -.4023 | .0182 |
| **5.1328** | **-.2157** | **.1091** | **-1.9768** | **.0500** | **-.4314** | **.0000** |
| 5.2000 | -.2225 | .1100 | -2.0224 | .0450 | -.4401 | -.0050 |
| 5.5000 | -.2530 | .1147 | -2.2050 | .0291 | -.4798 | -.0262 |
| 5.8000 | -.2835 | .1204 | -2.3552 | .0199 | -.5214 | -.0455 |
| 6.1000 | -.3139 | .1268 | -2.4765 | .0144 | -.5645 | -.0633 |
| 6.4000 | -.3444 | .1338 | -2.5731 | .0111 | -.6090 | -.0798 |
| 6.7000 | -.3749 | .1415 | -2.6492 | .0090 | -.6546 | -.0951 |
| 7.0000 | -.4053 | .1497 | -2.7086 | .0076 | -.7012 | -.1095 |

**Figure J16.** *Conditional effect of focal predictor (severity) on outcome (message derogation) at values of the moderator (self-efficacy) (H6b, 1).*

Moderator value(s) defining Johnson-Neyman significance region(s):

| Value | % below | % above |
|---|---|---|
| 5.3418 | 9.5890 | 90.4110 |

Conditional effect of focal predictor at values of the moderator:

| Resp Eff | Effect | se | t | p | LLCI | ULCI |
|---|---|---|---|---|---|---|
| 1.0000 | .1153 | .2053 | .5617 | .5752 | -.2906 | .5213 |
| 1.3000 | .0886 | .1958 | .4524 | .6516 | -.2984 | .4755 |
| 1.6000 | .0618 | .1866 | .3312 | .7410 | -.3070 | .4306 |
| 1.9000 | .0350 | .1779 | .1969 | .8442 | -.3166 | .3866 |
| 2.2000 | .0082 | .1697 | .0486 | .9613 | -.3272 | .3437 |
| 2.5000 | -.0185 | .1621 | -.1143 | .9092 | -.3390 | .3019 |
| 2.8000 | -.0453 | .1552 | -.2918 | .7708 | -.3521 | .2615 |
| 3.1000 | -.0721 | .1491 | -.4832 | .6297 | -.3669 | .2228 |
| 3.4000 | -.0988 | .1440 | -.6866 | .4935 | -.3835 | .1858 |
| 3.7000 | -.1256 | .1398 | -.8986 | .3704 | -.4020 | .1507 |
| 4.0000 | -.1524 | .1367 | -1.1146 | .2669 | -.4227 | .1179 |
| 4.3000 | -.1792 | .1348 | -1.3290 | .1860 | -.4457 | .0873 |
| 4.6000 | -.2059 | .1341 | -1.5355 | .1269 | -.4711 | .0592 |
| 4.9000 | -.2327 | .1347 | -1.7282 | .0861 | -.4989 | .0335 |
| 5.2000 | -.2595 | .1364 | -1.9021 | .0592 | -.5292 | .0102 |
| **5.3418** | **-.2721** | **.1377** | **-1.9768** | **.0500** | **-.5443** | **.0000** |
| 5.5000 | -.2863 | .1394 | -2.0541 | .0418 | -.5618 | -.0108 |
| 5.8000 | -.3130 | .1434 | -2.1829 | .0307 | -.5965 | -.0296 |
| 6.1000 | -.3398 | .1485 | -2.2890 | .0236 | -.6333 | -.0463 |
| 6.4000 | -.3666 | .1544 | -2.3739 | .0189 | -.6719 | -.0613 |
| 6.7000 | -.3934 | .1612 | -2.4401 | .0159 | -.7120 | -.0747 |
| 7.0000 | -.4201 | .1687 | -2.4905 | .0139 | -.7536 | -.0867 |

**Figure J17.** *Conditional effect of focal predictor (severity) on outcome (message derogation) at values of the moderator (response efficacy) (H6b, 2).*

Moderator value(s) defining Johnson-Neyman significance region(s):

| Value | % below | % above |
|---|---|---|
| 5.7401 | 16.4384 | 83.5616 |

Conditional effect of focal predictor at values of the moderator:

| Self-Eff | Effect | se | t | p | LLCI | ULCI |
|---|---|---|---|---|---|---|
| 1.0000 | .2740 | .1557 | 1.7602 | .0805 | -.0337 | .5818 |
| 1.3000 | .2407 | .1474 | 1.6330 | .1047 | -.0507 | .5321 |
| 1.6000 | .2074 | .1396 | 1.4857 | .1396 | -.0686 | .4834 |
| 1.9000 | .1741 | .1324 | 1.3152 | .1906 | -.0876 | .4358 |
| 2.2000 | .1408 | .1258 | 1.1192 | .2650 | -.1079 | .3895 |
| 2.5000 | .1075 | .1200 | .8957 | .3719 | -.1298 | .3448 |
| 2.8000 | .0742 | .1151 | .6446 | .5202 | -.1534 | .3018 |
| 3.1000 | .0409 | .1112 | .3677 | .7136 | -.1789 | .2607 |
| 3.4000 | .0076 | .1084 | .0700 | .9443 | -.2067 | .2219 |
| 3.7000 | -.0257 | .1068 | -.2407 | .8102 | -.2369 | .1855 |
| 4.0000 | -.0590 | .1065 | -.5541 | .5804 | -.2696 | .1515 |
| 4.3000 | -.0923 | .1074 | -.8593 | .3916 | -.3047 | .1201 |
| 4.6000 | -.1256 | .1096 | -1.1461 | .2537 | -.3423 | .0911 |
| 4.9000 | -.1589 | .1129 | -1.4071 | .1616 | -.3822 | .0643 |
| 5.2000 | -.1922 | .1173 | -1.6382 | .1036 | -.4242 | .0397 |
| 5.5000 | -.2255 | .1227 | -1.8383 | .0681 | -.4681 | .0170 |
| **5.7401** | **-.2522** | **.1276** | **-1.9768** | **.0500** | **-.5044** | **.0000** |
| 5.8000 | -.2588 | .1289 | -2.0086 | .0465 | -.5136 | -.0041 |
| 6.1000 | -.2922 | .1358 | -2.1518 | .0331 | -.5605 | -.0238 |
| 6.4000 | -.3255 | .1433 | -2.2715 | .0246 | -.6087 | -.0422 |
| 6.7000 | -.3588 | .1513 | -2.3710 | .0191 | -.6579 | -.0596 |
| 7.0000 | -.3921 | .1598 | -2.4536 | .0154 | -.7080 | -.0762 |

**Figure J18.** *Conditional effect of focal predictor (susceptibility) on outcome (message derogation) at values of the moderator (self-efficacy) (H6b, 3).*

There are no statistical significance transition points within the observed range of the moderator found using the Johnson-Neyman method.

