APPEALING TO FEAR
A META-ANALYSIS OF FEAR APPEAL EFFECTIVENESS AND THEORIES

BY

MELANIE BETH TANNENBAUM

DISSERTATION

Submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy in Psychology
in the Graduate College of the
University of Illinois at Urbana-Champaign, 2015

Urbana, Illinois

Doctoral Committee:

Professor Dolores Albarracin, Chair
Assistant Professor Michael Kraus
Assistant Professor Jesse Preston
Assistant Professor Nichelle Carpenter
Associate Professor Patrick Vargas

ABSTRACT

The effects of fear appeals on attitudes, intentions, and behaviors were examined in a comprehensive meta-analysis. Studies were included if they contained a treatment group exposed to a fear appeal, a valid comparison group, a manipulation of depicted fear, a measure of attitudes, intentions, or behaviors concerning the targeted risk or recommended solution, and adequate statistics to calculate effect sizes. The meta-analysis included 127 papers (9% unpublished) yielding 248 independent samples (N_{Total} = 27,372) collected from diverse populations. Results showed a positive effect of fear appeals on attitudes, intentions, and behaviors, with the average effect on a composite index being fixed-effects $\bar{d}$ = 0.27. Moderation analyses based on prominent fear appeal theories showed that the effectiveness of fear appeals increased when the message depicted higher levels of fear, included efficacy statements, and depicted high susceptibility and severity. Messages were also more influential when the recommended behavior was one-time only, was self-esteem enhancing (hindering) and death was (was not) mentioned, and occurred at a delay when death was mentioned. Finally, fear appeals were more influential when the message's audience was primarily female, from collectivist cultures, and young adult.

ACKNOWLEDGEMENTS

First and foremost, I could not acknowledge anyone before profusely thanking my advisor, Dolores Albarracin, for everything that she has done for me throughout grad school. Writing this dissertation was only possible because of her immense amounts of guidance, understanding, help, and support. Because of her, I always felt like I had someone "in my corner" ready to go to bat for me and fight for my success and well-being. I cannot imagine a better mentor. I am also grateful to my committee members — Jesse Preston, Nichelle Carpenter, Patrick Vargas, and Michael Kraus — for their valuable guidance, feedback, and insights. Finally, I am immensely grateful to Lori Hendricks and Ashley Ramm for answering all of my panicked 2 AM e-mails throughout graduate school and convincing me that everything will be alright with my forms/deposits/scheduling/course registering, and to the rest of the SPO faculty at UIUC for all of the classes, journal club meetings, and hallway conversations that enriched my graduate school experience.

On a personal note, I would not be where I am today without my family and friends. To my friends from Illinois — thank you for always being there to laugh, drink, and cry our way through graduate school together. To my friends from everywhere else — thank you for always being there to answer my texts, calls, e-mails, and messages at all times, even though you probably didn't understand what I was so anxious about half the time or why something called a "meta-analysis" kept giving me panic attacks. To the family I've always had, especially my Mom and Dad — thank you for 27 years of support, sky-high expectations, and that constant, unwavering, borderline-obnoxious belief that I would do great things, even when I was doubting myself and frustrated that you wouldn't join in and doubt me too. Thank you for refusing to cave. And finally, to the family I've chosen — Justin Hepler. Could there be a better husband? I submit that there could not. Thank you for always pushing me to be better. Thank you for pushing me to finish this darn thing. We work too well together for our collaborative projects to stop now just because we've left the Social Action Lab, so I'm glad we did the smart thing and locked down this partnership for life. Can't wait for Phase II.

TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION

Fear appeals are persuasive messages that attempt to arouse fear by emphasizing the potential danger and harm that will befall individuals if they do not adopt the messages' recommendations (Dillard, 1996; Maddux & Rogers, 1983). Although these messages are often used in political, public health, and advertising campaigns in the hopes of reducing risky attitudes, intentions, or behaviors, their use is often a polarizing issue. Whereas some practitioners are confident in the power of fear appeals to persuade audiences (e.g., CDC, 2014; Xu et al., 2014), others are adamant that such messages are counterproductive (e.g., Drug Free Action Alliance, 2013; Ruiter et al., 2014). The fear appeal literature reflects this disagreement, and empirical studies, literature reviews, and meta-analyses conducted over the past six decades have offered a diverse array of perspectives on the topic. Although some meta-analytic examinations have found positive effects of fear appeals on some outcomes (Witte & Allen, 2000), others have found null effects (de Hoog et al., 2007) or even negative effects (Peters et al., 2012). In the current paper, I present the results of a comprehensive meta-analysis of fear appeal research with two goals in mind. My first goal was to compile the largest available meta-analytic database of fear appeal research and estimate average effects. My second goal was to test a variety of theoretical predictions, many of which have never been examined meta-analytically, and to organize them within a framework that takes into account characteristics of a fear appeal's message, recommended behavior, and audience.

1.1 A Message-Behavior-Audience Framework of Fear Appeals

Existing theories about fear appeals have focused on either the content of the *message*, the nature of the *behavior* recommended by the communication, or the characteristics of the *audience* receiving the message. However, all three of these aspects (message, behavior, and

audience) are important and were considered in the framework that guided this review. This integrative framework gave the present meta-analysis a broader scope beyond past analyses of fear appeals. Specifically, each prior meta-analysis has only tested theories relevant to the message portion of the present framework, and thus was only able to address a limited set of questions pertaining to fear appeal effectiveness (for a description of prior meta-analyses, see Table 1) (Boster & Mongeau, 1984; de Hoog et al., 2007; Earl & Albarracin, 2007; Floyd et al., 2000; Milne et al., 2000; Peters et al., 2012; Sutton, 1982; Witte & Allen, 2000). By adopting this more holistic view of fear appeals, it became possible to connect existing models that are generally treated as separate and to generate novel hypotheses about fear appeal effectiveness that have previously gone untested. Overall, this model is meant to be an organizing thread to help connect existing theories and research, and to identify areas in need of future research. This framework is useful for several reasons. First, each aspect (message, behavior, and audience) has the potential to vary independently of the others and may impact the communication's effectiveness in ways scholars must consider. Second, this structure connects and organizes seemingly unrelated theories of fear appeals under a coherent framework. Third, and of particular importance, the MBA framework highlights that prior research has strongly focused on characteristics of fear appeal messages somewhat to the exclusion of the behaviors being addressed or the audiences being targeted (see Table 1). However, this bias is not due to a lack of interesting or important effects concerning the behavior or audience aspects of a fear appeal communication. Finally, in addition to introducing this framework, the current meta-analysis used a substantially larger meta-analytic database than prior analyses, thus providing more precision to test relevant hypotheses.

CHAPTER 2: THE CONTENT OF FEAR APPEAL MESSAGES

Seven prominent theories make predictions about the impact of message characteristics on fear appeal effectiveness: The linear model of fear appeals (e.g., Witte & Allen, 2000), the curvilinear model of fear appeals (e.g., Hovland et al., 1953), the health belief model (Rosenstock, 1966; Becker, 1974; Becker et al., 1977; Becker et al., 1978; Rosenstock, 1974), the parallel process model (Leventhal, 1970), the extended parallel process model (Witte, 1992; Witte, 1998), the stage model (de Hoog et al., 2007), and the elaboration likelihood model (Petty & Cacioppo, 1986). These theories concern the level of depicted fear within messages, the use (or omission) of efficacy statements within messages, the level of depicted susceptibility and/or severity within messages, and the vividness of a message's information.

2.1 Amount of depicted fear

Perhaps the most central aspect of a fear appeal message is the amount of fear it is intended to arouse in message recipients. I will refer to this as depicted fear to emphasize that it reflects a property of the message's content, rather than the subjective state of fear that message recipients experience.[1] Two competing theories make predictions about amount of depicted fear, which I will refer to as the linear model (e.g., Witte & Allen, 2000) and the curvilinear model

[1] The MBA framework addresses the relation between *fear appeals* and outcomes of interest (e.g., intentions) rather than the relation between *fear* and outcomes of interest. Although many fear appeal theories discuss fear, empirical studies typically test the impact of fear appeal messages on outcomes, and subsequently infer that message effects were mediated by experienced fear even though fear itself is rarely measured (for a discussion, see Popova, 2012, p.466). Indeed, only 71 of the 248 studies in the current meta-analysis measured fear directly, and such measures were typically treated as manipulation checks rather than independent variables or mediators. I will therefore discuss the influence of depicted message characteristics rather than subjectively experienced states (e.g., depicted fear versus experienced fear). This distinction applies to prior meta-analyses and primary studies as well, though the distinction is rarely made.

(Hovland et al., 1953; Janis, 1967; Janis & Feshbach, 1953; McGuire, 1968; McGuire, 1969). Both theoretical perspectives conceptualize depicted fear as a source of motivation, such that exposure to depicted fear increases motivation to adopt the message's recommendations (Hovland et al., 1953; Witte & Allen, 2000). Further, both models predict that low levels of depicted fear will be relatively less motivating and thus less effective than moderate levels of fear. However, the linear model predicts that depicted fear has a positive and monotonic influences on attitudes, intentions, and behaviors, such that high depicted fear is more effective than moderate depicted fear (e.g., Witte & Allen, 2000). In contrast, the curvilinear model predicts that high depicted fear elicits defensive avoidance, a reaction in which message recipients disengage from the message, avoid further exposure to the message, and/or derogate the message because it is too frightening (Higbee, 1969; Hovland et al., 1953; Janis, 1967; 1968; Janis & Feshbach, 1953; Janis & Leventhal, 1968; McGuire, 1968; 1969; Millman, 1968). Consequently, the curvilinear theory predicts that high levels of depicted fear should be less effective than moderate levels of depicted fear.

The linear and curvilinear models have been tested in prior meta-analyses, and the linear model has consistently been supported by existing data, whereas the curvilinear model has not (e.g., Witte & Allen, 2000). One drawback to prior investigations of the linear and curvilinear models is that the analyses included comparisons from studies that used two levels of depicted fear, even though it is difficult to equate levels of depicted fear across different studies – what may qualify as moderate depicted fear in one study may qualify as low depicted fear in a different study. Thus, an appropriate test of the linear and curvilinear models requires depicted fear to be manipulated with at least three levels within the same study to ensure that moderate depicted fear is operationalized as an intermediate level between extremes. I therefore tested the

linear and curvilinear models in the current meta-analysis by comparing the effects of high versus moderate depicted fear, using only studies that manipulated depicted fear across several levels. The linear model predicts that high depicted fear will be more effective than moderate depicted fear, whereas the curvilinear model predicts that high depicted fear will be less effective than moderate depicted fear.

2.2 Efficacy statements

According to the health belief model (HBM; Rosenstock, 1966; Becker, 1974; Becker et al., 1977; Becker et al., 1978; Rosenstock, 1974), the stage model (e.g., de Hoog et al., 2007), the parallel process model (PPM; Leventhal, 1970), and the extended parallel process model (EPPM; Witte, 1992; Witte, 1998), fear appeals "work only when accompanied by… efficacy messages" (Witte & Allen, 2000, p.606). An efficacy message is a statement that assures message recipients that they are capable of performing the fear appeal's recommended actions (self-efficacy) and/or that performing the recommended actions will result in desirable consequences (response-efficacy). The HBM, stage model, PPM, and EPPM suggest that when message recipients are presented with a threat (i.e., depicted fear), resulting feelings of vulnerability lead them to evaluate whether or not adopting the message's recommendations will protect them from the threat-related negative consequences. If recipients decide that adopting the recommended action(s) will protect them, the fear appeal should be more effective. As efficacy statements provide this assurance, fear appeal messages that include statements about self- or response-efficacy should be more effective than fear appeal messages that include neither (de Hoog et al., 2007; Witte & Allen, 2000).

There are two forms of the efficacy statement hypothesis. The strong hypothesis is that fear appeals without efficacy statements will produce negative effects (i.e., will backfire). The

weak hypothesis is that fear appeals without efficacy statements will produce weaker (i.e., less positive or null) effects relative to fear appeals with efficacy statements. Three meta-analyses have tested whether the inclusion of efficacy statements in fear appeals leads to increased effectiveness, and all found support for the weak hypothesis (de Hoog et al., 2007; Mongeau, 1998; Witte & Allen, 2000). However, those studies were conducted using less comprehensive meta-analytic databases, and thus the current synthesis can provide a more thorough assessment of the strong and weak hypotheses.

2.3 Depicted susceptibility and severity

According to the stage model (de Hoog et al., 2007), the effectiveness of fear appeals should depend on their levels of depicted susceptibility and severity. A message high in depicted susceptibility emphasizes the message recipient's personal risk for negative consequences (e.g., "One of fourteen women is destined to develop breast cancer during her life. So every woman may get breast cancer. You also run that risk!"; Siero et al., 1984), whereas a message low in depicted susceptibility does not personalize risk (e.g., "One of fourteen women is destined to develop breast cancer during her life."; Siero et al., 1984). A message high in depicted severity describes the negative consequences of not taking action (e.g., "Breast cancer is a serious disease of which many women die, contrary to, for example, cancer of the uterus, where 90% to 95% recover."; Siero et al., 1984), whereas a message low in depicted severity portrays manageable consequences (e.g., "If breast cancer is detected at an early stage it can be cured in a number of cases, contrary to, for example, lung cancer where 90% die of it."; Siero et al., 1984). According to this model, high depicted severity (but not susceptibility) should improve attitudes, whereas high depicted susceptibility (but not severity) should improve intentions and behaviors. Consequently, only the combination of high-depicted susceptibility and severity should improve

attitudes, intentions, and behaviors. A previous meta-analysis found mixed results concerning these predictions (de Hoog et al., 2007). Specifically, messages with high depicted severity positively influenced attitudes, intentions, and behaviors, whereas messages with high depicted susceptibility positively influenced intentions and behaviors but not attitudes. I tested these hypotheses on the present more comprehensive database.

2.4 Vividness of the message

Vivid messages (defined here as colorful, graphic, or otherwise attention-grabbing visual stimuli) may facilitate information processing more than dull information (Nisbett & Ross, 1980; Sherer & Rogers, 1984) and can consequently be more persuasive (Petty & Cacioppo, 1986). Evidence suggests that fear appeals become more persuasive as they become more graphically interesting and attention-grabbing for message recipients (Berkowitz & Cottingham, 1960; Robbins, 1962), and visual content (versus lengthy verbal messages) may also facilitate persuasion by being easier and less cognitively taxing to understand (McGuire, 1968). Many fear appeals lack vivid information and rely on verbal, informational, or statistical appeals (e.g., a pamphlet discussing a disease along with a few descriptive graphs; Brouwers & Sorrentino, 1993). On the other hand, more vivid appeals may include graphic, attention-grabbing pictures or videos (e.g., a poster of two nude people embracing each other with the phrase “Use a condom” displayed at the bottom; Dahl et al., 2003). To examine whether fear appeals are more effective if they contain vivid information, I compared studies with fear inductions relying on vivid or evocative imagery relative to studies that induced fear verbally.

Vividness may also interact with depicted susceptibility and severity to influence fear appeal effectiveness. According to the stage model, susceptibility should impact risk assessment via in-depth cognitive assessment, whereas severity should impact risk assessment via more

visceral emotional reactions (de Hoog et al., 2007). In persuasion contexts, logical arguments are often associated with in-depth thought, whereas visual stimuli are often associated with automatic emotional reactions (e.g., Petty & Cacioppo et al., 1986). Thus, there may be a congruency effect, such that fear appeals emphasizing severity information are particularly effective when conveyed with vivid/visual messages and fear appeals emphasizing susceptibility information are particularly effective when conveyed using less vivid/verbal messages. Therefore, in addition to testing for a main effect of message vividness, I also tested for an interaction of vividness with depicted susceptibility and severity.

2.5 Comparison group message

For exploratory purposes, I examined whether the type of message received by the comparison group moderated effect sizes. The three types of comparison messages in the present study are low depicted fear, neutral, and no message. Although I do not anticipate differences, it is possible that comparisons with low depicted fear will result in smaller effect sizes relative to the other two comparison groups because exposure to low depicted fear may result in persuasion in the same direction as the treatment group.