Conditional effect of focal predictor at values of the moderator:

| Resp Eff | Effect | se | t | p | LLCI | ULCI |
|---|---|---|---|---|---|---|
| 1.0000 | .2032 | .2001 | 1.0156 | .3116 | -.1924 | .5988 |
| 1.3000 | .1748 | .1915 | .9127 | .3629 | -.2038 | .5533 |
| 1.6000 | .1463 | .1835 | .7976 | .4264 | -.2163 | .5090 |
| 1.9000 | .1179 | .1761 | .6695 | .5043 | -.2302 | .4659 |
| 2.2000 | .0894 | .1694 | .5278 | .5984 | -.2455 | .4244 |
| 2.5000 | .0610 | .1636 | .3727 | .7099 | -.2625 | .3844 |
| 2.8000 | .0325 | .1588 | .2049 | .8379 | -.2813 | .3464 |
| 3.1000 | .0041 | .1549 | .0264 | .9790 | -.3021 | .3103 |
| 3.4000 | -.0244 | .1521 | -.1601 | .8730 | -.3251 | .2764 |
| 3.7000 | -.0528 | .1505 | -.3509 | .7262 | -.3503 | .2447 |
| 4.0000 | -.0813 | .1501 | -.5414 | .5891 | -.3779 | .2154 |
| 4.3000 | -.1097 | .1509 | -.7272 | .4683 | -.4079 | .1885 |
| 4.6000 | -.1381 | .1528 | -.9041 | .3675 | -.4402 | .1639 |
| 4.9000 | -.1666 | .1559 | -1.0687 | .2870 | -.4748 | .1416 |
| 5.2000 | -.1950 | .1601 | -1.2186 | .2250 | -.5114 | .1213 |
| 5.5000 | -.2235 | .1652 | -1.3529 | .1783 | -.5501 | .1031 |
| 5.8000 | -.2519 | .1713 | -1.4712 | .1435 | -.5905 | .0866 |
| 6.1000 | -.2804 | .1781 | -1.5742 | .1177 | -.6325 | .0717 |
| 6.4000 | -.3088 | .1857 | -1.6632 | .0985 | -.6759 | .0582 |
| 6.7000 | -.3373 | .1939 | -1.7394 | .0841 | -.7206 | .0460 |
| 7.0000 | -.3657 | .2027 | -1.8045 | .0733 | -.7664 | .0349 |

**Figure J19.** *Conditional effect of focal predictor (susceptibility) on outcome (message derogation) at values of the moderator (response efficacy) (H6b, 4).*

```
Moderator value(s) defining Johnson-Neyman significance region(s):
      Value    % below    % above
     6.7416    39.7260    60.2740
```

Conditional effect of focal predictor at values of the moderator:

| Efficacy | Effect | se | t | p | LLCI | ULCI |
|---|---|---|---|---|---|---|
| 1.0000 | .3830 | .2008 | 1.9078 | .0584 | -.0138 | .7799 |
| 1.3000 | .3450 | .1916 | 1.8008 | .0739 | -.0337 | .7238 |
| 1.6000 | .3070 | .1829 | 1.6788 | .0954 | -.0545 | .6686 |
| 1.9000 | .2691 | .1747 | 1.5398 | .1258 | -.0764 | .6145 |
| 2.2000 | .2311 | .1672 | 1.3821 | .1691 | -.0994 | .5616 |
| 2.5000 | .1931 | .1603 | 1.2041 | .2306 | -.1239 | .5101 |
| 2.8000 | .1551 | .1543 | 1.0051 | .3166 | -.1499 | .4601 |
| 3.1000 | .1171 | .1491 | .7851 | .4337 | -.1777 | .4119 |
| 3.4000 | .0791 | .1450 | .5456 | .5862 | -.2075 | .3657 |
| 3.7000 | .0411 | .1419 | .2897 | .7724 | -.2394 | .3216 |
| 4.0000 | .0031 | .1400 | .0223 | .9822 | -.2735 | .2798 |
| 4.3000 | -.0349 | .1392 | -.2505 | .8026 | -.3101 | .2403 |
| 4.6000 | -.0729 | .1397 | -.5216 | .6028 | -.3490 | .2033 |
| 4.9000 | -.1108 | .1414 | -.7842 | .4342 | -.3903 | .1686 |
| 5.2000 | -.1488 | .1442 | -1.0323 | .3037 | -.4339 | .1362 |
| 5.5000 | -.1868 | .1481 | -1.2614 | .2092 | -.4796 | .1060 |
| 5.8000 | -.2248 | .1531 | -1.4689 | .1441 | -.5274 | .0777 |
| 6.1000 | -.2628 | .1589 | -1.6539 | .1004 | -.5769 | .0513 |
| 6.4000 | -.3008 | .1656 | -1.8167 | .0714 | -.6281 | .0265 |
| 6.7000 | -.3388 | .1730 | -1.9587 | .0521 | -.6807 | .0031 |
| **6.7416** | **-.3441** | **.1740** | **-1.9768** | **.0500** | **-.6881** | **.0000** |
| 7.0000 | -.3768 | .1810 | -2.0817 | .0392 | -.7346 | -.0190 |

**Figure J20.** *Conditional effect of focal predictor (overall threat) on outcome (message derogation) at values of the moderator (overall efficacy) (H6b, 5).*

Moderator value(s) defining Johnson-Neyman significance region(s):

| Value | % below | % above |
|---|---|---|
| 4.8779 | 12.3288 | 87.6712 |

Conditional effect of focal predictor at values of the moderator:

| Self-Eff | Effect | se | t | p | LLCI | ULCI |
|---|---|---|---|---|---|---|
| 1.0000 | .0952 | .1887 | .5045 | .6147 | -.2779 | .4683 |
| 1.3000 | .0684 | .1785 | .3833 | .7020 | -.2845 | .4213 |
| 1.6000 | .0417 | .1688 | .2468 | .8055 | -.2920 | .3753 |
| 1.9000 | .0149 | .1597 | .0931 | .9259 | -.3008 | .3305 |
| 2.2000 | -.0119 | .1512 | -.0788 | .9373 | -.3109 | .2870 |
| 2.5000 | -.0387 | .1436 | -.2694 | .7880 | -.3226 | .2452 |
| 2.8000 | -.0655 | .1369 | -.4781 | .6333 | -.3362 | .2052 |
| 3.1000 | -.0923 | .1314 | -.7022 | .4837 | -.3519 | .1674 |
| 3.4000 | -.1190 | .1270 | -.9370 | .3504 | -.3702 | .1321 |
| 3.7000 | -.1458 | .1241 | -1.1751 | .2419 | -.3911 | .0995 |
| 4.0000 | -.1726 | .1226 | -1.4078 | .1614 | -.4149 | .0698 |
| 4.3000 | -.1994 | .1226 | -1.6258 | .1062 | -.4418 | .0431 |
| 4.6000 | -.2262 | .1242 | -1.8210 | .0707 | -.4717 | .0194 |
| **4.8779** | **-.2510** | **.1270** | **-1.9768** | **.0500** | **-.5019** | **.0000** |
| 4.9000 | -.2529 | .1272 | -1.9881 | .0487 | -.5044 | -.0014 |
| 5.2000 | -.2797 | .1316 | -2.1252 | .0353 | -.5399 | -.0195 |
| 5.5000 | -.3065 | .1372 | -2.2332 | .0271 | -.5778 | -.0352 |
| 5.8000 | -.3333 | .1440 | -2.3150 | .0220 | -.6179 | -.0487 |
| 6.1000 | -.3601 | .1516 | -2.3746 | .0189 | -.6598 | -.0603 |
| 6.4000 | -.3868 | .1601 | -2.4162 | .0170 | -.7033 | -.0703 |
| 6.7000 | -.4136 | .1693 | -2.4436 | .0158 | -.7482 | -.0790 |
| 7.0000 | -.4404 | .1790 | -2.4602 | .0151 | -.7943 | -.0865 |

**Figure J21.** *Conditional effect of focal predictor (severity) on outcome (defensive avoidance) at values of the moderator (self-efficacy) (H6c, 1).*