CHAPTER 3: THE RECOMMENDED BEHAVIOR

Five prominent theories make predictions about the impact of the recommended behaviors on fear appeal effectiveness: Robertson's single action theory (Robertson, 1975; Rothman, Martino, Bedell, Detweiler, & Salovey, 1999), prospect theory (Rothman et al., 1999; Rothman & Salovey, 1997; Tversky & Kahneman, 1981) terror management theory (Goldenberg & Arndt, 2008; Pyszczynski, Greenberg, & Solomon, 1999; Shehryar & Hunt, 2005; Solomon, Greenberg, & Pyszczynski, 1991), general action theory (Albarracin et al., 2011; Tannenbaum et al., 2011), and Colburn's health relevance theory (Colburn, 1967). These theories concern whether the recommended behavior is a one-time or recurring activity, involves detection or prevention/promotion, occurs immediately or after a delay, can enhance self-esteem, is intended to replace a self-esteem enhancing behavior, involved action versus inaction, and involves health versus non-health behaviors.

3.1 One-time versus repeated behaviors

According to Robertson (1975; also see Rothman et al., 1999), persuasive messages should be more successful when they recommend one-time behaviors (e.g., getting vaccinated) compared to behaviors that must be repeated over an extended period of time (e.g., exercising). As it takes less effort to do something once than many times, people are likely to be more compliant when a single behavior is recommended. Using this principle, I compared the effectiveness of fear appeals recommending one-time versus repeated behaviors.

3.2 Detection versus prevention/promotion behaviors

According to prospect theory, negative outcomes can be categorized as incurring a loss or foregoing a gain, and losses tend to be more psychologically impactful than foregone gains of objectively equal magnitude (Tversky & Kahneman, 1981). Several researchers have extended

the logic of prospect theory to fear appeals, hypothesizing that fear appeals should be more effective when recommending detection behaviors relative to prevention/promotion behaviors (Rothman, Martino, Bedell, Detweiler, & Salovey, 1999; Rothman & Salovey, 1997). Detection behaviors are enacted to obtain information about potential risk factors or existing health issues (e.g., being screened for cancer), and thus engaging in a detection behavior increases risk for incurring a loss (e.g., acquiring the unwanted and undesirable information that one has cancer). In contrast, prevention/promotion behaviors are enacted to obtain desirable outcomes (e.g., exercising to lose weight or avoid weight gain), and thus engaging in prevention/promotion behaviors does not increase risk for incurring a loss (e.g., exercising will only bring one closer to the desired outcome of losing weight or avoiding weight gain, so there is no potential for loss by engaging in exercise). Fear appeals are loss-framed messages because they emphasize negative consequences, and loss-framed information makes people more willing than usual to take risks (Meyerowitz & Chaiken, 1987; van't Riet et al., 2014). Therefore, although fear appeals should be effective for both detection and prevention/promotion behaviors, they should be particularly effective for detection behaviors because the loss-framed nature of the message should make people more willing than usual to take on the risk of the detection behavior (Meyerowitz & Chaiken, 1987; Rothman, Martino, Bedell, Detweiler, & Salovey, 1999; Rothman & Salovey, 1997; van't Riet et al., 2014).

3.3 Mentioning death, self-esteem relevance, and time delays

Many fear appeals explicitly mention death (89 of the 248 studies in the present meta-analysis), and terror management theory (TMT) makes three predictions about this factor. According to TMT, when people are reminded of their mortality by being exposed to the concept of death, they often become motivated to buffer their self-esteem to reduce mortality related

anxiety (Goldenberg & Arndt, 2008; Pyszczynski et al., 1999; Shehryar & Hunt, 2005; Solomon et al., 1991). Some fear appeals recommend behaviors that can enhance self-esteem (e.g., dieting, which can improve body image; Goldenberg & Arndt, 2008), whereas others attempt to persuade people to stop engaging in behaviors that enhance self-esteem (e.g., tanning, which can also improve body image; Janssen et al., 2013). When fear appeals mention death, message recipients should increase commitment to behaviors that enhance self-esteem, regardless of whether the fear appeals encourage or discourage those behaviors. Consequently, fear appeals recommending self-esteem enhancing behaviors (e.g., dieting) should be more effective when they mention death than when they do not. In contrast, fear appeals recommending the cessation of behaviors that enhance self-esteem (e.g., tanning abstinence) should be less effective when they mention death than when they do not.

TMT also posits that reminders of death activate two types of defensive responses: Short-term proximal defenses and long-term distal defenses. Proximal defenses involve refuting information to avoid considering one's death, whereas distal defenses involve buffering one's self-esteem and pursuing long-term goals (e.g., a healthy lifestyle; Goldenberg & Arndt, 2008). Consequently, fear appeals that mention death should be more effective if there is a delay between fear appeal exposure and occurrence of the outcome, rather than if outcomes occur immediately after exposure when proximal defenses are still active (e.g., Greenberg et al., 1990; Shehryar & Hunt, 2005).[2]

3.4 Action versus inaction behaviors

[2] TMT theories also predict a higher order interaction between mentions of death, time delays, and self-esteem, such that the predicted effects of self-esteem discussed above become stronger after a delay (Goldenberg & Arndt, 2008). Of the 12 conditions represented by this prediction (2 death x 3 delay x 2 self-esteem), four had zero observations in the present meta-analysis. Thus, I could only test the simpler predictions concerning self-esteem and time delay in isolation.

An important dimension along which behaviors vary is action versus inaction, with some behaviors requiring relatively high levels of motor or cognitive output (e.g., exercise) and others requiring low levels of output (e.g., dieting) (Albarracin et al., 2011; Hepler & Albarracin, 2013; Hepler, Albarracin, McCulloch, & Noguchi, 2012; Hepler, Wang, & Albarracin, 2012; Ireland et al., 2015; Tannenbaum et al., 2011). Although both actions and inactions can allow people to make progress toward a goal (e.g., pursuing weight loss via increased exercise or decreased food intake), it is possible that once people are motivated by fear, they will be particularly motivated to pursue actions because fear is an emotion associated with action tendencies (e.g., Frijda, 1986). Therefore, I examined whether fear appeals were more effective when they recommended active behaviors relative to inactive behaviors.

3.5 Health relevant behaviors

According to Colburn (1967), fear appeals may be particularly effective when they target health behaviors because health behaviors are often perceived as more important and/or worthy of attention than non-health behaviors. Therefore, I compared the effectiveness of fear appeals that recommended health relevant behaviors (e.g., disease prevention behaviors; Brouwers & Sorrentino, 1993) versus those that recommended other behaviors (e.g., not voting for a particular politician because he will pass harmful legislation; Calantone & Warshaw, 1985).

CHAPTER 4: THE AUDIENCE

Four prominent theories make predictions about the impact of the audience on fear appeal effectiveness: Regulatory fit theory (Higgins, Pierro, & Kruglanski, 2008; Kurman & Hui, 2011; Lockwood, Marshall, & Sadler, 2005), the transtheoretical model (Prochaska & DiClemente, 1983; Prochaska et al., 1992; Prochaska & Velicer, 1997), Sears' age and persuasion theory (Sears, 1983; Sears, 1986), and the elaboration likelihood model (Petty & Cacioppo, 1986). These predictions concern whether the message's audience is primarily female (versus male), from a collectivist culture (versus an individualistic culture), Asian or Hispanic/Latino(a) (versus African or European), already attempting to change risk behaviors (versus not), college-aged (versus younger or older), and highly educated (versus not).

4.1 Culture, gender, and race

According to regulatory focus theory, people can be prevention or promotion focused, placing greater value on either the avoidance of negative outcomes or the pursuit of positive outcomes, respectively (Higgins et al., 2008). Message frames that match the prevention versus promotion tendencies of the audience are more persuasive because they emphasize goal pursuit strategies preferred by the audience, and this regulatory fit increases attitudes toward the message, message engagement, and message elaboration, which are all factors that can increase persuasion (for a review of regulatory fit effects in persuasion, see Cesario, Higgins, & Scholar, 2008). Importantly, fear appeals are definitionally prevention-framed messages because they emphasize what one should do to avoid negative outcomes, and prevention-focused populations should therefore be more persuaded by fear appeals relative to promotion-focused populations.

Cultural research has found that members of collectivist cultures tend to be more prevention focused than members of individualist cultures (Kurman & Hui, 2011; Lockwood et

al., 2005). Cultures differ along a variety of dimensions including socialization practices and values (Greenfield et al., 2003; Schwartz, 2009), and thus members of certain cultures may be socialized to place more emphasis on either prevention or promotion focused behavioral strategies. Specifically, collectivist cultures socialize group members to be vigilant to avoid negative outcomes because such outcomes may reflect poorly on the group as a whole (Heine et al., 1999; Kitayama et al., 1997). As a result, members of collectivist cultures tend to adopt prevention focused strategies because these strategies allow them to directly pursue the goal of avoiding undesirable outcomes (Kurman & Hui, 2011; Lockwood et al., 2005). Importantly, prior research has identified differences in individualism-collectivism across a range of cultural groups, such that collectivism tends to be higher for women (versus men), Eastern cultures (versus Western cultures), and Asian and Hispanic/Latino(a) populations (versus African and European populations) (Hofstede, 1980; Kurman & Hui, 2011; Lockwood et al., 2005; Oyserman et al., 2002; Sampson et al., 2001; Triandis, 1995). As fear appeals are prevention-framed messages, they should therefore be particularly effective for audiences that are primarily female, Eastern, Asian, and Hispanic/Latino(a).

4.2 Early versus late stages of change

According to the transtheoretical model, people engaging in risky behaviors can be classified as belonging to an early stage (the model's precontemplation, contemplation, and preparation stages) or a late stage (the model's action and maintenance stages) in the change process (Prochaska & DiClemente, 1983; Prochaska et al., 1992; Prochaska & Velicer, 1997). According to the early-effectiveness hypothesis, fear appeals should be more effective for individuals in the early (vs. late) stages because the former require motivational appeals to understand that a threat exists and to increase commitment to adopting desirable behaviors

and/or abandoning undesirable behaviors. In contrast, late stage individuals are already committed to behavior change and do not require such motivational appeals (DiClemente et al., 1991; Nabi, Roskos-Ewoldsen & Dillman Carpenter, 2008; Prochaska & DiClemente, 1983; Prochaska, DiClemente, & Nocross, 1992; Prochaska, DiClemente, & Nocross, 2002). The late-effectiveness hypothesis competes with the early one to predict that success at behavior change is associated with increases in self- and response efficacy (Cho & Salmon, 2006). As a result, exposure to a fear appeal should lead individuals who have already enacted change to process the fear appeal in the context of their high response efficacy (Cho & Salmon, 2006). Consequently, the late-effectiveness hypothesis predicts that fear appeals should be more effective for late stage relative to early stage individuals. To test the early-effectiveness and late-effectiveness hypotheses, I classified each study's sample as belonging to one of the transtheoretical model's first three stages or last two stages. I then compared the effectiveness of fear appeals for individuals in the early versus late stages.

4.3 Age

Young adults are particularly susceptible to persuasion relative to other age groups due to fluid social and political attitudes resulting from constant lifestyle changes that typically occur in early adulthood (Glenn, 1980; Sears, 1983; 1986; Jennings & Niemi, 1981; Jennings & Markus, 1984). Specifically, college-aged (18-22 years old) adults are generally thought to be exceptionally persuadable because of their unique life circumstances that involve constant change and frequent exposure to novel ideas and environments (Sears, 1986; ten Hoor et al., 2012). Therefore, fear appeals may be particularly effective for college-aged adults (18-22 years old) relative to adults (over 22 years old) or children/teens (under 18 years old).

Further, college-aged adults are often less likely than other age groups to realize that certain threats exist and to believe they should take precautions against such threats (e.g., automobile accidents; Tay et al., 2000). Thus, age differences in fear appeal effectiveness may be moderated by the stages of change. Specifically, college-aged adults in the early stages of change should be relatively unaware of threats compared to adults in the early stages and relatively less concerned by threats relative to children/teens in the early stages. In contrast, college-aged adults in the later stages of change (i.e., those who have already committed to changing their behavior) should already be aware of the relevant threats and concerned about them at a level comparable to other age groups. As fear appeals provide information about threats that college-aged adults in the early stages of change are unlikely to have considered, college-aged adults may be more persuaded by fear appeals relative to other age groups in the early stages of change but not the later stages of change when all groups have equal awareness and concern for threats. Therefore, I tested whether age had a main effect on fear appeal effectiveness, and also whether this effect was moderated by stages of change.

4.4 Education

Education is associated with the ability to accurately process information and follow instructions, and higher education has been associated with higher susceptibility to persuasion (e.g., Earl & Albarracin, 2007; Petty & Cacioppo, 1986; Sears, 1986). Therefore, I tested whether adults with higher levels of educational attainment were more persuaded by fear appeals relative to adults with lower levels of educational attainment.

CHAPTER 5: OVERVIEW

I compiled the largest meta-analytic database of fear appeals to date to examine the effectiveness of fear appeals for changing attitudes, intentions, and behaviors, and also to test moderator predictions made by a variety of influential fear appeal theories. Each of these theories tends to focus on one of three things – the content of the *message*, the type of *behavior* recommended by the communication, or the characteristics of the *audience* receiving the message (see Table 1 for a full list of theories and related hypotheses). Of the 27 fear appeal hypotheses discussed, only seven have been tested in prior meta-analyses, and all of them fall under the message aspect of the MBA framework (Table 1). Thus, the present research represents the first meta-analytic test for 20 of the 27 hypotheses and the first meta-analytic test for any hypotheses related to the behavior and audience aspects of the present framework.

CHAPTER 6: METHODS

6.1 Review and Inclusion Criteria

To locate studies, I conducted a search of the *PsycInfo* and *Medline* databases using the keywords (risk *or* fear *or* shock *or* severity *or* susceptibility) AND (persuasion *or* appeal *or* argument *or* tactic *or* campaign *or* communication *or* intervention). To supplement these database searches, I examined the reference lists of previous fear appeal meta-analyses, review articles, and chapters. I also contacted researchers to request unpublished data and sent requests to the e-mail lists of the *Society of Behavioral Medicine*, the *Society for Personality and Social Psychology*, the *European Health Psychology Society*, and the *American Academy of Health Behavior*. My search extended through February 2015 and yielded 430 potentially eligible articles, which were subsequently screened for inclusion in the current meta-analysis based on several inclusion criteria. For inclusion in this meta-analysis, studies had to meet the following eligibility criteria:

1. Studies were included if they contained an experimental research design in which a treatment group was exposed to a message designed to induce fear (i.e., a fear appeal).

2. Studies were included if they contained a comparison group. The comparison group could have been a group that was not exposed to any message, a group that was exposed to a message that was not designed to induce fear, or a message that was designed to induce less fear than the treatment group's message. When a study included more than two potential comparison groups, I opted to compare the highest depicted fear condition with the lowest depicted fear condition, prioritizing them in the following order: No message comparison group, neutral message comparison group, and low depicted fear comparison group. Thus, for a study containing a low depicted fear group and a neutral

message group, I used the neutral message group as the comparison group. Overall, all results should be interpreted as the effect of exposure to messages depicting more fear relative to less.[3]

3. Studies were included if they experimentally manipulated depicted fear across groups. Studies were excluded if they used correlational research designs or provided all groups with the same level of depicted fear.

4. Studies were included if they measured one or more of the following variables as an outcome in both the treatment and comparison groups: Attitudes, intentions, or behaviors.

5. Studies were excluded if they did not contain appropriate statistics (e.g., *F* ratios, means and standard deviations, frequencies, or exact *p* values) for calculating an effect size representing the difference of outcomes for treatment versus comparison groups. If a study was otherwise eligible but did not contain appropriate statistics (e.g., it provided path coefficients from a structural equation analysis but did not supply means and standard deviations for treatment and comparison groups), I attempted to contact the study's authors to retrieve usable data such as means and standard deviations. I contacted authors of 39 papers for this purpose: Three provided the requested data, six responded

[3] A number of papers did not provide the full text of the messages that were presented to each group, which made it impossible to determine if comparison groups labeled with the terms neutral message or control message were actually presented with neutral messages or with low depicted fear messages. Thus, I could consistently compare relative levels of depicted fear across studies (more depicted fear vs. less depicted fear), but not absolute levels of fear (high depicted fear vs. low depicted fear vs. no depicted fear). Consequently, no message groups, neutral message groups, and low depicted fear groups were all considered appropriate comparison groups. Further, it was generally not possible to combine different potential comparison groups because information about standard deviations for the outcomes of each group was often lacking from reports, which made it unfeasible to calculate correct standard errors for combined comparison groups.

but could not provide the relevant data, and the rest did not respond to multiple contact requests.