Moderator value(s) defining Johnson-Neyman significance region(s):

| Value | % below | % above |
|---|---|---|
| 5.4096 | 9.5890 | 90.4110 |

Conditional effect of focal predictor at values of the moderator:

| Resp Eff | Effect | se | t | p | LLCI | ULCI |
|---|---|---|---|---|---|---|
| 1.0000 | .1057 | .2431 | .4347 | .6644 | -.3749 | .5863 |
| 1.3000 | .0765 | .2318 | .3299 | .7419 | -.3817 | .5347 |
| 1.6000 | .0473 | .2209 | .2139 | .8309 | -.3895 | .4840 |
| 1.9000 | .0180 | .2106 | .0856 | .9319 | -.3983 | .4343 |
| 2.2000 | -.0112 | .2009 | -.0557 | .9556 | -.4083 | .3859 |
| 2.5000 | -.0404 | .1919 | -.2106 | .8335 | -.4198 | .3390 |
| 2.8000 | -.0696 | .1838 | -.3789 | .7053 | -.4330 | .2937 |
| 3.1000 | -.0989 | .1766 | -.5598 | .5765 | -.4480 | .2502 |
| 3.4000 | -.1281 | .1705 | -.7514 | .4537 | -.4651 | .2089 |
| 3.7000 | -.1573 | .1655 | -.9503 | .3436 | -.4845 | .1699 |
| 4.0000 | -.1865 | .1619 | -1.1522 | .2512 | -.5066 | .1335 |
| 4.3000 | -.2158 | .1596 | -1.3517 | .1786 | -.5313 | .0998 |
| 4.6000 | -.2450 | .1588 | -1.5427 | .1251 | -.5589 | .0689 |
| 4.9000 | -.2742 | .1594 | -1.7197 | .0877 | -.5894 | .0410 |
| 5.2000 | -.3034 | .1615 | -1.8784 | .0624 | -.6227 | .0159 |
| **5.4096** | **-.3238** | **.1638** | **-1.9768** | **.0500** | **-.6477** | **.0000** |
| 5.5000 | -.3327 | .1650 | -2.0159 | .0457 | -.6588 | -.0065 |
| 5.8000 | -.3619 | .1698 | -2.1312 | .0348 | -.6975 | -.0262 |
| 6.1000 | -.3911 | .1758 | -2.2249 | .0277 | -.7386 | -.0436 |
| 6.4000 | -.4203 | .1828 | -2.2988 | .0230 | -.7818 | -.0589 |
| 6.7000 | -.4495 | .1909 | -2.3552 | .0199 | -.8269 | -.0722 |
| 7.0000 | -.4788 | .1997 | -2.3969 | .0178 | -.8736 | -.0839 |

**Figure J22.** *Conditional effect of focal predictor (severity) on outcome (defensive avoidance) at values of the moderator (response efficacy) (H6c, 2).*

There are no statistical significance transition points within the observed range of the moderator found using the Johnson-Neyman method.

Conditional effect of focal predictor at values of the moderator:

| Self-Eff | Effect | se | t | p | LLCI | ULCI |
|---|---|---|---|---|---|---|
| 1.0000 | .2248 | .1877 | 1.1978 | .2330 | -.1462 | .5957 |
| 1.3000 | .1974 | .1777 | 1.1107 | .2686 | -.1539 | .5486 |
| 1.6000 | .1699 | .1683 | 1.0097 | .3144 | -.1628 | .5026 |
| 1.9000 | .1425 | .1596 | .8930 | .3734 | -.1730 | .4579 |
| 2.2000 | .1151 | .1517 | .7587 | .4493 | -.1847 | .4149 |
| 2.5000 | .0876 | .1447 | .6057 | .5457 | -.1984 | .3736 |
| 2.8000 | .0602 | .1388 | .4339 | .6650 | -.2141 | .3345 |
| 3.1000 | .0328 | .1340 | .2445 | .8072 | -.2322 | .2978 |
| 3.4000 | .0053 | .1307 | .0409 | .9675 | -.2530 | .2637 |
| 3.7000 | -.0221 | .1288 | -.1715 | .8641 | -.2767 | .2325 |
| 4.0000 | -.0495 | .1284 | -.3857 | .7003 | -.3033 | .2043 |
| 4.3000 | -.0769 | .1295 | -.5942 | .5533 | -.3330 | .1791 |
| 4.6000 | -.1044 | .1321 | -.7900 | .4308 | -.3656 | .1568 |
| 4.9000 | -.1318 | .1361 | -.9682 | .3346 | -.4009 | .1373 |
| 5.2000 | -.1592 | .1414 | -1.1258 | .2621 | -.4388 | .1204 |
| 5.5000 | -.1867 | .1479 | -1.2622 | .2089 | -.4790 | .1057 |
| 5.8000 | -.2141 | .1553 | -1.3783 | .1703 | -.5212 | .0930 |
| 6.1000 | -.2415 | .1636 | -1.4759 | .1422 | -.5650 | .0820 |
| 6.4000 | -.2690 | .1727 | -1.5573 | .1216 | -.6104 | .0724 |
| 6.7000 | -.2964 | .1824 | -1.6250 | .1064 | -.6569 | .0642 |
| 7.0000 | -.3238 | .1926 | -1.6812 | .0949 | -.7046 | .0569 |

**Figure J23.** *Conditional effect of focal predictor (susceptibility) on outcome (defensive avoidance) at values of the moderator (self-efficacy) (H6c, 3).*

There are no statistical significance transition points within the observed
range of the moderator found using the Johnson-Neyman method.

Conditional effect of focal predictor at values of the moderator:

| Resp Eff | Effect | se | t | p | LLCI | ULCI |
|---|---|---|---|---|---|---|
| 1.0000 | .3070 | .2379 | 1.2909 | .1988 | -.1632 | .7773 |
| 1.3000 | .2796 | .2276 | 1.2283 | .2214 | -.1704 | .7295 |
| 1.6000 | .2521 | .2181 | 1.1562 | .2495 | -.1789 | .6832 |
| 1.9000 | .2247 | .2093 | 1.0735 | .2849 | -.1890 | .6384 |
| 2.2000 | .1972 | .2014 | .9792 | .3291 | -.2009 | .5953 |
| 2.5000 | .1698 | .1945 | .8728 | .3843 | -.2147 | .5542 |
| 2.8000 | .1423 | .1887 | .7541 | .4521 | -.2307 | .5153 |
| 3.1000 | .1148 | .1841 | .6237 | .5338 | -.2491 | .4788 |
| 3.4000 | .0874 | .1808 | .4832 | .6297 | -.2701 | .4448 |
| 3.7000 | .0599 | .1789 | .3349 | .7382 | -.2937 | .4136 |
| 4.0000 | .0325 | .1784 | .1820 | .8559 | -.3202 | .3851 |
| 4.3000 | .0050 | .1793 | .0279 | .9778 | -.3495 | .3595 |
| 4.6000 | -.0225 | .1816 | -.1236 | .9018 | -.3815 | .3366 |
| 4.9000 | -.0499 | .1853 | -.2694 | .7880 | -.4162 | .3164 |
| 5.2000 | -.0774 | .1902 | -.4067 | .6849 | -.4534 | .2987 |
| 5.5000 | -.1048 | .1964 | -.5338 | .5943 | -.4930 | .2834 |
| 5.8000 | -.1323 | .2036 | -.6499 | .5168 | -.5347 | .2701 |
| 6.1000 | -.1597 | .2117 | -.7545 | .4518 | -.5783 | .2588 |
| 6.4000 | -.1872 | .2207 | -.8481 | .3978 | -.6235 | .2491 |
| 6.7000 | -.2147 | .2305 | -.9314 | .3533 | -.6703 | .2410 |
| 7.0000 | -.2421 | .2409 | -1.0050 | .3166 | -.7184 | .2341 |

**Figure J24.** *Conditional effect of focal predictor (susceptibility) on outcome (defensive avoidance) at values of the moderator (response efficacy) (H6c, 4).*

There are no statistical significance transition points within the observed range of the moderator found using the Johnson-Neyman method.

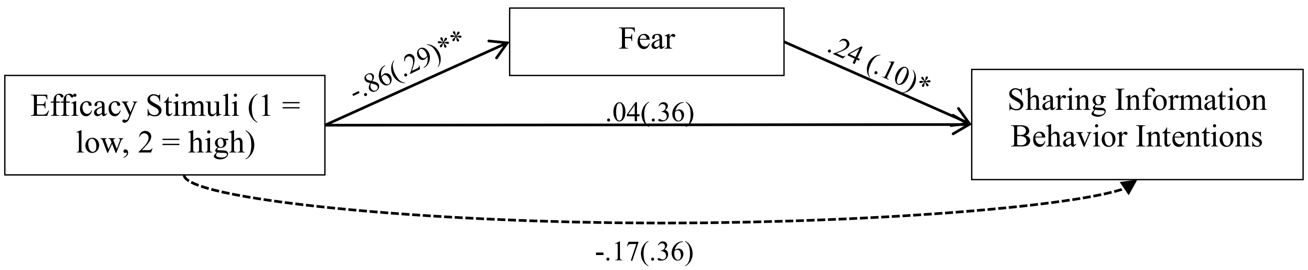
Conditional effect of focal predictor at values of the moderator:

| Efficacy | Effect | se | t | p | LLCI | ULCI |
|---|---|---|---|---|---|---|
| 1.0000 | .3820 | .2398 | 1.5929 | .1134 | -.0921 | .8561 |
| 1.3000 | .3454 | .2289 | 1.5090 | .1335 | -.1071 | .7978 |
| 1.6000 | .3087 | .2185 | 1.4130 | .1598 | -.1232 | .7406 |
| 1.9000 | .2721 | .2087 | 1.3034 | .1945 | -.1406 | .6847 |
| 2.2000 | .2354 | .1997 | 1.1787 | .2405 | -.1594 | .6302 |
| 2.5000 | .1988 | .1915 | 1.0377 | .3012 | -.1799 | .5774 |
| 2.8000 | .1621 | .1843 | .8795 | .3806 | -.2023 | .5265 |
| 3.1000 | .1255 | .1782 | .7041 | .4825 | -.2268 | .4777 |
| 3.4000 | .0888 | .1732 | .5127 | .6090 | -.2536 | .4312 |
| 3.7000 | .0521 | .1695 | .3076 | .7588 | -.2829 | .3872 |
| 4.0000 | .0155 | .1672 | .0927 | .9263 | -.3150 | .3460 |
| 4.3000 | -.0212 | .1663 | -.1273 | .8989 | -.3499 | .3076 |
| 4.6000 | -.0578 | .1669 | -.3465 | .7295 | -.3877 | .2720 |
| 4.9000 | -.0945 | .1689 | -.5595 | .5767 | -.4283 | .2393 |
| 5.2000 | -.1311 | .1722 | -.7613 | .4478 | -.4716 | .2094 |
| 5.5000 | -.1678 | .1769 | -.9482 | .3446 | -.5175 | .1820 |
| 5.8000 | -.2044 | .1828 | -1.1181 | .2654 | -.5658 | .1570 |
| 6.1000 | -.2411 | .1898 | -1.2701 | .2061 | -.6163 | .1342 |
| 6.4000 | -.2777 | .1978 | -1.4042 | .1624 | -.6687 | .1133 |
| 6.7000 | -.3144 | .2066 | -1.5216 | .1303 | -.7228 | .0941 |
| 7.0000 | -.3510 | .2162 | -1.6236 | .1067 | -.7785 | .0764 |

**Figure J25.** *Conditional effect of focal predictor (overall threat) on outcome (defensive avoidance) at values of the moderator (overall efficacy) (H6c, 5).*

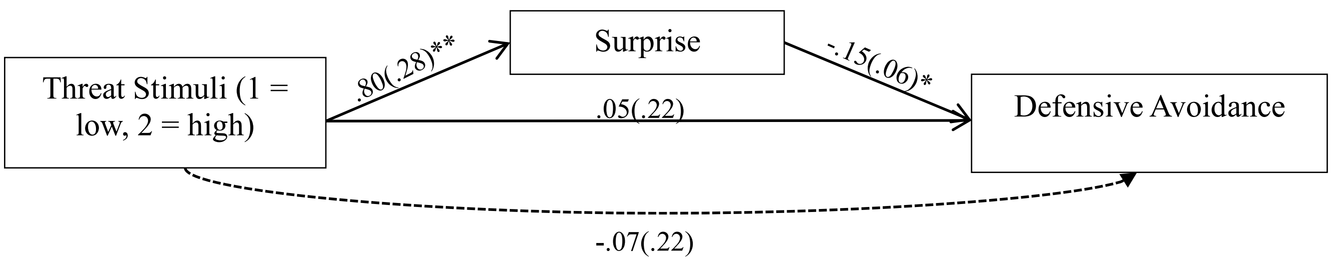
## Appendix K: Mediation Figures for Research Question 2

**Figure K1.** *Fear as a Mediator between Efficacy Stimuli and Sharing Information Behavior Intentions*




*Notes.* Parallel mediation model of the EPPM. Fear significantly mediated the relation between X and Y: effect = -.21, Boot *SE* = .12, 95% Boot *CI*: -.4667, -.0204. *$p$ < .05, **$p$ < .01.

**Figure K2.** *Surprise as a Mediator between Threat Stimuli and Defensive Avoidance*




*Notes.* Parallel mediation model of the EPPM. Surprise significantly mediated the relation between X and Y: effect = -.12, Boot *SE* = .07, 95% Boot *CI*: -.2716, -.0145. *$p$ < .05, **$p$ < .01.

## Appendix L: Physiological Manipulation Checks and Preliminary Analysis

**Table L1.** *Physiological Manipulation Checks – Age and Gender*

| | | Age | Gender[a] |
|---|---|---|---|
| Which survey was completed? | iMotions (*n* = 44) | 19.52(.41) | 1.64(.07) |
| | Qualtrics (*n* = 102) | 19.81(.27) | 1.73(.05) |
| Video data included in physiological analysis? | Yes (*n* = 41) | 19.46(.42) | 1.66(.07) |
| | No (*n* = 105) | 19.83(.26) | 1.71(.05) |

*Note:* Means that do not share a common superscript are significantly different at p < .05.
[a] Males were indicated with a value of 1 and females were indicated with a value of 2.

**Table L2.** *Physiological Manipulation Checks – Pre-test EPPM Variables*

| | | Pre-Severity | Pre-Susceptibility | Pre-Self-Efficacy | Pre-Response Efficacy | Pre-Non-Smoking BI | Pre-Sharing Information BI |
|---|---|---|---|---|---|---|---|
| Which survey was completed? | iMotions (*n* = 44) | 6.46(.11) | 6.63(.09) | 6.18(.16) | 6.39(.14) | 6.29(.22) | 3.50(.32) |
| | Qualtrics (*n* = 102) | 6.55(.07) | 6.66(.06) | 6.48(.11) | 6.33(.09) | 6.34(.14) | 4.13(.21) |
| Video data included in physiological analysis? | Yes (*n* = 41) | 6.45(.11) | 6.63(.09) | 6.15(.17) | 6.39(.14) | 6.24(.22) | 3.46(.33) |
| | No (*n* = 105) | 6.55(.07) | 6.66(.06) | 6.49(.11) | 6.34(.09) | 6.35(.14) | 4.12(.21) |

*Note:* Means that do not share a common superscript are significantly different at $p < .05$. BI = behavior intentions.