Of the 430 reports considered for inclusion in this meta-analysis, 127 met the inclusion criteria (9% unpublished), providing 248 statistically independent samples with a total *N* of 27,372 participants in the treatment and comparison groups combined. Samples ranged in age from 9-87 years (*M* = 22.77 years, *SD* = 9.24 years) and were on average 66% female (*SD* = 33%). An average of 81% of each sample had completed high school (*SD* = 37%). Further, samples were on average 71% White or European-American (*SD* = 34%), 14% Asian or Asian-American (*SD* = 31%), 8% Black or African-American (*SD* = 18%), and 5% Hispanic/Latino(a) (*SD* = 14%).

6.2 Coding of Outcomes (Effect Size Calculation)

I calculated a single effect size per sample that compared attitudes, intentions, and behaviors for the treatment group relative to the comparison group. First, for each sample I recorded all measures of attitudes, intentions, and behaviors. For each outcome, I calculated the standardized mean difference between treatment and comparison groups correcting for sample size bias (Johnson & Eagly, 2014, p. 686). Effect sizes (*d*) were calculated based on provided *F*-ratios, *t*-tests, odds ratios, or means and standard deviations. To produce *d* for any odds ratios, I divided the log of the odds ratio by 1.81 (Haddock, Rindskopf, & Shadish, 1998; Hasselblad & Hedges, 1995).

Note that outcomes could have concerned the negative behavior/issue targeted by the fear appeal (e.g., attitudes toward smoking) or the fear appeal's recommendations (e.g., attitudes toward smoking cessation). Effect sizes were calculated such that higher positive values indicate

the treatment group scored higher in the message's direction. For example, if a study used anti-smoking messages, a positive *d* would indicate that the treatment group (relative to the comparison group) had more negative attitudes toward smoking or more positive attitudes toward smoking cessation. Thus, a positive effect size indicates the fear appeal worked, whereas a negative effect size indicates the fear appeal backfired.

The majority of samples ($k = 170$) included only one type of dependent measure (attitudes, intentions, or behaviors), but some samples included two types ($k = 61$) or all three ($k = 17$). Therefore, after calculating *d* for each outcome in a sample, I averaged all *d* values together to form a single effect size per sample that represents positive change in the direction advocated by the fear appeal. Further, if a sample included two or more measures of the same outcome type (e.g., attitudes toward smoking and attitudes toward smoking cessation), each was included in the average and weighted equally (the number of samples with multiple attitude, intention, and behavior measures was respectively $k = 18$, $k = 24$, and $k = 12$). This approach is justified on several grounds. First, for studies that included all three types of outcomes (attitudes, intentions, and behaviors), Cronbach's alpha for the composite measure was .87, indicating that the three types of measures are highly internally consistent. Further, prior research has demonstrated that composite measures combining attitudes, intentions, and behaviors are a valid outcome of interest when investigating the relative persuasiveness of messages (O'Keefe, 2013). I therefore combined all attitude, intention, and behavior measures within each sample to form a single effect size per sample, which is how the results will be presented in the present manuscript. However, I also conducted all analyses separately for attitude, intention, and behavior measures; these results are presented in Appendix A and are consistent with the results based on the combined measure. Several hypotheses made specific predictions about attitudes,

intentions, or behaviors, and for those hypotheses (see Table 1), I present the relevant outcomes of interest in the body of the manuscript.

Of note, attitudes were most commonly measured with semantic differential scales (e.g., positive/negative, beneficial/harmful, wise/foolish, etc.; Roskos-Ewoldsen, Yu, & Rhodes, 2004; Nabi, Roskos-Ewoldsen & Dillman Carpentier, 2008) and Likert style scales (e.g., agreement with statements such as, "I don't like speeding"; Cauberghe et al, 2009, p. 280). Intentions were frequently measured with Likert style scales (e.g., agreement with statements such as, "In the immediate future, I plan to find someone who will teach me to do an accurate breast self-examination"; Roskos-Ewoldsen et al., 2004, p. 58) and questions with dichotomous response options (e.g., "In the future, I intend to stop spending time outside strictly for the purpose of getting a tan," with responses *Yes* and *No*; McMath & Prentice-Dunn, 2005, p.629). Finally, behaviors were often measured dichotomously with self-report questions (e.g., "As a direct result of this message, did you seek help?" with responses *Yes* and *No*; Smalec & Klingle, 2000, p. 45) or behavioral observation data (e.g., information obtained from medical records; Ordoñana et al., 2009).

6.3 Coding of Potential Moderators

To test each hypothesis from the message, behavior, and audience portions of the MBA framework, I coded several relevant variables (moderator codes for each paper included in the meta-analysis are displayed in Table 2). The first author trained two independent coders, who then coded all study characteristics relevant to each report. Intercoder reliability was calculated on 20% of the overall database using Cohen's kappa (κ) for categorical variables and Pearson's *r* for continuous variables. Agreement for all variables was good: Categorical variables had average κ = .93 (SD = .06, minimum = .80), and continuous variables had average *r* = .92 (SD =

.12, minimum = .73). Disagreements were resolved by discussion and further examination of the studies.

6.4 Moderators related to message content

To test hypotheses concerning message content, I coded messages' amount of depicted fear, inclusion (or absence) of efficacy statements, levels of depicted susceptibility, levels of depicted severity, inclusion (or absence) of vivid information, and the type of message used in the comparison group.

6.4.1 Amount of depicted fear. To test the linear and curvilinear hypotheses, I coded whether studies included a moderate depicted fear group. To qualify, studies had to contain at least three experimental groups that were exposed to different levels of depicted fear. Thus, a study containing a high depicted fear group, a moderate depicted fear group, and a low depicted fear group would be included, whereas a study containing a high depicted fear group, a low depicted fear group, and a neutral control group would not. As noted above, an appropriate test of the linear and curvilinear hypotheses requires a comparison between high and moderate depicted fear; thus, the moderate group must represent a level of depicted fear between high and low (rather than between high and none). In the entire database (k = 248), 21 samples included more than two experimental groups exposed to varying levels of depicted fear. To test the linear and curvilinear hypotheses, I calculated effect sizes (d) comparing outcomes for the highest versus middle depicted fear groups (the calculation of these effect sizes followed the same procedure detailed above for the calculation of treatment versus comparison effect sizes). The moderate depicted fear groups (total N = 1,626) were not included in other analyses (the studies and corresponding effect sizes included in this analysis can be found in Table 3)

6.4.2 Efficacy statements. For each article, I dichotomously coded whether or not an efficacy message was embedded in the fear appeal. The efficacy message could have focused on self-efficacy (e.g., emphasizing that people have a built-in urge for physical activity and this basic human physical need will make it easy to begin a regular exercise program; Wurtele & Maddux, 1987), response-efficacy (e.g., emphasizing that exercise leads to higher levels of high-density lipoprotein and thus prevents heart attacks; Wurtele & Maddux, 1987), or both (e.g., highlighting that condoms substantially reduce the risk of HIV transmission if used correctly and are easy to use consistently; Witte & Morrison, 1995).

6.4.3 Depicted susceptibility and severity. For each article, I coded whether depicted severity was manipulated to be higher in the treatment group relative to the comparison group (e.g., the treatment group received a message emphasizing the drastic consequences of not wearing bicycle helmets; Rodriguez, 1995) and whether depicted susceptibility was manipulated to be higher in the treatment group relative to the comparison group (e.g., the treatment group received a message focusing on how coffee consumption will likely lead the message recipient to develop fibromyalgia; Lieberman & Chaiken, 1992).

6.4.4 Vividness of the message. For each article, I dichotomously coded whether the message included vivid, evocative imagery (e.g., a poster of two nude people embracing each other with the phrase "Use a condom" displayed at the bottom; Dahl et al., 2003) or not (e.g., a pamphlet discussing a disease along with a few descriptive graphs; Brouwers & Sorrentino, 1993).

6.4.5 Comparison group message. For each study, I coded whether the comparison group was presented with a low depicted fear message, a neutral message, or no message.

6.5 Moderators related to behavior characteristics

To test hypotheses concerning the targeted behavior, I coded whether fear appeals recommended behaviors that were one-time versus recurring, detection versus prevention/promotion focused, action versus inaction focused, and health relevant versus not health relevant. I also coded whether death was mentioned when discussing the behavior, whether the behavior was measured immediately versus after a delay, and whether the recommended behaviors was self-esteem enhancing or self-esteem hindering.

6.5.1 One-time versus repeated behaviors. I coded whether the recommended behaviors concerned one-time-only instances (e.g., signing up for a stress management training; Das et al., 2003) or would need to be enacted over an extended period of time (e.g., regularly using child safety devices when traveling by car; Change et al., 1989).

6.5.2 Detection versus prevention/promotion. For each article, I coded if the recommended behavior was a detection behavior (e.g., getting tested for syphilis; Fukada 1975) or a prevention/promotion behavior (e.g., attending a training to prevent repetitive stress injury; Pengchit, 2010). I initially attempted to code prevention and promotion behaviors separately. However, due to the nature of these constructs, it was often difficult to discern how participants would construe a behavior (e.g., did participants conceptualize exercising as promoting a healthy BMI or preventing obesity?). As the relevant hypothesis solely concerned fear appeals being more effective when recommending detection (vs. prevention/promotion) behaviors, prevention and promotion behaviors were collapsed into a single code.

6.5.3 Mentioning death, self-esteem relevance, and time delays. I created a dichotomous code for whether or not the message explicitly used the word *death*. Messages dealing with behaviors or issues that could clearly lead to death were still coded as non-death if the word death was not explicitly mentioned within the message itself (e.g., messages about

smoking or HIV/AIDS that did not explicitly mention death as one of the potential consequences; Insko et al., 1965; McMath & Prentice-Dunn, 2005; Raleigh, 2002; Witte & Allen, 2000). This decision allowed for a more stringent test of TMT hypotheses, and provided an even distribution of death versus non-death conditions, which avoids the potential confound of death messages always being about more severe topics than non-death messages.

6.5.3.1 Self-esteem relevance. I coded whether the recommended behavior was self-esteem hindering or self-esteem enhancing. Self-esteem hindering behaviors were intended to replace existing behaviors that allowed message recipients to derive self-esteem. Samples were coded as containing a self-esteem hindering behavior if the researchers specifically measured self-esteem for the existing behavior being targeted by the fear appeal and described the sample as high (e.g., high driving-related self-esteem; Taubman Ben-Ari et al., 2000), if the sample was designated as committed to the existing behavior (e.g., smokers that were highly committed to smoking; Priolo & Milhabet, 2008), or if the existing behavior is one that people typically engage in to improve self-esteem and/or physical attractiveness (e.g., tanning or bulimia; Janssen et al., 2013; Smalec & Klingle, 2000).

In contrast, self-esteem enhancing behaviors have the potential to provide individuals with self-esteem. Samples were coded as containing a self-esteem enhancing behavior if the recommended behavior is commonly associated with the pursuit of improved self-esteem and/or physical attractiveness (e.g., fear appeals recommending a healthy diet to decrease BMI; Goldenberg & Arndt, 2008). Samples were also coded as self-esteem enhancing when fear appeals targeted behaviors that the audience had clearly already made the choice to forego (e.g., antismoking ads directed at non-smokers; Insko et al., 1965) because message recipients should generally be able to derive self-esteem by continuing to avoid engaging in the discouraged

behavior (e.g., non-smokers who are told that smoking is bad and smoking abstinence is good should feel as though their decision to abstain from smoking reflects positively on them). Thus, studies were coded as self-esteem enhancing if the recommended behavior could improve self-esteem via the pursuit of physical attractiveness (e.g., exercise; Wurtele & Maddux, 1987), if the addressed behavior was not relevant for the sample (e.g., anti-smoking ads for non-smokers; Insko et al., 1965; Smart & Fejer, 1974), if the sample was designated as not committed to the behavior in question (e.g., smokers that were not committed to smoking; Priolo & Milhabet, 2008), or if the researchers specifically measured self-esteem related to the existing behavior being targeted by the fear appeal and described the sample as low (e.g., low driving-related self-esteem; Taubman Ben-Ari et al., 2000).

6.5.3.2 Time delay. I coded the amount of time between the fear appeal and the measurement of the outcome variable using three discrete categories: (a) The measure occurred the same day as the fear appeal exposure (e.g., Taubman Ben-Ari et al., 2000; Cho & Salmon, 2006; Nabi et al., 2008; Smart & Fejer, 1974; Stainback & Rogers, 1983); (b) the measure occurred one to fourteen days after fear appeal exposure (e.g., Berkowitz, 1998; Kirscht et al., 1978; Muthusamy et al., 2009); and (c) the measure occurred more than fourteen days after fear appeal exposure (e.g., Bagley & low, 1992; Smith & Stutts, 2003; Witte & Morrison, 1995). I used categories because delayed outcomes often occurred within a specified range – e.g., participants returned to the lab during the following two weeks, but the exact number of days was not specified.

6.5.4 Action versus inaction behaviors. I coded whether the recommended behaviors were active responses that required message recipients to increase motor or cognitive output

(e.g., exercising, getting vaccinated) or inactive responses that required message recipients to decrease motor or cognitive output (e.g., dieting, smoking cessation).

6.5.5 Health relevant behaviors. I coded whether the recommended behaviors were health relevant (e.g., getting vaccinated, dieting) or not (e.g., buying insurance, voting for a particular politician).

6.6 Moderators related to the audience

To test hypotheses concerning the audience portion of the MBA framework, I coded the gender composition of the sample, whether the sample was from a collectivist or individualist country, the percent of each sample that was African, Asian, European, and Hispanic/Latino(a), the transtheoretical model stage of change that was applicable to the sample, the average age of the sample, and the educational attainment of the sample.

6.6.1 Gender composition. I coded the percent of the sample that was female. I also converted this percent to a categorical variable to provide multiple tests of this hypothesis. Specifically, I recorded if a sample was all-female or all-male (e.g., if participants were specifically being targeted for testicular or breast self-exams; Nabi et al., 2008), or if the sample contained 50% of each gender rounded to the nearest whole digit (e.g., Witte & Allen, 2000).

6.6.2 Collectivism and individualism. I dichotomously coded whether each study's sample came from a primarily collectivist culture (e.g., East Asian cultures like South Korea, Japan, and Taiwan; Chu, 1966; Fukada, 1973; 1975; 1988; Kim et al., 2009) or a primarily individualist culture (e.g., Western cultures like Australia, Canada, and the United States; Beck, 1984; Brouwers & Sorrentino, 1993; Dahl et al., 2003; Hill & Gardner, 1980; Jones & Owen, 2006; LaTour & Tanner, 2003; Lewis et al., 2010; Smart & Fejer, 1974).

6.6.3 Race. For each sample, I coded the percent of the sample that was identified as being African, Asian, European, and Hispanic/Latino(a). These categories included Americans who identified as African American, Asian American, European American, and Hispanic/Latino(a) American.

6.6.4 Stage of change. I coded the transtheoretical model's stage of change that was most applicable to the audience. As most studies did not specifically measure this variable, I designed a conservative coding scheme to ensure I could include the maximum number of reports in this analysis while avoiding misclassifications. The early-effectiveness and late-effectiveness hypotheses both make predictions that compare individuals in the first three stages of the model (precontemplation, contemplation, and preparation) versus the last two stages of the model (action and maintenance). Thus, I created a dichotomous code indicating whether the sample was in the early or late stages of the model.

Samples were considered precontemplation if there was a clear indication that it was a sample merely at risk for a given behavior (e.g., participants who were designated as noncompliant with safe sex recommendations; Raleigh, 2002), or participants were being persuaded about a fictitious or not well-known disease/risk for which they had clearly not been engaging in protective action beforehand (e.g., hypoglycemia; de Hoog et al., 2008). I excluded samples in which the participants may have been in the precontemplation stage but for which there were no pretest measures available (e.g., if the sample was given a message about drinking and driving but there were no baseline measures available to indicate whether or not the sample had engaged in drunk driving in the past; Shehryar & Hunt, 2005). Samples were considered contemplation or preparation if there was a clear indication that they were already preparing to engage in the recommended action (e.g., a sample of women under 50 years old who had not yet

received mammograms, but the majority of whom stated they intended to receive mammograms after age 50; Jones & Owen, 2006). Samples were classified into the action/maintenance category if participants had explicitly been engaging in the recommended behavior (e.g., a message promoted breast self-exams and 80% of the sample indicated they already performed breast self-exams regularly; Siero, Kok, & Pruyn, 1984) or if they were recruited from a population that would definitionally be in this stage (e.g., patients receiving treatment in alcohol rehabilitation clinics; Brown, 1979).