**Table L3.** *Physiological Manipulation Checks – Post-test Threat and Efficacy Perceptions*

| | | Post Severity | Post Susceptibility | Post Self-Efficacy | Post Response Efficacy |
|---|---|---|---|---|---|
| Which survey was completed? | iMotions (*n* = 44) | 6.46(.16) | 6.58(.15) | 6.17(.17) | 6.55(.15) |
| | Qualtrics (*n* = 102) | 6.55(.11) | 6.61(.10) | 6.55(.11) | 6.51(.10) |
| Video data included in physiological analysis? | Yes (*n* = 41) | 6.50(.17) | 6.59(.15) | 6.20(.18) | 6.62(.16) |
| | No (*n* = 105) | 6.53(.10) | 6.61(.10) | 6.53(.11) | 6.49(.10) |

*Note:* Means that do not share a common superscript are significantly different at $p < .05$.

**Table L4.** *Physiological Manipulation Checks – EPPM Outcome Variables*

| | | Post Non-Smoking BI | Post Sharing Information BI | Perceived Manipulation | Message Derogation | Defensive Avoidance |
|---|---|---|---|---|---|---|
| Which survey was completed? | iMotions (*n* = 44) | 6.58(.18) | 4.16(.33) | 2.15(.18) | 1.97(.16) | 1.75(.20) |
| | Qualtrics (*n* = 102) | 6.43(.12) | 4.60(.21) | 1.99(.12) | 1.81(.11) | 1.78(.13) |
| Video data included in physiological analysis? | Yes (*n* = 41) | 6.55(.19) | 4.12(.34) | 2.16(.18) | 1.96(.17) | 1.65(.20) |
| | No (*n* = 105) | 6.45(.12) | 4.57(.21) | 1.99(.12) | 1.82(.11) | 1.81(.13) |

*Note:* Means that do not share a common superscript are significantly different at p < .05. BI = behavior intentions.

**Table L5.** *Physiological Manipulation Checks – Self-Report Emotions*

| | | Fear | Anger | Contentment | Guilt | Happiness | Sadness | Surprise |
|---|---|---|---|---|---|---|---|---|
| Which survey was completed? | iMotions (*n* = 44) | 2.09(.25)[a] | 1.86(.24)[a] | 1.73(.19) | 1.78(.22) | 1.46(.18) | 2.27(.25)[a] | 2.25(.25)[a] |
| | Qualtrics (*n* = 102) | 3.47(.16)[b] | 2.55(.16)[b] | 1.68(.12) | 2.20(.15) | 1.55(.12) | 3.25(.16)[b] | 3.19(.17)[b] |
| Video data included in physiological analysis? | Yes (*n* = 41) | 2.06(.26)[a] | 1.85(.25)[a] | 1.69(.19) | 1.76(.23) | 1.42(.18) | 2.29(.26)[a] | 2.29(.26)[a] |
| | No (*n* = 105) | 3.44(.16)[b] | 2.54(.16)[b] | 1.70(.12) | 2.20(.15) | 1.56(.11) | 3.21(.16)[b] | 3.15(.17)[b] |

*Note:* Means that do not share a common superscript are significantly different at p < .05.

**Table L6.** *Physiological Preliminary Analysis – Threat-Stimuli Anger, Contempt, and Disgust (Time Percentage and Frame Count)*

| | | Anger, Thr. (TP) | Anger, Thr. (FC) | Contempt, Thr. (TP) | Contempt, Thr. (FC) | Disgust, Thr. (TP) | Disgust, Thr. (FC) |
|---|---|---|---|---|---|---|---|
| Threat conditions | High | .00(.07) | .00(.61) | .61(1.18) | 16.63(12.45) | .04(.04) | 1.21(.76) |
| | Low | .09(.06) | .77(.57) | 2.15(1.09) | 16.32(11.57) | .06(.04) | .41(.70) |

*Notes:* Means that do not share a common superscript are significantly different at p < .05. Thr = Threat, TP = time percentage, FC = frame count.

**Table L7.** *Physiological Preliminary Analysis – Threat-Stimuli Fear, Joy, and Sadness (Time Percentage and Frame Count)*

| | | Fear, Thr. (TP) | Fear, Thr. (FC) | Joy, Thr. (TP) | Joy, Thr. (FC) | Sadness, Thr. (TP) | Sadness, Thr. (FC) |
|---|---|---|---|---|---|---|---|
| Threat conditions | High | .02(.03) | .53(.44) | .02(2.21) | .58(19.94) | .01(.23) | .26(2.06) |
| | Low | .04(.03) | .32(.41) | 3.73(2.05) | 33.82(18.53) | .33(.21) | 3.00(1.92) |

*Notes:* Means that do not share a common superscript are significantly different at p < .05. Thr = Threat, TP = time percentage, FC = frame count.

**Table L8.** *Physiological Preliminary Analysis – Threat-Stimuli Surprise, Positive Valence, and Negative Valence (Time Percentage and Frame Count)*

| | | Surprise, Thr. (TP) | Surprise, Thr. (FC) | Positive Val., Thr. (TP) | Positive Val., Thr. (FC) | Negative Val., Thr. (TP) | Negative Val., Thr. (FC) |
|---|---|---|---|---|---|---|---|
| Threat conditions | High | .27(.46) | 7.37(4.80) | .00(2.18) | .00(19.69) | 2.57(1.69) | 32.32(14.58) |
| | Low | 1.20(.43) | 9.73(4.46) | 3.76(2.02) | 34.05(18.30) | 3.20(1.57) | 22.82(13.55) |

*Notes:* Means that do not share a common superscript are significantly different at p < .05. Thr = Threat, TP = time percentage, FC = frame count, Val = Valence.

**Table L9.** *Physiological Preliminary Analysis – Efficacy-Stimuli Anger, Contempt, and Disgust (Time Percentage and Frame Count)*

| | | Anger, Eff. (TP) | Anger, Eff. (FC) | Contempt, Eff. (TP) | Contempt, Eff. (FC) | Disgust, Eff. (TP) | Disgust, Eff. (FC) |
|---|---|---|---|---|---|---|---|
| Efficacy conditions | High | .12(.07) | 2.77(1.44) | .91(.60) | 23.27(8.94) | .20(.08) | 4.36(1.77) |
| | Low | .05(.07) | .21(1.55) | 1.07(.65) | 8.21(9.62) | .05(.09) | .16(1.90) |

*Notes:* Means that do not share a common superscript are significantly different at p < .05. Eff = Efficacy, TP = time percentage, FC = frame count.

**Table L10.** *Physiological Preliminary Analysis – Efficacy-Stimuli Fear, Joy, and Sadness (Time Percentage and Frame Count)*

| | | Fear, Eff. (TP) | Fear, Eff. (FC) | Joy, Eff. (TP) | Joy, Eff. (FC) | Sadness, Eff. (TP) | Sadness, Eff. (FC) |
|---|---|---|---|---|---|---|---|
| Efficacy conditions | High | .68(.31) | 18.50(8.35) | .53(.49) | 13.91(9.53) | .26(.17) | 6.64(4.31) |
| | Low | .00(.33) | .00(8.98) | .56(.53) | 4.95(10.25) | .00(.18) | .00(4.64) |

*Notes:* Means that do not share a common superscript are significantly different at p < .05. Eff = Efficacy, TP = time percentage, FC = frame count.



**Table L11.** *Physiological Preliminary Analysis – Efficacy-Stimuli Surprise, Positive Valence, and Negative Valence (Time Percentage and Frame Count)*

| | | Surprise, Eff. (TP) | Surprise, Eff. (FC) | Positive Val., Eff. (TP) | Positive Val., Eff. (FC) | Negative Val., Eff. (TP) | Negative Val., Eff. (FC) |
|---|---|---|---|---|---|---|---|
| Efficacy conditions | High | .63(.32) | 16.05(4.96) | .63(.55) | 16.23(11.02) | 2.43(.60) | 60.32(12.21)[a] |
| | Low | .60(.35) | 5.05(5.34) | .64(.60) | 5.68(11.86) | 1.51(.64) | 9.95(13.14)[b] |

*Notes:* Means that do not share a common superscript are significantly different at p < .05. Eff = Efficacy, TP = time percentage, FC = frame count, Val = Valence.