6.6.5 Age. I coded the average age of each sample (M = 22.77 years; SD = 9.24 years) and categorized samples as children/teens (average age under 18 years), college-aged adults (average age 18-22 years), or adults (average age over 22 years).

6.6.6 Education. I coded the percent of each sample that had attained a high school degree or higher (M = 81%, SD = 37%). Many studies did not provide explicit educational attainment information, but in some cases it was clear that the sample had obtained high school degrees (e.g., samples of college students). In such cases, I estimated the percent of sample who completed high school as 100%.

CHAPTER 7: RESULTS

All analyses were conducted in R using the meta-analytic software package metafor, version 1.9.4 (Viechtbauer, 2010). I conducted all analyses using fixed- and random-effects analyses. As both types of analyses produced comparable results, I present the results of the fixed-effects analyses in the body of the manuscript and the results of the random-effects analyses in Appendix B.

7.1 Distribution of Effect Sizes

I first analyzed the distribution of effect sizes in the sample to determine whether there were biases in study retrieval and inclusion. Figure 1 displays a forest plot for the meta-analytic database, and Figure 2 displays the corresponding funnel plot. If no retrieval or inclusion bias is present in a meta-analytic database, the distribution of effect sizes in the funnel plot should be centered on and symmetric around the mean effect size, with smaller variability toward the top of the figure. If retrieval or inclusion biases are present, then the distribution should be asymmetric around the mean effect size. As can be seen in the figure, the distribution appears quite symmetric with smaller variability toward the top of the plot. I conducted a formal test of funnel plot asymmetry known as Begg and Mazumdar's rank correlation test, which is a non-parametric correlation of the effect sizes with their corresponding standard errors (Begg & Mazumdar, 1994). If this correlation is significantly different from zero, there is evidence of inclusion bias. The rank correlation was $r = -.02$, $p = .67$. Thus, there is no evidence of retrieval or inclusion bias.

Another way of testing for biases is to use the normal quantile plot method (Wang & Bushman, 1999). In a normal quantile plot, the observed values of a variable are plotted against the expected values given normality. If the sample of effect sizes is from a normal distribution,

data points cluster around the diagonal; if the sample of effect sizes is biased by publication practices or eligibility criteria, data points deviate from the diagonal (Wang & Bushman, 1999). As can be seen from Figure 3, the effect sizes followed a straight line and generally fell within the 95% confidence interval of the normality line, and thus there is no evidence of retrieval or inclusion bias.

7.2 Study Characteristics

For descriptive purposes, I recorded the following for each sample: (a) Year of publication; (b) publication form (journal article, unpublished dissertation or thesis, or conference paper); (c) research setting; and (d) issue type/domain. The resulting descriptive statistics appear in Table 4.

7.3 Average Effect Size and Between-Effects Variability

The average weighted effect size comparing outcomes for treatment to comparison groups was $d = 0.27$ with a 95% CI of [0.25, 0.30]. Therefore, fear appeals have a significant and positive effect on outcomes. That is, relative to participants in comparison groups, participants in treatment groups (i.e., those exposed to relatively high levels of depicted fear) had attitudes, intentions, and behaviors that were more in line with the position advocated by the fear appeal. There was also significant heterogeneity among effect sizes $Q(247) = 1{,}287$, $p < .0001$, suggesting that moderator analyses are appropriate.

For studies that included a manipulation check of subjectively experienced fear, I coded this variable and calculated *d* for treatment versus comparison groups using the same methods employed for primary outcomes. I included all measures that asked respondents to report their current levels of fear (e.g., Cauberghe, De Pelsmacker, Janssens & Dens, 2009; Cho & Salmon, 2006; Nabi, Roskos-Ewoldsen & Dillman Carpentier, 2008). Based on the 71 samples that

included such manipulation checks, fear appeals were generally successful at inducing experienced fear, such that treatment groups reported more fear than comparison groups, combined effect size $d = 0.88$ (95% CI: [0.83, 0.94]).

7.4 Theoretical Tests

To test hypotheses of interest (see Table 1), I primarily conducted moderator analyses by calculating weighted effect sizes and corresponding 95% CIs for each level of the moderator variables (i.e., I meta-analyzed samples within each moderator level separately to produce an overall effect size estimate for that level). If the CIs for two moderator levels are not overlapping, then those levels of the moderator are significantly different from each other. In contrast, if the CIs are overlapping, then those levels of the moderator are not significantly different from each other. I also conducted moderated meta-regressions to analyze all moderator variables; those results were identical to the 95% CI analyses and are thus not presented here. Table 5 displays average weighted effect sizes and corresponding 95% CIs for all levels of the categorical moderator variables.

7.5 Tests of message content hypotheses.

7.5.1 Message content: Depicted fear. To test the linear and curvilinear hypotheses, I calculated an average weighted effect size comparing groups that were exposed to moderate depicted fear versus high depicted fear (see Table 3). The linear hypothesis predicts that this effect size should be positive and significant, whereas the curvilinear hypothesis predicts that this effect size should be negative and significant. The combined effect size was $d = 0.02$ with a 95% CI of [-0.05, 0.09]. Therefore, outcomes did not differ for groups exposed to moderate versus high depicted fear. Instead of supporting either the linear or curvilinear hypothesis, this result suggests that depicted fear may have a maximum effective value, beyond which there is no

impact of depicting additional fear. This finding may have implications for practitioners using fear appeals - i.e., once a message depicts moderate fear, there is no value in depicting additional fear, but depicting additional fear will not lead to negative effects.

One caveat is that this analysis was only based on 21 samples. However, this is the largest and most valid test of the linear and curvilinear hypotheses to date. Specifically, to ensure that the test concerned high depicted fear versus moderate depicted fear, I only included studies with at least three levels of depicted fear. Given that I obtained an overall positive effect of depicted fear when comparing treatment and comparison groups, the results here can be interpreted as supporting a modified version of the linear hypothesis. Specifically, depicted fear has significant positive effects, but depicted fear cannot be effectively manipulated indefinitely and results in diminishing returns beyond a certain point (rather than negative effects causing the message to backfire, as suggested by the curvilinear hypothesis). However, given the limited sample size, this conclusion should be confirmed in future research.

7.5.2 Message content: Efficacy statements. The strong and weak efficacy hypotheses both predict that inclusion of efficacy statements in a fear appeal will lead to increased effectiveness. The results support this hypothesis: Fear appeals were more effective when they included efficacy statements (95% CI: [0.41, 0.49]) than when they did not (95% CI: [0.16, 0.22]). However, the strong hypothesis predicts that fear appeals without efficacy messages will backfire and produce negative effects, whereas the weak hypothesis predicts that fear appeals without efficacy statements will simply produce less positive or null effects. The results clearly support the weak efficacy hypothesis and disconfirm the strong efficacy hypothesis. Thus, fear appeals are effective with or without efficacy statements, but the inclusion of efficacy statements is associated with increased effectiveness. These results confirm the conclusions of prior meta-

analyses concerning the use of efficacy statements (de Hoog et al., 2007; Peters et al., 2012; Witte & Allen, 2000).

As numerous theories and researchers have predicted that low efficacy combined with high depicted fear can be a dangerous combination that may backfire and lead message recipients to increase engagement in the harmful behaviors (e.g., Drug Free Action Alliance, 2013; Kok et al., 2014; Ruiter et al., 2014; Witte & Allen, 2000), I decided to explore this idea in more detail. Of the 154 studies with low depicted efficacy, only nine (5.8%) produced significant negative effect sizes. Further, of the 94 studies with high depicted efficacy, only 3 (3.2%) produced significant negative effect sizes. A two-way χ^2 test comparing the frequency of significant negative effects to non-negative effects (non-significant and significantly positive effects combined) revealed there was no difference across the high and low efficacy groups, $\chi^2(1) = .89$, $\varphi = -.06$, $p = .34$. As one of the observed frequencies used in this analysis was below five (the number of significant negative effects for high efficacy messages), the validity of a χ^2 analysis may be questionable. Thus, I also analyzed the data using a Fisher's exact test, which confirmed that there was no significant relation between the number of significant negative effects and the presence of low versus high efficacy statements, $p = .54$. Therefore, there is no evidence that low efficacy statements are more likely to be associated with backfire effects than high efficacy statements. This supplemental analysis supports the conclusions of the initial "efficacy statement" moderator analysis, and together these analyses suggest that low efficacy statements categorically do not increase the likelihood of fear appeals backfiring. However, given the large amount of existing research interest in this idea, I identified several features that were present in all of the studies that contained low depicted efficacy and produced negative effects. All of these studies were conducted in individualist countries, focused on repeated behaviors (see below),

depicted high severity along with low susceptibility (see below), and targeted individuals in the later stages of change (see below). The domains of investigation varied widely, including messages targeting obesity, drunk driving, illegal downloading, dental hygiene, smoking, and internet addiction. Therefore, although I found no evidence whatsoever that low efficacy messages are associated with an increased likelihood of fear appeals backfiring, researchers interested in exploring this idea in future studies may wish to focus on the features identified above.

7.5.3 Message content: Depicted susceptibility and severity. The first hypothesis concerning depicted susceptibility and severity states that fear appeals high in depicted severity (but not depicted susceptibility) will positively influence attitudes but will not influence intentions or behaviors. The 95% CIs indicated that fear appeals that were only high in depicted severity had positive effects for attitudes (95% CI: [0.15, 0.24]), intentions (95% CI: [0.25, 0.34]), and behaviors (95% CI: [0.29, 0.38]) (see Appendix A for the results of all analyses done separately for attitudes, intentions, and behavior). Although this hypothesis was not supported, the results replicated a previous meta-analytic finding that high depicted severity influences all three outcome measures (de Hoog et al., 2007). The second hypothesis is that fear appeals high in depicted susceptibility (but not severity) will positively influence intentions and behaviors but will not influence attitudes. The 95% CIs indicated that fear appeals that were only high in depicted susceptibility had positive effects for attitudes (95% CI: [0.14, 0.53]), intentions (95% CI: [0.23, 0.52]), and behaviors (95% CI: [0.03, 0.84]). Therefore, this hypothesis was not supported. The third hypothesis is that fear appeals with high depicted severity and high depicted susceptibility will positively influence attitudes, intentions, and behaviors. The 95% CIs confirmed this prediction and indicated that fear appeals high on both moderators had positive

effects for attitudes (95% CI: [0.12, 0.28]), intentions (95% CI: [0.22, 0.33]), and behaviors (95% CI: [0.38, 0.53]). Further, the 95% CI for the focal outcome in the present meta-analysis (the average of attitude, intention, and behavior outcomes) also supported this result: [0.29, 0.39]. Thus, fear appeals had positive effects on attitudes, intentions, and behaviors when they were high in depicted severity and/or susceptibility.

7.5.4 Message content: Vividness of the message. Based on research demonstrating that vivid information can be more persuasive than plain information (Nisbett & Ross, 1980; Petty & Cacioppo, 1986; Sherer & Rogers, 1984), fear appeals containing vivid information may be more effective than non-vivid fear appeals. This hypothesis was not supported. Vivid fear appeals (95% CI: [0.27, 0.35]) and non-vivid fear appeals (95% CI: [0.26, 0.35]) were not differentially effective. To test whether message vividness interacted with depicted severity and susceptibility, I calculated confidence intervals for each combination of these variables. First, there were no vivid messages with low depicted severity and susceptibility, but there were non-vivid messages low in both (95% CI: [-0.28, 0.26]). Second, for messages high in depicted severity but low in depicted susceptibility, there was no difference between vivid messages (95% CI: [0.29, 0.39]) and non-vivid messages (95% CI: [0.20, 0.35]). Third, for messages high in depicted susceptibility but low in depicted severity, there were no differences between vivid messages (95% CI: [-0.27, 0.89]) and non-vivid messages (95% CI: [0.23, 0.52]). Finally, for messages high in both depicted susceptibility and severity, there was no difference between vivid messages (95% CI: [-0.10, 0.29]) and non-vivid messages (95% CI: [0.26, 0.38]). Therefore, there was no moderation when considering message vividness along with depicted severity and susceptibility.

7.5.5 Message content: Comparison group message. To explore whether the type of message received by the comparison group moderated effect sizes, I compared the average effect

size for studies with low depicted fear comparison groups (95% CI: [0.210, 0.291]), neutral message comparison groups (95% CI: [0.294, 0.378]), and no message comparison groups (95% CI: [0.182, 0.274]). Surprisingly, neutral comparison groups displayed larger effect sizes (at three decimal places) than both low depicted fear and no message comparison groups, though the latter two did not differ from each other. This was unanticipated and counter to expectations (e.g., that low depicted fear messages would result in weaker effect sizes relative to the other two conditions). However, it is possible that studies using neutral comparison groups also used relatively strong manipulations of depicted fear in the treatment condition, or that these studies systematically differed from other studies along some other dimension. Overall, there were no differences between studies using low depicted fear and no message comparison groups, but both produced smaller average effect sizes compared to studies using neutral comparison groups.

7.6 Tests of the recommended behavior hypotheses.

7.6.1 Recommended behavior: One-time versus repeated behaviors. According to Robertson's (1975) single action theory, fear appeals that attempt to persuade people about one-time behaviors (e.g., getting vaccinated) should be more effective than fear appeals that attempt to persuade people about repeated behaviors (e.g., exercising multiple times per week every week). The results supported this hypothesis, such that fear appeals recommending one-time behaviors (95% CI: [0.42, 0.52]) were more effective than fear appeals recommending repeated behaviors (95% CI: [0.18, 0.24]). However, it is worth noting that fear appeals were effective for both types of recommended behaviors, and they were simply more effective for one-time behaviors.

7.6.2 Recommended behavior: Detection versus prevention/promotion behaviors. Based on hypotheses derived from prospect theory, several researchers have hypothesized that

fear appeals should be more effective when recommending detection behaviors relative to prevention/promotion behaviors. The results did not support this hypothesis, as fear appeals recommending detection behaviors (95% CI: [0.27, 0.41]) and prevention/promotion behaviors (95% CI: [0.24, 0.29]) were equally effective.

7.6.3 Recommended behavior: Death and self-esteem. Based on predictions from terror management theory, fear appeals that mention death (versus not) should be more effective when the recommended behavior is self-esteem enhancing but less effective when the recommended behavior is self-esteem hindering. The results supported these predictions. When fear appeals mentioned death and recommended a self-esteem hindering behavior, the fear appeals were ineffective (95% CI: [-0.16, 0.10]), and were moreover less effective than fear appeals that did not mention death and recommended a self-esteem hindering behavior (95% CI: [0.40, 0.76]). Further, when fear appeals mentioned death and recommended a self-esteem enhancing behavior, they were more effective (95% CI: [0.34, 0.61]) than fear appeals that did not mention death and recommended a self-esteem enhancing behavior (95% CI: [-0.02, 0.16]). Thus, both self-esteem hypotheses derived from terror management theory were supported: When fear appeals recommend self-esteem enhancing behaviors, they are more effective when they mention death, whereas when fear appeals recommend self-esteem hindering behaviors they are less effective when they mention death.

7.6.4 Recommended behavior: Death and delay. A separate prediction derived from terror management theory is that fear appeals that mention death will be more effective if the recommended behavior is measured after a delay rather than immediately. These predictions were partially supported. When fear appeals mentioned death, they were more effective for outcomes that occurred between one and fourteen days after fear appeal exposure (95% CI:

[0.63, 0.91]) relative to outcomes that occurred the same day (95% CI: [0.14, 0.25]) or more than fourteen days later (95% CI: [0.20, 0.46]). The latter two time frames did not differ from each other. However, when fear appeals did not mention death, they were most effective for outcomes that occurred more than fourteen days later (95% CI: [0.33, 0.45]), second most effective for outcomes that occurred the same day (95% CI: [0.22, 0.29]), and ineffective for outcomes that occurred between one and fourteen days after fear appeal exposure (95% CI: [-0.11, 0.14]). Therefore, the death and delay hypothesis is mostly supported: Fear appeals that mention death are most effective after a short time delay of one to fourteen days (but not longer time delays), whereas fear appeals that do not mention death are effective for immediate outcomes, ineffective for medium-delay outcomes, and particularly effective for long-delay outcomes.

Interestingly, the increased effectiveness of fear appeals at a time delay in both conditions suggests that sleeper effects may be common when using fear appeals. A sleeper effect occurs when message recipients initially reject a message's recommendations but then come to accept the recommendations after a time delay (i.e., the message is not persuasive immediately, but it is persuasive after a delay; Kumkale & Albarracin, 2004). The occurrence of sleeper effects in response to fear appeals is sensible given that fear is an avoidance emotion (e.g., Frijda, 1986). That is, the fear induced by the message may cause message recipients to temporarily disengage from thinking about the message's topic, but after the fear subsides, the information conveyed in the message may come to mind and influence attitudes, intentions, and behaviors. Although sleeper effects are typically investigated as a function of a message's source credibility (Kumkale & Albarracin, 2004), these findings suggest that other factors such as the emotion depicted or induced by a message may also cause similar effects.

7.6.5 Recommended behavior: Action versus inaction behaviors. As fear appeals are thought to induce fear (an emotion associated with action tendencies), fear appeals may be more effective when they recommend active rather than inactive behaviors. However, fear appeals recommending actions (95% CI: [0.25, 0.31]) and inactions (95% CI: [0.25, 0.33]) did not differ from each other.

7.6.6 Recommended behavior: Health relevant behaviors. As health relevant messages may be spontaneously perceived as more important and self-relevant than other messages (Colburn, 1967), I compared messages recommending health behaviors (95% CI: [0.24, 0.29]) versus other behaviors (95% CI: [0.25, 0.37]). Based on overlapping confidence intervals, there is no evidence that fear appeals recommending health versus other behaviors differed in effectiveness.

7.7 Tests of the audience hypotheses.

7.7.1 Audience: Gender. Based on predictions derived from regulatory fit, fear appeals should be more effective for women than men. I tested this hypothesis in two ways. First, via meta-regression I regressed effect size onto the percent of the sample that was female, which produced a significant effect, $b = 0.0025$ ($SE = 0.0006$, 95% CI for the slope: [0.0013, 0.0037]), $p < .0001$. Second, I categorized samples as including all-female participants, all-male participants, or an even 50/50 mix (I only included samples that were exactly 50/50 when rounded to the nearest whole digit). Fear appeals had more positive effects for samples with all female participants (95% CI: [0.35, 0.47]) than all male participants (95% CI: [0.00, 0.27]), although neither single-gender group differed significantly from the 50/50 samples (95% CI: [-0.13, 0.35]). Overall, the hypothesis was supported: Fear appeals are more effective for female message recipients than male message recipients.

7.7.2 Audience: Collectivism versus individualism. Based on predictions derived from regulatory fit theory, fear appeals should be more effective for collectivist samples than individualist samples. The results supported this hypothesis, such that fear appeals had more positive effects in studies conducted in collectivist countries (95% CI: [0.35, 0.49]) compared to individualist countries (95% CI: [0.23, 0.28]). However, it is worth noting that fear appeals were effective in both types of samples.

7.7.3 Audience: Race. As African and European cultures tend to be more individualist, whereas Asian and Hispanic/Latino(a) cultures tend to be more collectivist (Sampson et al., 2001), I tested whether fear appeals were less effective when samples included higher percentages of African and European participants but more effective when samples included higher percentages of Asian and Hispanic/Latino(a) participants. Not all studies reported information about race, and some studies collapsed race categories with few members into a single *other* category. Therefore, I initially conducted separate meta-regressions for each race category of interest. There was no relation between percent of the sample and fear appeal effectiveness when looking at percent African (b = -0.0003, SE = 0.0009, 95% CI for the slope: [-0.0015, 0.0021], p = .71), European (b = -0.0002, SE = 0.0005, 95% CI for the slope: [-0.0012, 0.0009], p = .78), Asian (b = 0.0003, SE = 0.0005, 95% CI for the slope: [-0.0007, 0.0013], p = .53), or Hispanic/Latino(a) (b = 0.0008, SE = 0.0022, 95% CI: [-0.0036, 0.0052], p = .35). In a meta-regression predicting effect size simultaneously from all race categories, none of the race variables were significant, with the 95% CIs for the slopes being: African ([-0.0139, 0.0171]), European ([-.0125, 0.0178]), Asian ([-0.0122, 0.0179]), and Hispanic/Latino(a) ([-0.0122, 0.0194]). Therefore, fear appeal effectiveness was unrelated to percent of the sample that was African, Asian, European, and Hispanic/Latino(a).

7.7.4 Audience: Stage of change. Based on the early-effectiveness hypothesis, fear appeals should be more effective for samples that occupy the first three stages of the stages of change model relative to the last two stages. In contrast, the late-effectiveness hypothesis predicts the opposite. Neither hypothesis was supported by the data because audiences in the early stages (95% CI: [0.27, 0.33]) and late stages (95% CI: [0.12, 0.28]) were not differentially impacted by fear appeals.

7.7.5 Audience: Age. As college-aged adults (18-22 years) are generally more influenced by persuasion attempts than other age groups (Sears, 1986), I compared samples with a mean age under 18 years, between 18-22 years, and over 22 years. As predicted, fear appeals were significantly more effective for samples with a mean age of 18-22 years (95% CI: [0.31, 0.39]) compared to under 18 years (95% CI: [0.13, 0.24]) or over 22 years (95% CI: [0.20, 0.28]). Next, I tested whether age interacts with stages of change such that college-aged adults were more persuaded than other age groups in the early stages of change but not the later stages of change. For message recipients in the early stages of change, 18-22 year olds were indeed more persuaded (95% CI: [0.36, .46]) than adults over 22 years (95% CI: [0.20, 0.29]) or children/teens under 18 years (95% CI: [0.19, 0.33]). In contrast, for message recipients in the later stages of change, there was no evidence that 18-22 year olds were more or less persuaded (95% CI: [0.05, 0.39]) than adults over 22 years (95% CI: [0.20, 0.52]) or children/teens under 18 years (95% CI: [0.02, 0.23]]. I also conducted these analyses as meta-regressions treating age as a continuous variable and including a quadratic age term to model the curvilinear effect. The results of the meta-regressions confirmed the results discussed here. Therefore, fear appeals were more effective for college-aged adults (18-22 years) relative to adults over 22 years or

children/teens under 18 years, and this effect held true for message recipients in the early stages of change but not the late stages of changes.

7.7.6 Audience: Education. To test whether education moderated fear appeal effectiveness, I conducted a meta-regression predicting effect size from percent of each sample that had completed at least high school, $b = 0.0016$ ($SE = 0.0003$, 95% CI for the slope: [0.0010, 0.0023]), $p < .001$. The results supported the hypothesis that higher levels of education are associated with increased fear appeal effectiveness.

CHAPTER 8: GENERAL DISCUSSION

Fear appeals are effective. The present meta-analysis found that fear appeals were successful at influencing attitudes, intentions, and behaviors across nearly all conditions that were analyzed. Even when a moderator was unrelated to fear appeal effectiveness, fear appeals were still more effective than comparison treatments. Further, there was not one level of any moderator that I tested for which fear appeals backfired to produce worse outcomes relative to the comparison groups. These results are striking given the wide range of theories that attempt to specify conditions under which fear appeals should be ineffective or counter-productive (e.g., the curvilinear model, the strong efficacy hypothesis, the stage model) and given the numerous practitioners who make bold claims stating that fear appeals are futile or even dangerous (e.g., Drug Free Action Alliance, 2013; Kok et al., 2014; Ruiter et al., 2014). Rather, fear appeals consistently work, and through the present meta-analysis I was able to identify various factors that can enhance their effectiveness to make them work even better. I believe that these results make important contributions to theory, practice, and policy.

8.1 A Message-Behavior-Audience Framework of Fear Appeals

The present review was structured around a framework that considers three important aspects of any fear appeal communication: The message's content, the recommended behavior, and the audience. This model is meant to be an organizing thread to help connect existing theories and research, and to identify areas in need of future research. I believe this framework is useful for several reasons. First, each aspect (message, behavior, and audience) has the potential to vary independently of the others and may impact the communication's effectiveness in ways scholars must consider. Second, this structure connects and organizes seemingly unrelated theories and hypotheses concerning fear appeals, including the linear model, the stage model,

and hypotheses derived from prospect theory. Specifically, I found that fear appeals were more effective when the message depicted relatively high amounts of fear, included an efficacy message, and stressed susceptibility related to the concerns being addressed (i.e., factors concerning the message). I also found that fear appeals were more effective when they recommended one-time only behaviors, self-esteem enhancing behaviors while mentioning death, self-esteem hindering behaviors while not mentioning death, or moderately delayed behaviors while mentioning death (i.e., factors concerning the recommended behavior). Further, fear appeals were most effective when audiences included mostly women, members of collectivist cultures, or college-aged adults in the early stages of change (i.e., factors concerning the audience).

The MBA framework also highlights that prior research has strongly focused on one particular aspect of fear appeals somewhat to the exclusion of the other aspects. Specifically, the bulk of prior research on fear appeals has investigated questions about the message's content – indeed, of the prior meta-analyses on fear appeals, all of them addressed questions related to the message's content while overlooking questions related to the recommended behavior and audience. However, this bias is clearly not due to a lack of interesting or potentially important effects concerning the behavior or audience, as several clear effects emerged pertaining to each. Thus, I hope that the MBA framework will help generate interest in research directed toward these previously under-studied aspects of fear appeal effectiveness.

8.2 Limitations

Three specific limitations are worth mentioning. First, as discussed in the introduction, the present results concern fear appeals rather than fear. That is, the present meta-analysis did not compare people who were subjectively afraid to people who were subjectively unafraid, but

rather it compared groups that were exposed to messages designed to depict more or less fear inducing content. Consequently, all comparisons between the treatment and comparison groups must be interpreted as effects of exposure to depicted levels of fear rather than effects of fear per se. However, this feature is not unique to the present analyses, and prior meta-analyses of fear appeals are subject to the same considerations (e.g., Boster & Mongeau, 1984; de Hoog et al., 2007; Peters et al., 2012; Sutton, 1984; Witte & Allen, 2000). As researchers and practitioners alike are typically concerned with how to design effective communications, knowledge of the effectiveness of fear appeals is quite useful.

Relatedly, although the treatment groups were found to have experienced more subjective fear than the comparison groups, the majority of samples included no assessment of subjective fear (k = 177, which is 71% of samples in the database). This is a serious limitation of the existing literature for three reasons. First, if fear appeals are presumed to have an effect on outcomes by instilling fear in message recipients, it is important to verify that these messages actually evoke fear, and that it is the evoked fear that mediates the relation between message presentation and response. Indeed, many fear appeals may evoke emotions in addition to fear (e.g., disgust, anger), and these other emotions may partially (or in some cases fully) mediate the effects of fear appeals. Second, the lack of subjective fear measures makes it difficult (if not impossible) to equate fear appeal intensity across studies. What one research team refers to as low fear may represent what another research teams refers to as moderate fear or a control condition. However, the inclusion of subjective measures of fear in response to fear appeals would enable researchers to equate fear appeal intensity across studies and more precisely investigate effects via well-calibrated levels of fear. For example, this could be done by labeling fear conditions based on subjective fear ratings provided by participants in a standardized way –

e.g., if the average subjective fear rating was a "2" on a 1 (not frightened) to 5 (very frightened) scale, then the fear condition could be labeled as a *40% fear condition* (2/5 = .40), whereas if the average subjective fear rating was "3," the condition could be labeled as a *60% fear condition* (3/5 = .60). Such labeling systems would help researchers equate fear conditions across studies and would also discourage misinterpretations of fear conditions simply based on the subjective labels given to conditions by researchers that may or may not actually reflect the amount of subjectively experienced fear (e.g., *moderate-fear* or *low-fear* are both terms that could reasonably describe a "40% fear" condition). Finally, the lack of subjective fear measures makes it difficult for researchers interested in the effects of fear (rather than fear appeals) to investigate relevant hypotheses meta-analytically. All three of these issues can be easily resolved by including measures of subjective fear in future studies on fear appeals, and I therefore urge researchers to do so.

The third limitation of note concerns the coding of variables in the current meta-analysis. Specifically, to test hypotheses related to terror management theory, studies were coded as either containing the word death or not. However, some studies did not include full texts for fear appeal messages, and thus it is possible that some messages did contain the word death but were nonetheless coded as not containing this word (however, studies were only coded as containing the word death if a portion of the message's text was available that showed this word). Overall, it is likely that such miscodings would attenuate potential differences across conditions, although analyses including this variable found significant results nonetheless.

8.3 Future Directions

8.3.1 Experimental manipulations and mechanisms. The present meta-analysis only included experimental studies that compared treatment and comparison groups, and thus internal

validity is good when considering the effects of relatively high versus low depicted fear. However, meta-analyses are a correlational research design, and thus many of the moderator analyses I conducted should be interpreted with this in mind. For example, does using fear appeals to target one-time behaviors versus recurring behaviors actually cause the fear appeals to be more effective, or are fear appeals that target one-time behaviors systematically different from fear appeals that target recurring behaviors along some other dimension that results in the observed difference? Future experimental work will be necessary to address such questions, and I therefore encourage researchers to experimentally test the moderator findings concerning variables that were not manipulated in the primary studies.

It is also important for future research to uncover the mechanisms behind the moderation effects I identified. For example, why are fear appeals more effective for one-time behaviors? A number of the hypotheses that I substantiated are relatively agnostic concerning mechanisms, and this is a serious gap in the current fear appeal literature. To truly understand fear appeal effectiveness, it is necessary to know why they work. This knowledge could then be used to design more effective fear appeals, and it could potentially be used for other types of communications as well.

Relatedly, future research could benefit from developing methods to manipulate perceptions of certain variables that were found to be significant moderators. For example, fear appeals were more effective for one-time behaviors, but this knowledge is currently of little use to researchers or practitioners who address recurring behaviors. However, this knowledge could become useful if methods were developed to successfully re-frame recurring behaviors as one-time behaviors. Such methods would also allow for experimental tests of the relevant dimensions

and mechanisms (e.g., test whether fear appeals can be made more effective for a particular behavior if the behavior is framed as one-time rather than recurring).

8.3.2 Linear effect of fear. Another important question to address in future research concerns the linear and curvilinear hypotheses tested in the present study. Strictly speaking, I did not find support for either model. High levels of depicted fear did not lead to different outcomes than moderate depicted fear, suggesting that high and moderate depictions of fear produce similar results. However, the reason for this is unclear – were the high fear messages unsuccessful at evoking more subjective fear than the moderate messages, or is there simply a point beyond which additional fear (depicted or subjective) confers no benefit? To explore these possibilities, future studies should examine a large range of depicted fear along with measures of subjectively experienced fear.

8.3.3 Attitudes, intentions, and behaviors. The results for attitude, intention, and behavior measures were generally consistent across studies, though occasionally the results diverged for certain moderators (see Appendix A for all results presented separately for attitudes, intentions, and behaviors). In such cases, it is difficult to interpret why such differences exist. First, different types of measures are often used for different outcomes. For example, behaviors were frequently measured using counts ("Number of times you did X") or observational techniques (e.g., recording data from medical records; Ordoñana et al., 2009), intentions were frequently measured using agreement with dichotomous statements (e.g., "In the future, I intend to stop spending time outside strictly for the purpose of getting a tan," with responses *Yes* and *No*; McMath & Prentice-Dunn, 2005, p.629) or Likert scales, and attitudes were frequently measures using semantic differential scales and Likert scales. Therefore, when results in the present meta-analysis differ as a function of attitude, intention, and behavior outcomes, these

differences may reflect substantive differences concerning the impact of fear appeals on different outcomes, or they may simply represent measurement variance across outcome measures and have nothing to do with substantive differences.