**Table L12.** *Physiological Preliminary Analysis – Overall-Stimuli Anger, Contempt, and Disgust (Time Percentage and Frame Count)*

| | | Anger, Ov. (TP) | Anger, Ov. (FC) | Contempt, Ov. (TP) | Contempt, Ov. (FC) | Disgust, Ov. (TP) | Disgust, Ov. (FC) |
|---|---|---|---|---|---|---|---|
| Overall conditions | High threat/high efficacy | .00(.09) | .06(1.52) | .31(1.09) | 8.06(12.14)[a] | .08(.08) | 1.78(1.61) |
| | High threat/low efficacy | .00(.09) | .00(1.44) | .50(1.04) | 13.65(11.51)[a] | .07(.08) | 1.10(1.53) |
| | Low threat/high efficacy | .17(.08) | 2.96(1.26) | .72(.91) | 16.65(10.10)[a] | .14(.07) | 2.69(1.34) |
| | Low threat/low efficacy | .05(.09) | .22(1.52) | 3.61(1.09) | 27.33(12.14)[b] | .05(.08) | .39(1.61) |

*Notes:* Means that do not share a common superscript are significantly different at $p < .05$. Ov = Overall, TP = time percentage, FC = frame count.

**Table L13**. *Physiological Preliminary Analysis – Overall-Stimuli Fear, Joy, and Sadness (Time Percentage and Frame Count)*

| | | Fear, Ov. (TP) | Fear, Ov. (FC) | Joy, Ov. (TP) | Joy, Ov. (FC) | Sadness, Ov. (TP) | Sadness, Ov. (FC) |
|---|---|---|---|---|---|---|---|
| Overall conditions | High threat/high efficacy | .03(.26) | .67(6.59) | .00(1.63) | .00(16.47) | .01(.29) | .28(4.87) |
| | High threat/low efficacy | .02(.24) | .50(6.25) | .02(1.55) | .55(15.62) | .00(.28) | .00(4.62) |
| | Low threat/high efficacy | .59(.21) | 15.46(5.48) | 1.12(1.36) | 17.81(13.70) | .50(.24) | 8.15(4.05) |
| | Low threat/low efficacy | .00(.26) | .00(6.59) | 4.19(1.63) | 37.83(16.47) | .00(.24) | .00(4.87) |

*Notes:* Means that do not share a common superscript are significantly different at $p < .05$. Ov = Overall, TP = time percentage, FC = frame count.

**Table L14.** *Physiological Preliminary Analysis – Overall-Stimuli Surprise, Positive Valence, and Negative Valence (Time Percentage and Frame Count)*

| | | Surprise, Ov. (TP) | Surprise, Ov. (FC) | Positive Val., Ov. (TP) | Positive Val., Ov. (FC) | Negative Val., Ov. (TP) | Negative Val., Ov. (FC) |
|---|---|---|---|---|---|---|---|
| Overall conditions | High threat/high efficacy | .56(.42)$^{ab}$ | 14.11(5.65) | .00(1.66) | .00(17.27) | 1.20(1.40) | 31.00(15.64) |
| | High threat/low efficacy | .47(.40)$^{ab}$ | 5.20(5.36) | .00(1.57) | .00(16.38) | 2.34(1.33) | 22.25(14.84) |
| | Low threat/high efficacy | .38(.35)$^{b}$ | 8.73(4.70) | 1.36(1.38) | 21.27(14.37) | 3.29(1.16) | 52.58(13.01) |
| | Low threat/low efficacy | 1.52(.42)$^{a}$ | 12.11(5.65) | 4.07(1.66) | 36.72(17.27) | 2.64(1.40) | 14.56(15.64) |

*Notes:* Means that do not share a common superscript are significantly different at $p < .05$. Ov = Overall, TP = time percentage, FC = frame count, Val = Valence.

## Appendix M: Physiological Correlation Tables for Research Question 3

**Table M1.** *Correlations between Positive Self-Report and Physiological Emotions (Time Percentage)*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| 1 Contentment (SR) | ---- | | | | | | |
| 2 Happiness (SR) | .76*** | ---- | | | | | |
| 3 Joy, Thr. (P) | .36* | .46** | ---- | | | | |
| 4 Joy, Eff. (P) | .71*** | .48** | .01 | ---- | | | |
| 5 Joy, Ov. (P) | .51** | .55*** | .97*** | .24 | ---- | | |
| 6 Positive Val., Thr. (P) | .38* | .47** | 1.00*** | .03 | .97*** | ---- | |
| 7 Positive Val., Eff. (P) | .72*** | .52*** | .06 | 1.00*** | .29† | .08 | ---- |
| 8 Positive Val., Ov. (P) | .54*** | .58*** | .96*** | .28† | 1.00*** | .97*** | .33* |

*Notes.* SR = self-report, P = physiological, Thr = threat stimuli, Eff = efficacy stimuli, Ov = overall/average of both stimuli, Val. = valence. Tested using the time percentage that participants demonstrated facial expressions of joy and positive valence.
†p < .10, *p < .05, **p < .01, ***p < .001

**Table M2.** *Correlations between Negative Self-Report and Physiological Emotions (Time Percentage)*

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Anger (SR) | ---- | | | | | | | | | | | | | |
| 2 | Fear (SR) | .42** | ---- | | | | | | | | | | | | |
| 3 | Sadness (SR) | .48** | .78*** | ---- | | | | | | | | | | | |
| 4 | Anger, Thr. (P) | .07 | -.13 | -.16 | ---- | | | | | | | | | | |
| 5 | Anger, Eff. (P) | -.03 | -.23 | -.27† | .72*** | ---- | | | | | | | | | |
| 6 | Anger, Ov. (P) | .02 | -.20 | -.24 | .92*** | .93*** | ---- | | | | | | | | |
| 7 | Fear, Thr. (P) | .05 | -.06 | .07 | -.03 | -.06 | -.05 | ---- | | | | | | | |
| 8 | Fear, Eff. (P) | .03 | -.04 | .01 | -.04 | -.07 | -.06 | .72*** | ---- | | | | | | |
| 9 | Fear, Ov. (P) | .03 | -.04 | .02 | -.04 | -.07 | -.06 | .76*** | 1.00*** | ---- | | | | | |
| 10 | Sadness, Thr. (P) | .09 | -.13 | -.14 | .99*** | .70*** | .91*** | .11 | .09 | .09 | ---- | | | | |
| 11 | Sadness, Eff. (P) | .06 | -.16 | -.19 | .99*** | .79*** | .96*** | -.04 | -.05 | -.05 | .97*** | ---- | | | |
| 12 | Sadness, Ov. (P) | .08 | -.14 | -.16 | .99*** | .75*** | .94*** | .04 | .03 | .03 | 1.00*** | .99*** | ---- | | |
| 13 | Negative Val., Thr. (P) | -.04 | -.03 | .02 | .06 | .11 | .09 | -.02 | .00 | .00 | .06 | .08 | .07 | ---- | |
| 14 | Negative Val., Eff. (P) | -.17 | -.10 | -.12 | .06 | .26† | .18 | -.13 | .04 | .02 | .04 | .07 | .05 | .16 | ---- |
| 15 | Negative Val., Ov. (P) | -.09 | -.06 | -.02 | .07 | .18 | .14 | -.06 | .01 | .01 | .07 | .10 | .08 | .94*** | .49** |

*Notes.* SR = self-report, P = physiological, Thr = threat stimuli, Eff = efficacy stimuli, Ov = overall/average of both stimuli, Val. = valence. Tested using the time percentage that participants demonstrated facial expressions of anger, fear, sadness, and negative valence.
†p < .10, *p < .05, **p < .01, ***p < .001