Second, behaviors are often more difficult to accurately assess than attitudes or intentions, and thus researchers may be less likely to include behavioral measures when investigating certain types of hypotheses, such as new or risky hypotheses that have a lower probability of success. Similarly, it is possible that certain types of target behaviors are more likely to be tapped with certain types of measures – e.g., it may be more natural to assess attitudes toward recurring behaviors ("What is your attitudes toward getting the flu vaccine each year?") rather than intentions ("Do you intend to get the flu vaccine each year for the rest of your life?"). Thus, differences across outcome types may also reflect differences in the types of behaviors or populations being targeted. Generally, when attitude, intention, and behavior results differed, there was no overall apparent pattern for these differences. Combined with the high correlations among measures, this indicates that differences across outcome types may be more likely to result from extraneous differences (e.g., measurement variance) rather than substantive differences, but this is a question that should still be explored in future research. Overall, it is still appropriate to combine these outcome types for the reasons discussed above in the methods section (i.e., they were highly correlated with each other, and they all represent outcomes of persuasion, which is the primary focus of the present analysis), and readers interested in differences among outcomes should consult Appendix A.

8.3.4 Integration of findings. Finally, I believe that an additional benefit of the MBA framework is its ability to guide researchers in generating future research questions. As mentioned, organizing the existing literature under this framework highlights the relative dearth

of research addressing the behavior and audience aspects of the model relative to the message aspect. A number of interesting questions have yet to be explored in these areas. For example, are fear appeals more effective if they address behaviors concerning the self or close others (e.g., one's children, romantic partners), public or private behaviors (e.g., exercising at a gym versus alone), or socially desirable or undesirable behaviors? Further, are fear appeals differentially effective for target populations that differ in age, education, social class, or personality? Such questions have received relatively little attention, but they have the potential to inform fear appeal theory and practice.

Additionally, what kinds of interactions exist when crossing aspects of message, behavior, and audience? I investigated two such questions in the present study with the hypotheses related to terror management theory – i.e., message content (presence versus absence of the word death) crossed with the recommended behavior (self-esteem enhancing versus hindering behaviors, immediate versus delayed outcomes). Both of these hypotheses were confirmed and yielded important insights into fear appeal effectiveness. This prompts the question of which other variables interact, particularly variables from separate aspects of the model. For example, might fear appeal effectiveness be moderated by interactions of culture (a factor of the audience) with the kind of behavior addressed by the fear appeal? Cross-cultural differences have rarely been explored in the effectiveness of fear appeals, and it is possible that cultural sensitivity to a behavior/issue may moderate the effectiveness of fear appeals addressing that behavior/issue. For example, East Asian countries have extremely low HIV prevalence rates and thus may be less susceptible to fear appeals on that topic relative to other topics. Whether this is true and whether it interacts with related findings (e.g., increased effectiveness of fear

appeals in collectivist samples) is an empirical question that could be fruitfully explored in future research.

Importantly, aspects other than message content, behavior, and audience may moderate the effectiveness of fear appeal communications. However, based on my review of the literature, there simply appeared to be too little research on other aspects to include them in the current framework. Two potential aspects worth noting are the source of the communication and the subjective experience of the message recipient. First, based on a well-established body of literature in persuasion demonstrating that aspects of a message's source can influence the persuasiveness of the message (Briñol & Petty, 2009; Kumkale et al., 2010; Pornpitakpan, 2004; Wilson & Sherrell, 1993), the source of a fear appeal communication should be an important moderator for fear appeal effectiveness. For example, fear appeals from benevolent groups (e.g., a respected government institution, a close personal friend) may be more effective than fear appeals from self-interested groups (e.g., corporations or other for-profit entities). However, most empirical studies did not detail source information in a manner that allowed for a test of such hypotheses. Further, many fear appeals are delivered in the form of public service announcements, and thus there is relatively little variation across existing studies on this dimension. Second, drawing on the previous distinction between fear appeals and fear, the subjective experience of the message recipient should be an important aspect of fear appeal communications. Although most empirical studies simply do not measure participants' subjective states, such measures could be very informative to test a variety of interesting questions. For example, is fear the only emotion evoked by fear appeals? If not, what other negative emotions are evoked (e.g., disgust, shame, guilt, anger), and are they partially responsible for the effectiveness of fear appeals? Similarly, perhaps the effects of fear appeals

are simply driven by induced negative affect or high arousal, and the specific experience of fear is superfluous? Future research using measures of subjective experience are needed to address these questions. The paucity of existing research addressing source characteristics and subjective experience led me to not include these as aspects of the current review framework, but they would be welcome additions in the future.

It is worth noting that the MBA model is intended as an organizing framework to connect existing theories of fear appeals, rather than as a novel theory of fear appeals. Although the present research was not concerned with developing a grand, over-arching theory of fear appeal effectiveness, some researchers may be interested in creating such a theory, and this framework presents a solid foundation upon which researchers could pursue that goal. Specifically, when looking across results from the message, behavior, and audience aspects of the model, it may be possible to identify common themes that could be leveraged to form an over-arching theory. As one example, most of the significant effects can be construed as relevant to goal adoption and pursuit. For example, the amount of depicted fear, the amount of depicted severity and susceptibility, and the presence of the word death (in certain conditions) are all factors that can enhance the perceived importance of adopting the fear appeal's recommendation as a goal because they highlight the importance of doing so. Further, the presence of efficacy statements and the focus on one-time (versus repeated behaviors) are both factors that may enhance the perceived ease with which the fear appeal's recommendation could be pursued, thus making people feel as though the goal is more attainable and thus worthy of attention. Additionally, by targeting particular audiences, fear appeal recommendations may spontaneously be perceived as relevant to chronic goals for groups who are chronically avoidance-focused (women and members of collectivist cultures) or they may highlight why a particular goal is important for

groups who have not considered the goal before (young adults in the early stages of change). This is just one example of how the results of the present meta-analysis could be used to help future researchers identify common, cross-cutting themes that could then be used to build an over-arching theory of fear appeal effectiveness

8.4 Conclusion

To conclude, fear appeals are effective, and the present synthesis organized and identified factors that make them even more effective. Specifically, fear appeals are particularly effective when the communication depicts relatively high amounts of fear, includes an efficacy message, and stresses severity and susceptibility related to the concerns being addressed. Fear appeals are also more effective when they recommend one-time only behaviors, self-esteem enhancing behaviors while mentioning death, self-esteem hindering behaviors while not mentioning death, or delayed behaviors while mentioning death. Finally, fear appeals are also more effective when the audience is comprised of mostly women, members of collectivist cultures, or college-aged adults in the early stages of change. I formed these conclusions by meta-analytically testing a wide variety of influential fear appeal theories using the largest and most comprehensive fear appeals database to date. I believe this analysis has provided a thorough overview of the state of the literature and also generated a variety of important and exciting future directions.

Table 1. Theories and hypotheses tested.

MBA Aspect	Theory	Hypothesis	Current Meta-Analysis	Relevant Prior Meta-Analyses
Message	LM	High depicted fear will lead to better outcomes than moderate depicted fear	Partial support	Boster & Mongeau (1984) Sutton (1982) Witte & Allen (2000)
	CM	High depicted fear will lead to worse outcomes than moderate depicted fear	Not supported	
	ES	Strong: Fear appeals that lack efficacy statements will produce negative effects	Not supported	de Hoog et al. (2007) Earl & Albarracin (2007) Floyd et al. (2000) Milne et al. (2000) Peters et al. (2012) Witte & Allen (2000)
	ES	Weak: Fear appeals that lack efficacy statements will produce weaker effects (less positive or null) relative to fear appeals that include efficacy statements	Supported	
	SM	Fear appeals with high depicted severity (and low depicted susceptibility) will positively influence attitudes but will not influence intentions or behaviors	Not supported	de Hoog et al. (2007) Floyd et al. (2000) Milne et al. (2000)
	SM	Fear appeals with high depicted susceptibility (and low depicted severity) will positively influence intentions and behaviors but will not influence attitudes	Not supported	
	SM	Fear appeals with high depicted severity and high depicted susceptibility will positively influence attitudes, intentions, and behaviors	Supported	
	VIV	When fear appeals contain vivid information, they will be more effective	Not supported	None
	VIV	Fear appeals with high depicted severity will be particularly effective when conveyed with vivid information	Not supported	
	VIV	Fear appeals with high depicted susceptibility will be particularly effective when conveyed with non-vivid information	Not supported	
	COMP	The type of comparison group used may moderate effect sizes for outcome measures	Partial support	
Behavior	RSAT	Fear appeals will be more effective for one-time versus repeated behaviors	Supported	None
	PT	Fear appeals will be more effective for detection versus promotion/prevention behaviors	Not supported	

Table 1 (cont.)

MBA Aspect	Theory	Hypothesis	Current Meta-Analysis	Relevant Prior Meta-Analyses
	TMT	When fear appeals recommend an SEE behavior, fear appeals that mention death should be more effective than fear appeals that do not	Supported	
	TMT	When fear appeals recommend an SEH behavior, fear appeals that mention death should be less effective than fear appeals that do not	Supported	
	TMT	Fear appeals that mention death (versus not) will be more effective for delayed outcomes	Partial support	
	ACT	Fear appeals will be more effective for action versus inaction behaviors	Not supported	
	CHRT	Fear appeals will be more effective for health-relevant versus other behaviors	Not supported	
Audience	RFT	Fear appeals will be more effective for female versus male audiences	Supported	None
	RFT	Fear appeals will be more effective for collectivist versus individualist audiences	Supported	
	RFT	Fear appeals will be more effective for Asian and Hispanic/Latino(a) audiences	Not supported	
	RFT	Fear appeals will be less effective for African and European audiences	Not supported	
	TM	Early: Fear appeals will be more effective for people in early TM stages of change	Not supported	
	TM	Late: Fear appeals will be more effective for people in late TM stages of change	Not supported	
	SAPT	Fear appeals will be more effective for young adults	Supported	
	SAPT	Fear appeals will be more effective for young adults in the early stages of change, but equally effective for all age groups in the later stages of change	Supported	
	ED	Fear appeals will be more effective for adults with higher levels of education	Supported	

Note: LM = Linear Model. CM = Curvilinear Model. ES = Efficacy Statements. SM = Stage Model. VIV = Vividness of Message. COMP = Comparison Group's Message. RSAT = Robertson's Single Action Theory. PT = Prospect Theory. TMT = Terror Management Theory. ACT = Action/Inaction Theory. CHRT = Colburn's Health Relevance Theory. RFT = Regulatory Focus Theory. TM = Transtheoretical Model. SAPT = Sear's Age and Persuasion Theory. ED = Education of Audience. SEE = Self-esteem enhancing. SEH = Self-esteem hindering.

Table 2. Effect sizes, sample sizes, and moderator codes for each sample in the meta-analysis.

Paper	AIB	d	N	dfear	Eff	Sus	Sev	V	C	OR	DPP	DP	SE	Delay	AI	HR	%F	IC	SOC	Age	Ed	R1	R2	R3	R4
Bagley & Low, 1992	B	.08	41	—	Y	N	Y	—	No	R	PP	N	—	L	A	Y	66	I	E	20	100	—	—	—	—
Bang, 1994	AI	-.11	223	.87	N	N	Y	Y	Ne	R	PP	Y	—	S	I	Y	54	I	—	20	100	—	—	—	—
Beach, 1966	I	.38	28	—	N	N	Y	Y	Lo	O	PP	Y	—	L	A	Y	—	I	E	—	—	—	—	—	—
Beck & Davis, 1978																									
1: Low Interest	AI	-.05	31	—	N	N	Y	Y	No	R	PP	N	—	S	I	Y	42	I	—	20	100	—	—	—	—
2: High Interest	AI	1.03	31	—	N	N	Y	Y	No	R	PP	N	—	S	I	Y	42	I	—	20	100	—	—	—	—
Beck, 1984	I	.77	226	—	N	N	Y	—	Lo	O	PP	N	—	S	A	N	47	I	E	22	100	—	—	—	—
Berkowitz, 1998																									
1: Low Sensation-Seeking, Message Choice	AIB	.02	48	—	Y	Y	Y	N	Lo	R	PP	N	—	M	A	Y	62	I	E	22	100	15	7	72	2
2: Low Sensation-Seeking, No Message Choice	AIB	-.23	34	—	Y	Y	Y	N	Lo	R	PP	N	—	M	A	Y	62	I	E	22	100	15	7	72	2
3: High Sensation-Seeking, Message Choice	AIB	.21	42	—	Y	Y	Y	N	Lo	R	PP	N	—	M	A	Y	62	I	E	22	100	15	7	72	2
4: High Sensation-Seeking No Message Choice	AIB	.01	48	—	Y	Y	Y	N	Lo	R	PP	N	—	M	A	Y	62	I	E	22	100	15	7	72	2
Brouwers & Sorrentino, 1993	IB	.25	149	—	Y	Y	Y	N	Lo	O	D	Y	—	S	A	Y	69	I	E	20	100	—	—	—	—
Brown, 1979	A	1.81	38	—	N	N	Y	N	No	R	PP	N	—	S	I	Y	0	I	L	46	—	—	—	—	—
Burnett, 1981	AI	1.06	76	—	N	N	Y	N	Ne	O	PP	N	—	S	A	N	—	I	E	—	—	—	—	—	—
Calantone & Warshaw, 1985	B	.96	180	0	Y	N	Y	N	Ne	O	PP	N	—	S	A	N	—	I	E	20	100	—	—	—	—
Carey, 1990	I	0	118	.42	N	N	Y	—	Lo	O	PP	Y	—	S	A	N	—	I	E	20	100	—	—	—	—
Chang et al., 1989	B	-.1	1425	—	N	N	Y	—	No	R	PP	N	—	S	A	Y	—	I	E	32	75	—	—	—	—
Cho & Salmon, 2006	IB	.42	239	2.08	N	Y	Y	N	Lo	R	PP	Y	SEH	M	A	Y	61	I	—	20	100	—	—	84	—
Chu, 1966																									
1: Low Efficacy	B	.36	240	—	N	Y	Y	—	Lo	O	PP	Y	—	M	A	Y	—	C	E	11	0	—	—	—	—
2: Medium Efficacy	B	.52	242	—	Y	Y	Y	—	Lo	O	PP	Y	—	M	A	Y	—	C	E	11	0	—	—	—	—
3: High Efficacy	B	1.71	231	—	Y	Y	Y	—	Lo	O	PP	Y	—	M	A	Y	—	C	E	11	0	—	—	—	—
Cooper et al., 2014																									
1: Appearance	I	.09	98	—	—	Y	Y	Y	Ne	R	PP	N	SEH	S	A	N	65	I	E	25	—	0	5	90	5
2: Cancer	I	-.33	98	—	—	Y	Y	Y	Ne	R	PP	Y	SEH	S	A	Y	65	I	E	25	—	0	5	90	5
Dabbs & Leventhal, 1966	AIB	.68	120	1.16	Y	Y	Y	N	No	O	PP	Y	—	S	A	Y	—	I	E	22	100	—	—	—	—
Dahl et al., 2003	B	.8	68	—	N	N	Y	Y	No	R	PP	Y	—	S	A	Y	—	I	—	23	—	—	—	—	—

Table 2 (cont.)

Paper	AIB	d	N	dfear	Eff	Sus	Sev	V	C	OR	DPP	DP	SE	Delay	AI	HR	%F	IC	SOC	Age	Ed	R1	R2	R3	R4
Das et al., 2003																									
1: Study 1, Weak Arguments, Low Vulnerability	A	-1.09	52	—	Y	N	Y	—	Lo	O	PP	N	—	S	A	N	—	I	E	20	100	—	—	—	—
2: Study 1, Weak Arguments, High Vulnerability	A	1.39	37	—	Y	N	Y	—	Lo	O	PP	N	—	S	A	N	—	I	E	20	100	—	—	—	—
3: Study 1, Strong Arguments, Low Vulnerability	A	2.12	45	—	Y	N	Y	—	Lo	O	PP	N	—	S	A	N	—	I	E	20	100	—	—	—	—
4: Study 1, Strong Arguments, High Vulnerability	A	-.63	43	—	Y	N	Y	—	Lo	O	PP	N	—	S	A	N	—	I	E	20	100	—	—	—	—
5: Study 2, Weak Arguments, Low Vulnerability	A	-.33	28	—	Y	N	Y	—	Lo	O	PP	N	—	S	A	N	—	I	E	23	100	—	—	—	—
6: Study 2, Weak Arguments, High Vulnerability	A	.11	28	—	Y	N	Y	—	Lo	O	PP	N	—	S	A	N	—	I	E	23	100	—	—	—	—
7: Study 2, Strong Arguments, Low Vulnerability	A	-.26	23	—	Y	N	Y	—	Lo	O	PP	N	—	S	A	N	—	I	E	23	100	—	—	—	—
8: Study 2, Strong Arguments, High Vulnerability	A	.23	32	—	Y	N	Y	—	Lo	O	PP	N	—	S	A	N	—	I	E	23	100	—	—	—	—
9: Study 3, Weak Arguments	A	-.5	31	—	Y	Y	Y	—	Lo	O	PP	N	—	S	A	N	—	I	E	20	100	—	—	—	—
10: Study 3, Strong Arguments	A	.99	29	—	Y	Y	Y	—	Lo	O	PP	N	—	S	A	N	—	I	E	20	100	—	—	—	—
de Hoog et al., 2005	AIB	.59	118	.64	Y	Y	Y	—	Lo	O	PP	N	—	S	A	N	69	I	E	20	100	—	—	—	—
de Hoog et al., 2008																									
1: Study 1, Low Source Credibility	AI	.41	30	—	N	Y	Y	—	Lo	O	D	N	—	S	A	Y	71	I	E	20	100	—	—	—	—
2: Study 1, High Source Credibility	AI	.25	30	—	N	Y	Y	—	Lo	O	D	N	—	S	A	Y	71	I	E	20	100	—	—	—	—
3: Study 2, Weak Arguments	AI	.51	32	—	N	Y	Y	—	Lo	O	D	N	—	S	A	Y	75	I	E	20	100	—	—	—	—
4: Study 2, Strong Arguments	AI	.65	32	—	N	Y	Y	—	Lo	O	D	N	—	S	A	Y	75	I	E	20	100	—	—	—	—
Dembroski et al., 1978																									
1: Black Communicator	A	.22	40	—	Y	Y	Y	—	Ne	R	PP	N	—	—	A	Y	52	I	E	15	0	100	0	0	0
2: White Communicator	A	1.48	40	—	Y	Y	Y	—	Ne	R	PP	N	—	—	A	Y	52	I	E	15	0	100	0	0	0
Dijkstra & Bos, 2015	IB	-.01	118	—	Y	N	Y	N	Lo	R	PP	Y	—	L	I	Y	56	I	E	37	81	0	0	100	0
Duke et al., 2014																									
1: Threat vs. Control	IB	.41	1540	—	N	N	Y	Y	No	R	PP	N	—	L	I	Y	53	I	E	45	95	10	6	79	6
2: Threat + SE vs. SE	IB	.67	970	—	Y	N	Y	Y	Ne	R	PP	N	—	L	I	Y	53	I	E	45	95	10	6	79	6
Evans et al., 1968	B	-.53	49	—	N	N	Y	—	Ne	R	PP	N	—	M	A	Y	—	I	E	14	0	—	—	—	—

Table 2 (cont.)

Paper	AIB	d	N	dfear	Eff	Sus	Sev	V	C	OR	DPP	DP	SE	Delay	AI	HR	%F	IC	SOC	Age	Ed	R1	R2	R3	R4
Evans et al., 1970	IB	.35	156	—	Y	N	Y	—	Ne	R	PP	N	—	M	A	Y	—	I	E	14	0	—	—	—	—
Feenstra et al., 2014	AIB	.32	1128	—	N	N	Y	Y	No	R	PP	N	—	L	I	N	52	I	E	15	0	0	0	100	0
France et al., 2014																									
1: Threat vs. Control	I	.65	141	—	N	N	Y	N	Ne	R	PP	N	—	S	I	Y	100	I	E	32	90	0	0	100	0
2: Threat + SE vs. SE	I	.48	213	—	Y	N	Y	N	Ne	R	PP	N	—	S	I	Y	100	I	E	32	90	0	0	100	0
Frandsen, 1963	A	.13	1080	—	N	N	Y	—	Lo	R	PP	N	—	S	—	Y	—	I	E	20	100	—	—	—	—
Fukada, 1973	IB	.3	354	2.09	Y	N	Y	—	Lo	O	D	N	—	S	A	Y	57	C	—	20	100	0	100	0	0
Fukada, 1975																									
1: Low Efficacy, Low Source Credibility	AIB	-.19	76	.96	N	Y	Y	N	Ne	O	D	N	—	S	A	Y	100	C	—	20	100	0	100	0	0
2: Low Efficacy, High Source Credibility	AIB	.58	76	1.52	N	Y	Y	N	Ne	O	D	N	—	S	A	Y	100	C	—	20	100	0	100	0	0
3: High Efficacy, Low Source Credibility	AIB	.31	76	1.03	Y	Y	Y	N	Ne	O	D	N	—	S	A	Y	100	C	—	20	100	0	100	0	0
4: High Efficacy, High Source Credibility	AIB	.89	76	1.19	Y	Y	Y	N	Ne	O	D	N	—	S	A	Y	100	C	—	20	100	0	100	0	0
Fukada, 1983a	AIB	.94	48	3.63	N	N	Y	—	No	O	D	N	—	L	A	Y	100	C	—	20	100	0	100	0	0
Fukada, 1983b																									
1: No Forewarnings	I	.99	76	—	N	Y	Y	N	Lo	O	D	N	—	S	A	Y	100	C	—	20	100	0	100	0	0
2: Topic Content Forewarning	I	.72	76	—	N	Y	Y	N	Lo	O	D	N	—	S	A	Y	100	C	—	20	100	0	100	0	0
3: Persuasive Intent Forewarning	I	.58	76	—	N	Y	Y	N	Lo	O	D	N	—	S	A	Y	100	C	—	20	100	0	100	0	0
4: Fear Arousal Forewarning	I	1.08	76	—	N	Y	Y	N	Lo	O	D	N	—	S	A	Y	100	C	—	20	100	0	100	0	0
5: Topic Content & Fear Arousal Forewarnings	I	.94	76	—	N	Y	Y	N	Lo	O	D	N	—	S	A	Y	100	C	—	20	100	0	100	0	0
6: Topic Content & Persuasive Intent Forewarnings	I	1.1	76	—	N	Y	Y	N	Lo	O	D	N	—	S	A	Y	100	C	—	20	100	0	100	0	0
7: Persuasive Intent & Fear Arousal Forewarnings	I	.64	76	—	N	Y	Y	N	Lo	O	D	N	—	S	A	Y	100	C	—	20	100	0	100	0	0
8: All Three Forewarnings	I	.55	76	—	N	Y	Y	N	Lo	O	D	N	—	S	A	Y	100	C	—	20	100	0	100	0	0
Fukada, 1988																									
1: Receive Counterargument	I	.86	42	—	N	N	Y	—	No	O	D	N	—	S	A	Y	100	C	—	20	100	0	100	0	0
2: Don't Receive Counterargument	I	.4	42	—	N	N	Y	—	No	O	D	N	—	S	A	Y	100	C	—	20	100	0	100	0	0
Fukada, 1991	A	-.18	30	2.34	N	N	N	—	Lo	R	PP	N	—	M	—	Y	100	C	—	20	100	0	100	0	0
Gleicher & Petty, 1992	A	.23	336	.31	Y	Y	Y	—	Lo	R	PP	N	—	—	A	Y	—	I	E	20	—	—	—	—	—
Goldenbeld et al., 2008																									
1: Males	AI	-.05	42	—	Y	N	Y	Y	No	R	PP	Y	—	S	I	Y	0	I	—	51	70	0	0	100	0

Table 2 (cont.)

Paper	AIB	d	N	dfear	Eff	Sus	Sev	V	C	OR	DPP	DP	SE	Delay	AI	HR	%F	IC	SOC	Age	Ed	R1	R2	R3	R4
2: Females	AI	.73	32	—	Y	N	Y	Y	No	R	PP	Y	—	S	I	Y	100	I	—	51	70	0	0	100	0
Griffeth & Rogers, 1976	IB	1.17	137	2.89	Y	N	Y	Y	Ne	R	PP	Y	SEE	S	I	Y	—	I	L	16	0	—	—	—	—
Hass et al., 1975	I	.6	56	—	N	N	Y	N	Lo	R	PP	N	—	S	I	Y	—	I	E	20	100	—	—	—	—
Hendrick et al., 1975																									
1: Study 1, Fear Reduction	AI	.15	40	.2	N	N	N	—	Ne	O	PP	N	—	S	I	N	100	I	E	20	100	—	—	—	—
2: Study 1, No Fear Reduction	AI	.72	40	.48	N	N	N	—	Ne	O	PP	N	—	S	I	N	100	I	E	20	100	—	—	—	—
3: Study 2	AI	.24	122	1.41	N	N	N	—	Ne	O	PP	N	—	S	I	N	100	I	E	20	100	—	—	—	—
Hill & Gardner, 1980																									
1: Repressors	B	-.59	27	—	N	N	Y	Y	Lo	O	D	N	—	S	A	Y	0	I	E	44	—	—	—	—	—
2: Sensitizers	B	.44	25	—	N	N	Y	Y	Lo	O	D	N	—	S	A	Y	0	I	E	44	—	—	—	—	—
Hoeken & Geurts, 2005	I	-.34	149	—	N	N	Y	N	Ne	R	PP	N	—	S	I	N	83	I	—	21	100	—	—	—	—
Horowitz & Gustenik, 1970	A	.26	112	.34	N	N	Y	N	Lo	R	PP	Y	—	S	I	Y	—	I	—	20	100	—	—	—	—
Horowitz, 1969																									
1: Single Exposure	A	.37	60	—	N	N	Y	—	Lo	R	PP	Y	—	S	A	Y	0	I	—	20	100	—	—	—	—
2: Multiple Exposures	A	.1	60	—	N	N	Y	—	Lo	R	PP	Y	—	M	A	Y	0	I	—	20	100	—	—	—	—
Insko et al., 1965																									
1: Males	AI	0	72	0	N	Y	Y	—	Lo	R	PP	N	SEE	S	I	Y	0	I	L	13	0	—	—	—	—
2: Females	AI	0	72	0	N	Y	Y	—	Lo	R	PP	N	SEE	S	I	Y	100	I	L	13	0	—	—	—	—
Janis & Feshbach, 1954																									
1: Low Anxiety	AB	-.14	80	—	N	N	Y	—	Lo	R	PP	N	—	M	A	Y	—	I	—	15	0	—	—	—	—
2: High Anxiety	AB	-.68	51	—	N	N	Y	—	Lo	R	PP	N	—	M	A	Y	—	I	—	15	0	—	—	—	—
Janis & Terwilliger, 1962	A	-.72	31	—	N	N	Y	N	Lo	R	PP	Y	—	S	I	Y	19	I	—	37	—	—	—	—	—
Janssens & De Pelsmacker, 2007																									
1: Non-Drivers	A	-.04	95	.44	N	N	Y	Y	Lo	R	PP	Y	SEE	S	I	Y	—	I	L	18	—	—	—	—	—
2: Drivers	A	.01	89	.44	N	N	Y	Y	Lo	R	PP	Y	—	S	I	Y	—	I	—	18	—	—	—	—	—
Johnston, 2006																									
1: No Pre-Test	A	.57	60	—	Y	Y	Y	—	No	O	PP	N	—	S	A	Y	38	I	E	24	100	—	—	—	—
2: Pre-Test	A	.58	60	—	Y	Y	Y	—	No	O	PP	N	—	S	A	Y	38	I	E	24	100	—	—	—	—
Jones & Owen, 2006																									
1: Ages 18-39	I	0	44	.68	Y	N	Y	Y	Lo	R	D	N	—	S	A	Y	100	I	E	29	49	0	0	100	0
2: Ages 40-49	I	0	44	.47	Y	N	Y	Y	Lo	R	D	N	—	S	A	Y	100	I	E	45	49	0	0	100	0
3: Ages 50+	I	-.19	61	0	Y	N	Y	Y	Lo	R	D	N	—	S	A	Y	100	I	L	62	49	0	0	100	0

Table 2 (cont.)

Paper	AIB	d	N	dfear	Eff	Sus	Sev	V	C	OR	DPP	DP	SE	Delay	AI	HR	%F	IC	SOC	Age	Ed	R1	R2	R3	R4
Kareklas & Muehling, 2014																									
1: No Verbal, Control vs. Visual	AI	.25	112	—	N	N	Y	Y	Lo	R	PP	Y	—	S	I	N	44	I	E	24	—	5	11	72	9
2: Verbal, Control vs. Visual	AI	.1	112	—	N	N	Y	Y	No	R	PP	Y	—	S	I	N	44	I	E	24	—	5	11	72	9
Keller & Block, 1996																									
1: Self-Reference	I	-.01	51	.52	Y	Y	Y	Y	Lo	R	PP	Y	—	S	I	Y	—	I	E	20	100	—	—	—	—
2: Other-Reference	I	.84	47	.52	Y	N	Y	Y	Lo	R	PP	Y	—	S	I	Y	—	I	E	20	100	—	—	—	—
Keller, 1999																									
1: Don't Use Condoms	I	-.68	27	—	Y	N	Y	N	Lo	R	PP	Y	—	S	A	Y	100	I	E	24	100	5	11	72	12
2: Regularly Use Condoms	I	.66	34	—	Y	N	Y	N	Lo	R	PP	Y	SEE	S	A	Y	100	I	L	24	100	5	11	72	12
Kim et al., 2009	B	0	183	—	N	N	N	—	Ne	R	PP	N	—	L	A	Y	53	C	E	11	0	0	100	0	0
Kirscht & Haefner, 1973																									
1: One Exposure	B	.22	30	—	N	N	N	Y	Ne	R	PP	N	—	L	—	Y	58	I	E	30	60	—	—	—	—
2: Two Exposures	B	.06	28	—	N	N	N	Y	Ne	R	PP	Y	—	L	—	Y	58	I	E	30	60	—	—	—	—
3: Three Exposures	B	-.1	27	—	N	N	N	Y	Ne	R	PP	Y	—	L	—	Y	58	I	E	30	60	—	—	—	—
Kirscht et al., 1978	B	1.23	109	—	N	N	Y	—	No	R	PP	Y	SEE	M	I	Y	100	I	E	37	—	94	—	—	—
Kleinot & Rogers, 1982																									
1: Low Efficacy	I	.77	22	.99	N	Y	Y	N	Lo	R	PP	Y	—	S	I	Y	—	I	E	20	100	—	—	—	—
2: High Efficacy	I	1.16	22	.99	Y	Y	Y	N	Lo	R	PP	Y	—	S	I	Y	—	I	E	20	100	—	—	—	—
Klohn & Rogers, 1991	I	.68	85	—	N	N	Y	N	No	R	PP	N	SEE	S	A	Y	100	I	E	19	100	29	0	71	0
LaTour & Tanner, 2003	AI	.13	124	—	N	N	Y	Y	Lo	O	D	N	—	S	A	N	43	I	E	36	—	—	—	—	—
LaTour et al., 1996	AI	.29	305	—	N	N	Y	Y	Ne	O	PP	N	—	S	A	N	100	I	E	28	—	17	0	79	0
Leventhal & Niles, 1964	AI	.45	209	—	Y	N	Y	Y	No	O	D	N	—	S	I	Y	—	I	E	—	—	—	—	—	—
Leventhal & Watts, 1966																									
1: Smokers	B	-.02	48	—	Y	N	Y	Y	Lo	O	D	N	SEE	S	I	Y	—	I	L	42	—	—	—	—	—
2: Non-Smokers	B	-1.57	52	—	Y	N	Y	Y	Lo	O	D	N	—	S	I	Y	—	I	E	42	—	—	—	—	—
Leventhal et al., 1965																									
1: No Prior Vaccination	AI	.6	59	1.7	Y	Y	Y	N	Lo	O	PP	N	—	S	A	Y	—	I	E	22	100	—	—	—	—
2: Prior Vaccination	AI	.36	88	1.89	Y	Y	Y	N	Lo	O	PP	N	—	S	A	Y	—	I	L	22	100	—	—	—	—
Leventhal et al., 1967	I	.53	106	.8	Y	N	Y	Y	Ne	R	PP	N	—	S	I	Y	—	I	E	20	100	—	—	—	—
Levin et al., 2007	I	-.41	222	—	N	N	Y	N	Lo	R	PP	N	—	S	I	Y	—	I	E	20	100	—	—	—	—
Lewis et al., 2008																									
1: Male, Low Involvement	A	.23	35	—	N	N	Y	Y	Ne	R	PP	Y	SEE	L	I	N	0	I	L	34	—	0	0	100	0

Table 2 (cont.)