**Table M3.** *Correlations between Self-Report Surprise and Physiological Surprise, Positive Valence, and Negative Valence (Time Percentage)*

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| 1 | Surprise (SR) | ---- | | | | | | |
| 2 | Surprise, Thr. (P) | -.19 | ---- | | | | | |
| 3 | Surprise, Eff. (P) | -.27† | .03 | ---- | | | | |
| 4 | Surprise, Ov. (P) | -.31† | .81*** | .60*** | ---- | | | |
| 5 | Positive Val., Thr. (P) | .18 | .18 | -.03 | .13 | ---- | | |
| 6 | Positive Val., Eff. (P) | -.17 | -.03 | .18 | .09 | .08 | ---- | |
| 7 | Positive Val., Ov. (P) | .12 | .17 | .02 | .15 | .97*** | .33* | ---- |
| 8 | Negative Val., Thr. (P) | .07 | -.09 | -.08 | -.12 | -.05 | -.09 | -.07 |

*Notes.* SR = self-report, P = physiological, Thr = threat stimuli, Eff = efficacy stimuli, Ov = overall/average of both stimuli, Val. = valence. Tested using the time percentage that participants demonstrated facial expressions of surprise, positive valence, and negative valence.
†p < .10, *p < .05, **p < .01, ***p < .001



**Table M4**. *Correlations between Positive Self-Report and Physiological Emotions (Frame Count)*

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| 1 | Contentment (SR) | ---- | | | | | | |
| 2 | Happiness (SR) | .76*** | ---- | | | | | |
| 3 | Joy, Thr. (P) | .36* | .46** | ---- | | | | |
| 4 | Joy, Eff. (P) | .65*** | .68*** | .04 | ---- | | | |
| 5 | Joy, Ov. (P) | .60*** | .71*** | .90*** | .48** | ---- | | |
| 6 | Positive Val., Thr. (P) | .38* | .47** | 1.00*** | .06 | .90*** | ---- | |
| 7 | Positive Val., Eff. (P) | .65*** | .70*** | .06 | 1.00*** | .50** | .08 | ---- |
| 8 | Positive Val., Ov. (P) | .64*** | .73*** | .86*** | .54*** | 1.00*** | .87*** | .56*** |

*Notes.* SR = self-report, P = physiological, Thr = threat stimuli, Eff = efficacy stimuli, Ov = overall/average of both stimuli, Val. = valence. Tested using the total frame count that participants demonstrated facial expressions of joy, surprise, and positive valence.
†p < .10, *p < .05, **p < .01, ***p < .001

**Table M5.** *Correlations between Negative Self-Report and Physiological Emotions (Frame Count)*

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Anger (SR) | ---- | | | | | | | | | | | | | |
| 2 | Fear (SR) | .42** | ---- | | | | | | | | | | | | |
| 3 | Sadness (SR) | .48** | .78*** | ---- | | | | | | | | | | | |
| 4 | Anger, Thr. (P) | .07 | -.13 | -.16 | ---- | | | | | | | | | | |
| 5 | Anger, Eff. (P) | .02 | -.19 | -.23 | .86*** | ---- | | | | | | | | | |
| 6 | Anger, Ov. (P) | .03 | -.18 | -.22 | .93*** | .99*** | ---- | | | | | | | | |
| 7 | Fear, Thr. (P) | -.02 | -.11 | .02 | -.04 | -.05 | -.05 | ---- | | | | | | | |
| 8 | Fear, Eff. (P) | .02 | -.04 | .00 | -.04 | -.06 | -.06 | .42** | ---- | | | | | | |
| 9 | Fear, Ov. (P) | .02 | -.04 | .00 | -.04 | -.06 | -.06 | .46** | 1.00*** | ---- | | | | | |
| 10 | Sadness, Thr. (P) | .10 | -.12 | -.14 | .98*** | .84*** | .91*** | .05 | .08 | .08 | ---- | | | | |
| 11 | Sadness, Eff. (P) | .06 | -.15 | -.18 | .99*** | .92*** | .97*** | -.04 | -.05 | -.05 | .98*** | ---- | | | |
| 12 | Sadness, Ov. (P) | .07 | -.14 | -.17 | 1.00*** | .90*** | .95*** | -.01 | -.01 | -.01 | .99*** | 1.00*** | ---- | | |
| 13 | Negative Val., Thr. (P) | -.10 | -.07 | -.03 | .06 | .08 | .08 | -.03 | .01 | .00 | .07 | .07 | .07 | ---- | |
| 14 | Negative Val., Eff. (P) | -.16 | -.20 | -.15 | .11 | .15 | .14 | -.11 | .13 | .12 | .09 | .12 | .11 | .16 | ---- |
| 15 | Negative Val., Ov. (P) | -.17 | -.18 | -.12 | .11 | .15 | .14 | -.09 | .09 | .08 | .11 | .12 | .12 | .77*** | .76*** |

*Notes.* SR = self-report, P = physiological, Thr = threat stimuli, Eff = efficacy stimuli, Ov = overall/average of both stimuli, Val. = valence. Tested using the total frame count that participants demonstrated facial expressions of anger, fear, sadness, and negative valence.
†p < .10, *p < .05, **p < .01, ***p < .001

**Table M6.** *Correlations between Self-Report Surprise and Physiological Surprise, Positive Valence, and Negative Valence (Frame Count)*

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| 1 | Surprise (SR) | ---- | | | | | | |
| 2 | Surprise, Thr. (P) | -.19 | ---- | | | | | |
| 3 | Surprise, Eff. (P) | -.27† | .03 | ---- | | | | |
| 4 | Surprise, Ov. (P) | -.31† | .81*** | .60*** | ---- | | | |
| 5 | Positive Val., Thr. (P) | .18 | .18 | -.03 | .13 | ---- | | |
| 6 | Positive Val., Eff. (P) | -.17 | -.03 | .18 | .09 | .08 | ---- | |
| 7 | Positive Val., Ov. (P) | .12 | .17 | .02 | .15 | .97*** | .33* | ---- |
| 8 | Negative Val., Thr. (P) | .07 | -.09 | -.08 | -.12 | -.05 | -.09 | -.07 |

*Notes.* SR = self-report, P = physiological, Thr = threat stimuli, Eff = efficacy stimuli, Ov = overall/average of both stimuli, Val. = valence. Tested using the total frame count that participants demonstrated facial expressions of surprise, positive valence, and negative valence.
†p < .10, *p < .05, **p < .01, ***p < .001

**Table M7.** *Correlations between Self-Report Emotions and Uncategorized Emotions (Contempt, Disgust) (Time Percentage)*

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Anger (SR) | ---- | | | | | | | | | | | |
| 2 | Contentment (SR) | .13 | ---- | | | | | | | | | | |
| 3 | Fear (SR) | .42** | -.03 | ---- | | | | | | | | | |
| 4 | Guilt (SR) | .46** | .08 | .53*** | ---- | | | | | | | | |
| 5 | Happiness (SR) | .13 | .76*** | .09 | .19 | ---- | | | | | | | |
| 6 | Sadness (SR) | .48** | .03 | .78*** | .67*** | .19 | ---- | | | | | | |
| 7 | Surprise (SR) | .37* | .04 | .67*** | .46** | .13 | .82*** | ---- | | | | | |
| 8 | Contempt, Thr. (P) | -.16 | .00 | -.02 | -.02 | -.01 | -.04 | -.07 | ---- | | | | |
| 9 | Contempt, Eff. (P) | -.14 | .12 | -.23 | .00 | .11 | -.21 | -.19 | .43** | ---- | | | |
| 10 | Contempt, Ov. (P) | -.17 | .05 | -.11 | -.01 | .04 | -.12 | -.13 | .93*** | .74*** | ---- | | |
| 11 | Disgust, Thr. (P) | .08 | .07 | .01 | -.03 | .18 | .06 | -.03 | -.07 | -.11 | -.10 | ---- | |
| 12 | Disgust, Eff. (P) | -.01 | -.18 | -.11 | .09 | -.12 | -.11 | -.08 | .00 | -.08 | -.03 | .39* | ---- |
| 13 | Disgust, Ov. (P) | .02 | -.12 | -.08 | .07 | -.03 | -.07 | -.08 | -.03 | -.10 | -.06 | .67*** | .95*** |

*Notes.* SR = self-report, P = physiological, Thr = threat stimuli, Eff = efficacy stimuli, Ov = overall/average of both stimuli. Tested using the time percentage that participants demonstrated facial expressions of surprise, positive valence, and negative valence.
†p < .10, *p < .05, **p < .01, ***p < .001

**Table M8.** *Correlations between Self-Report Emotions and Uncategorized Emotions (Contempt, Disgust) (Frame Count)*

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Anger (SR) | ---- | | | | | | | | | | | |
| 2 | Contentment (SR) | .13 | ---- | | | | | | | | | | |
| 3 | Fear (SR) | .42** | -.03 | ---- | | | | | | | | | |
| 4 | Guilt (SR) | .46** | .08 | .53*** | ---- | | | | | | | | |
| 5 | Happiness (SR) | .13 | .76*** | .09 | .19 | ---- | | | | | | | |
| 6 | Sadness (SR) | .48** | .03 | .78*** | .67*** | .19 | ---- | | | | | | |
| 7 | Surprise (SR) | .37* | .04 | .67*** | .46** | .13 | .82*** | ---- | | | | | |
| 8 | Contempt, Thr. (P) | -.17 | .10 | .25 | .08 | .11 | .22 | .16 | ---- | | | | |
| 9 | Contempt, Eff. (P) | -.10 | .33* | -.26 | -.05 | .27† | -.27† | -.15 | .10 | ---- | | | |
| 10 | Contempt, Ov. (P) | -.19 | .27† | .03 | .04 | .24 | .01 | .03 | .81*** | .66*** | ---- | | |
| 11 | Disgust, Thr. (P) | .02 | -.02 | -.05 | -.01 | .05 | .05 | -.07 | -.07 | -.10 | -.11 | ---- | |
| 12 | Disgust, Eff. (P) | .06 | -.16 | -.06 | .18 | -.10 | -.06 | -.07 | -.07 | -.08 | -.10 | .13 | ---- |
| 13 | Disgust, Ov. (P) | .06 | -.15 | -.07 | .16 | -.08 | -.03 | -.09 | -.09 | -.11 | -.13 | .46** | .94*** |

*Notes.* SR = self-report, P = physiological, Thr = threat stimuli, Eff = efficacy stimuli, Ov = overall/average of both stimuli. Tested using the total frame count that participants demonstrated facial expressions of surprise, positive valence, and negative valence.
†p < .10, *p < .05, **p < .01, ***p < .001

## Appendix N: Physiological Regression Tables for Research Question 3

**Table N1.** *Regressions – Effects of Physiological Joy (Time Percentage) and Positive Valence (Time Percentage) on Happiness*

| | Happiness (self-report) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coefficients | | | | | ANOVA | | Model Summary | |
| Predictor (X) | *B* (SE) | *B* 95% CI [LL, UL] | β | *t* | *p* | *F* | *df* | $R^2$ | *Adj.* $R^2$ |
| 1. Joy, efficacy | .25 (.07) | [.102, .400] | .480 | 3.414 | .002 | 11.657 | 1, 39 | .230 | .210 |
| 2. Joy, overall | .13 (.03) | [.068, .198] | .554 | 4.158 | .000 | 17.291 | 1, 39 | .307 | .289 |
| 3. Positive valence, efficacy | .25 (.06) | [.116, .374] | .525 | 3.836 | .000 | 14.711 | 1, 39 | .274 | .255 |
| 4. Positive valence, overall | .14 (.03) | [.074, .200] | .576 | 4.405 | .000 | 19.407 | 1, 39 | .332 | .315 |

*Notes.* Tested using the time percentage that participants demonstrated joy or positive valence.

**Table N2.** *Regressions – Effects of Physiological Joy (Time Percentage) and Positive Valence (Time Percentage) on Contentment*

| | Contentment (self-report) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coefficients | | | | | ANOVA | | Model Summary | |
| Predictor (X) | *B* (SE) | *B* 95% CI [LL, UL] | β | *t* | *p* | *F* | *df* | $R^2$ | *Adj.* $R^2$ |
| 1. Joy, efficacy | .40 (.06) | [.271, .532] | .706 | 6.232 | .000 | 38.841 | 1, 39 | .499 | .486 |
| 2. Joy, overall | .13 (.04) | [.060, .200] | .509 | 3.697 | .001 | 13.668 | 1, 39 | .260 | .241 |
| 3. Positive valence, efficacy | .37 (.06) | [.253, .480] | .722 | 6.513 | .000 | 42.413 | 1, 39 | .521 | .509 |
| 4. Positive valence, overall | .14 (.04) | [.070, .210] | .543 | 4.043 | .000 | 16.344 | 1, 39 | .295 | .277 |

*Notes.* Tested using the time percentage that participants demonstrated joy or positive valence.

**Table N3.** *Regressions – Effects of Physiological Joy (Frame Count) and Positive Valence (Frame Count) on Happiness*

| | Happiness (self-report) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coefficients | | | | | ANOVA | | Model Summary | |
| Predictor (X) | *B* (SE) | *B* 95% CI [LL, UL] | β | *t* | *p* | *F* | *df* | $R^2$ | *Adj.* $R^2$ |
| 1. Joy, efficacy | .02 (.00) | [.012, .025] | .681 | 5.806 | .000 | 33.714 | 1, 39 | .464 | .450 |
| 2. Joy, overall | .02 (.00) | [.011, .022] | .705 | 6.203 | .000 | 38.476 | 1, 39 | .497 | .484 |
| 3. Positive valence, efficacy | .02 (.00) | [.011, .022] | .697 | 6.073 | .000 | 36.881 | 1, 39 | .486 | .473 |
| 4. Positive valence, overall | .02 (.00) | [.012, .022] | .733 | 6.722 | .000 | 45.189 | 1, 39 | .537 | .525 |

*Notes.* Tested using the total frame count that participants demonstrated joy or positive valence. These results are included as a manipulation check, due to differing stimuli lengths.

**Table N4.** *Regressions – Effects of Physiological Joy (Frame Count) and Positive Valence (Frame Count) on Contentment*

| | Contentment (self-report) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coefficients | | | | | ANOVA | | Model Summary | |
| Predictor (X) | *B* (SE) | *B* 95% CI [LL, UL] | β | *t* | *p* | *F* | *df* | $R^2$ | *Adj.* $R^2$ |
| 1. Joy, efficacy | .02 (.00) | [.012, .026] | .647 | 5.302 | .000 | 28.313 | 1, 39 | .419 | .404 |
| 2. Joy, overall | .02 (.00) | [.009, .022] | .602 | 4.706 | .000 | 22.150 | 1, 39 | .362 | .346 |
| 3. Positive valence, efficacy | .02 (.00) | [.010, .023] | .646 | 5.292 | .000 | 28.004 | 1, 39 | .418 | .403 |
| 4. Positive valence, overall | .02 (.00) | [.010, .022] | .635 | 5.130 | .000 | 26.315 | 1, 39 | .403 | .388 |

*Notes.* Tested using the total frame count that participants demonstrated joy or positive valence. These results are included as a manipulation check, due to differing stimuli lengths.

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