Paper	AIB	d	N	dfear	Eff	Sus	Sev	V	C	OR	DPP	DP	SE	Delay	AI	HR	%F	IC	SOC	Age	Ed	R1	R2	R3	R4
2: Male, High Involvement	A	.44	36	—	N	N	Y	Y	Ne	R	PP	Y	—	L	I	N	0	I	E	34	—	0	0	100	0
3: Female, Low Involvement	A	.91	65	—	N	N	Y	Y	Ne	R	PP	Y	SEE	L	I	N	100	I	L	34	—	0	0	100	0
4: Female, High Involvement	A	.87	65	—	N	N	Y	Y	Ne	R	PP	Y	—	L	I	N	100	I	E	34	—	0	0	100	0
Lewis et al., 2010	I	-.08	270	—	N	N	N	—	Ne	R	PP	N	—	S	I	Y	66	I	—	39	—	—	—	—	—
Li, 2002																									
1: Low Outcome	AI	.27	28	—	N	Y	Y	N	Lo	O	D	N	—	S	A	N	44	I	E	—	—	—	—	—	—
2: High Outcome	AI	.45	29	—	Y	Y	Y	N	Lo	O	D	N	—	S	A	N	44	I	E	—	—	—	—	—	—
Liberman & Chaiken, 1992	I	.35	86	.3	N	Y	N	N	Lo	R	PP	N	—	S	I	Y	100	I	E	20	100	—	—	—	—
1: Low Relevance																									
2: High Relevance	I	.35	86	.3	N	Y	N	N	Lo	R	PP	N	SEE	S	I	Y	100	I	L	20	100	—	—	—	—
Lwin & Malik, 2014																									
1: With Wii	AI	.1	199	—	N	N	Y	N	Ne	R	PP	N	SEE	L	A	Y	42	C	E	10	0	0	100	0	0
2: Without Wii	AI	-.24	199	—	N	N	Y	N	Ne	R	PP	N	SEE	L	A	Y	42	C	E	10	0	0	100	0	0
McMath & Prentice-Dunn, 2005	I	1.06	196	—	Y	N	Y	N	Ne	R	PP	N	SEH	S	I	Y	74	I	E	20	100	0	0	100	0
Meijnders et al., 2001a																									
1: Weak Arguments	AI	-.27	54	—	N	N	Y	—	Ne	O	PP	N	—	S	A	Y	50	I	E	45	42	—	—	—	—
2: Strong Arguments	AI	.47	54	—	N	N	Y	—	Ne	O	PP	N	—	S	A	Y	50	I	E	45	42	—	—	—	—
Meijnders et al., 2001b																									
1: Weak Arguments	A	.46	40	—	Y	N	Y	N	No	O	PP	N	—	S	A	Y	67	I	E	53	39	—	—	—	—
2: Strong Arguments	A	.47	40	—	Y	N	Y	N	No	O	PP	N	—	S	A	Y	67	I	E	53	39	—	—	—	—
Morales et al., 2012																									
1: Study 1 (Meth Use)	I	.42	104	—	N	N	N	—	Ne	R	PP	Y	—	S	I	Y	—	I	—	20	100	—	—	—	—
2: Study 2 (Sun Safety)	I	.43	94	—	N	N	N	—	Ne	R	PP	N	SEH	S	A	Y	—	I	—	20	100	—	—	—	—
3: Study 3 (BPA Products)	I	-.2	54	—	N	N	Y	—	Ne	O	PP	—	—	S	I	Y	—	I	E	—	—	—	—	—	—
Morris et al., 2014																									
1: Study 1, UV Photo	IB	.31	31	—	N	Y	Y	N	Ne	R	PP	Y	SEH	S	A	Y	100	I	E	19	100	0	0	100	0
2: Study 1, No UV Photo	IB	-.53	28	—	N	N	Y	N	Ne	R	PP	Y	SEH	S	A	Y	100	I	E	19	100	0	0	100	0
3: Study 2, Appearance Focus	I	1.05	24	—	N	Y	N	Y	Ne	R	PP	Y	SEH	S	A	N	100	I	E	20	100	0	0	100	0
4: Study 2, Health Focus	I	-.3	27	—	N	Y	N	Y	Ne	R	PP	Y	SEH	S	A	Y	100	I	E	20	100	0	0	100	0
5: Study 2, No Photo	I	-.51	33	—	N	N	N	Y	Ne	R	PP	Y	SEH	S	A	N	100	I	E	20	100	0	0	100	0
Muthusamy et al., 2009																									
1: No Efficacy Message	AIB	-.2	124	-.16	N	Y	Y	N	No	R	PP	N	—	M	A	Y	68	C	E	23	100	100	0	0	0

Table 2 (cont.)

Paper	AIB	d	N	dfear	Eff	Sus	Sev	V	C	OR	DPP	DP	SE	Delay	AI	HR	%F	IC	SOC	Age	Ed	R1	R2	R3	R4
2: Efficacy Message	AIB	.08	124	-.16	Y	Y	Y	N	Ne	R	PP	N	—	M	A	Y	68	C	E	23	100	100	0	0	0
Ordoñana et al., 2009																									
1: No Efficacy Message	IB	.59	45	.47	N	Y	Y	Y	Lo	O	PP	N	—	L	A	Y	83	I	E	20	100	—	—	—	—
2: Efficacy Message	IB	.52	47	.75	Y	Y	Y	Y	Lo	O	PP	N	—	L	A	Y	83	I	E	20	100	—	—	—	—
Pengchit, 2010	B	1.25	124	—	Y	Y	Y	N	Ne	O	PP	N	—	S	A	N	—	I	E	20	—	—	—	—	—
Pepper & Nettle, 2014																									
1: Study 1	IB	-.22	72	—	N	—	—	N	Ne	R	PP	Y	SEE	S	A	Y	46	I	E	—	—	0	0	100	0
2: Study 2	IB	.14	66	—	N	Y	N	N	No	R	PP	Y	SEE	S	A	Y	40	I	E	—	—	0	0	100	0
Powell, 1965																									
1: Threat to Listener	A	-.52	28	—	N	N	N	—	Lo	O	PP	Y	—	S	A	N	0	I	E	—	—	—	—	—	—
2: Threat to Family	A	.84	28	—	N	N	N	—	Lo	O	PP	Y	—	S	A	N	0	I	E	—	—	—	—	—	—
3: Threat to Nation	A	.01	24	—	N	N	N	—	Lo	O	PP	Y	—	S	A	N	0	I	E	—	—	—	—	—	—
Priolo & Mihabet, 2008																									
1: Study 1, Smokers Committed to Quitting	I	.72	60	—	N	—	—	N	Ne	R	PP	Y	SEE	S	I	Y	85	I	E	21	100	—	—	—	—
2: Study 1, Smokers Not Committed to Quitting	I	-.16	60	—	N	—	—	N	Ne	R	PP	Y	SEH	S	I	Y	85	I	E	21	100	—	—	—	—
3: Study 2, Smokers Committed to Smoking	I	-.55	60	1.34	N	—	—	N	Ne	R	PP	Y	SEH	S	I	Y	85	I	E	20	100	—	—	—	—
4: Study 2, Smokers Not Committed to Smoking	I	.49	60	—	N	—	—	N	Ne	R	PP	Y	SEE	S	I	Y	85	I	E	20	100	—	—	—	—
Radelfinger, 1965	I	.9	131	—	Y	N	Y	—	Ne	O	PP	N	—	S	A	Y	—	I	E	20	100	—	—	—	—
Raleigh, 2002																									
1: Males, Low Response Costs	I	-.19	17	—	Y	Y	N	N	Ne	R	PP	N	—	S	A	Y	0	I	E	20	100	—	—	—	—
2: Males, High Response Costs	I	-.25	13	—	N	Y	N	N	Ne	R	PP	N	—	S	A	Y	0	I	E	20	100	—	—	—	—
3: Females, Low Response Costs	I	-.24	11	—	Y	Y	N	N	Ne	R	PP	N	—	S	A	Y	100	I	E	20	100	—	—	—	—
4: Females, High Response Costs	I	-.78	10	—	N	Y	N	N	Ne	R	PP	N	—	S	A	Y	100	I	E	20	100	—	—	—	—
Ramirez & Lasater, 1976	B	0	462	—	Y	N	Y	—	Ne	R	PP	N	—	S	A	Y	—	I	E	12	0	—	—	—	—
Ramirez & Lasater, 1977	B	.3	196	—	Y	N	Y	—	Lo	R	PP	N	—	S	A	Y	—	I	E	13	0	0	0	78	22
Rippetoe & Rogers, 1987	I	.69	128	1.32	Y	Y	Y	N	Lo	R	D	N	—	S	A	Y	100	I	E	20	100	—	—	—	—
Rodriguez, 1995																									
1: Bicycle Safety	A	.98	124	1.37	N	N	Y	N	Ne	R	PP	Y	—	S	A	N	—	I	E	20	100	—	—	—	—
2: Drinking	A	.54	125	.72	N	Y	N	N	Ne	R	PP	Y	—	S	I	Y	—	I	E	20	100	—	—	—	—
3: Tetanus Vaccine	A	.42	120	1.46	N	Y	Y	N	Ne	O	PP	N	—	S	A	Y	—	I	—	20	100	—	—	—	—

Table 2 (cont.)

Paper	AIB	d	N	dfear	Eff	Sus	Sev	V	C	OR	DPP	DP	SE	Delay	AI	HR	%F	IC	SOC	Age	Ed	R1	R2	R3	R4
Rogers & Deckner, 1975																									
1: Study 1	AIB	.25	116	—	N	N	Y	Y	No	R	PP	N	—	S	I	Y	—	I	E	35	—	—	—	—	—
2: Study 2	AI	.38	152	.79	Y	N	Y	Y	Lo	R	PP	N	—	S	I	Y	—	I	E	35	—	—	—	—	—
Rogers & Mewborn, 1976																									
1: Low Efficacy	I	-.04	44	—	N	Y	Y	Y	Lo	R	PP	N	—	S	—	Y	—	I	—	20	100	—	—	—	—
2: High Efficacy	I	.41	44	—	Y	Y	Y	Y	Lo	R	PP	N	—	S	—	Y	—	I	—	20	100	—	—	—	—
Rogers & Thistlethwaite, 1970																									
1: Smokers	I	.47	40	1.1	Y	N	Y	Y	Lo	R	PP	N	—	S	I	Y	—	I	E	20	100	—	—	—	—
2: Non-Smokers	I	.82	40	1.1	Y	N	Y	Y	Lo	R	PP	N	SEE	S	I	Y	—	I	L	20	100	—	—	—	—
Rosen et al., 1982																									
1: Low Self-Esteem	I	.14	28	1.42	N	Y	Y	N	Lo	O	PP	Y	—	S	A	Y	49	I	E	20	100	—	—	—	—
2: High Self-Esteem	I	-.24	28	1.33	N	Y	Y	N	Lo	O	PP	Y	—	S	A	Y	49	I	E	20	100	—	—	—	—
Rosenthal, 1997																									
1: Peptic Ulcers	AI	.01	70	.69	N	Y	N	N	Ne	O	PP	N	—	S	A	Y	—	I	—	20	100	—	—	—	—
2: Heart Disease	AI	.26	70	.69	N	Y	N	N	Ne	O	PP	N	—	S	A	Y	—	I	—	20	100	—	—	—	—
Roskos-Ewoldsen et al., 2004																									
1: Low Efficacy	AI	-.19	55	1.01	N	Y	N	—	Lo	R	D	Y	—	S	A	Y	100	I	—	20	100	—	—	—	—
2: High Efficacy	AI	.1	55	1.01	Y	Y	N	—	Lo	R	D	Y	—	S	A	Y	100	I	—	20	100	—	—	—	—
Ruiter et al., 2003	AI	.17	130	.94	N	Y	Y	N	Lo	R	D	Y	—	S	A	Y	100	I	—	20	100	—	—	—	—
Schmitt & Blass, 2008	AI	.56	30	—	N	N	Y	Y	No	R	PP	Y	SEE	S	I	Y	—	I	L	20	100	—	—	—	—
Schoenbachler & Whittler, 1996	AI	0	248	.81	N	N	Y	Y	Lo	R	PP	Y	—	S	I	Y	—	I	—	13	0	—	—	—	—
Self & Rogers, 1990																									
1: Low Efficacy	I	-.55	42	—	N	Y	Y	N	Lo	R	PP	N	—	S	I	Y	55	I	—	20	100	—	—	—	—
2: High Efficacy	I	.64	42	—	Y	Y	Y	N	Lo	R	PP	N	—	S	I	Y	55	I	—	20	100	—	—	—	—
Shehryar & Hunt, 2005																									
1: Study 1, Low Commitment to Drunk Driving	A	.01	45	1.95	N	N	Y	Y	Ne	R	PP	Y	SEE	S	I	Y	57	I	—	22	100	—	—	—	—
2: Study 1, High Commitment to Drunk Driving	A	-1.07	45	1.95	N	N	Y	Y	Ne	R	PP	Y	SEH	S	I	Y	57	I	—	22	100	—	—	—	—
3: Study 2, Low Commitment to Drunk Driving, No Delay	A	-.79	25	2.8	N	N	Y	Y	Ne	R	PP	Y	SEE	S	I	Y	57	I	—	20	100	—	—	—	—
4: Study 2, High Commitment to Drunk Driving, No Delay	A	.12	25	2.8	N	N	Y	Y	Ne	R	PP	Y	SEH	S	I	Y	57	I	—	20	100	—	—	—	—

Table 2 (cont.)

Paper	AIB	d	N	dfear	Eff	Sus	Sev	V	C	OR	DPP	DP	SE	Delay	AI	HR	%F	IC	SOC	Age	Ed	R1	R2	R3	R4
5: Study 2, High Commitment to Drunk Driving, Delay	A	-1.17	25	2.8	N	N	Y	Y	Ne	R	PP	Y	SEH	S	I	Y	57	I	—	20	100	—	—	—	—
Shelton & Rogers, 1981																									
1: Low Empathy	I	.85	56	1.06	Y	N	Y	Y	Lo	R	PP	N	—	S	A	Y	—	I	E	20	—	—	—	—	—
2: High Empathy	I	.26	56	1.06	Y	N	Y	Y	Lo	R	PP	N	—	S	A	Y	—	I	E	20	—	—	—	—	—
Shen, 2011	A	.59	174	2.78	N	N	Y	Y	Ne	R	PP	N	—	S	I	Y	66	I	L	19	100	7	8	80	2
Siero et al., 1984	B	.24	269	—	N	Y	Y	N	No	R	D	Y	—	L	A	Y	100	I	L	53	—	—	—	—	—
Skilbeck et al., 1977																									
1: Single Exposure	B	-.99	40	—	N	N	Y	—	Lo	R	PP	N	SEE	M	I	Y	100	I	E	40	—	—	—	—	—
2: Multiple Exposures	B	-1.23	46	—	N	N	Y	—	Lo	R	PP	N	SEE	M	I	Y	100	I	E	40	—	—	—	—	—
Smalec & Klingle, 2000																									
1: Low Efficacy	B	-.6	22	—	N	Y	Y	N	Lo	O	PP	N	SEH	S	I	Y	81	I	L	24	—	7	9	50	0
2: High Efficacy	B	1.4	22	—	Y	Y	Y	N	Lo	O	PP	N	SEH	S	I	Y	81	I	L	24	—	7	9	50	0
Smart & Fejer, 1974																									
1: Marijuana, Non-Users	I	-.05	856	—	N	Y	Y	N	No	R	PP	N	SEE	S	I	Y	—	I	L	17	0	—	—	—	—
2: Marijuana, Users	I	-.17	249	—	N	Y	Y	N	No	R	PP	N	—	S	I	Y	—	I	E	17	0	—	—	—	—
3: Fictional Drug	I	1.66	194	—	N	Y	Y	N	Ne	R	PP	N	—	S	I	Y	—	I	E	20	100	—	—	—	—
Smerecnik & Ruiter, 2010																									
1: Low Efficacy	I	-.19	30	1.14	N	N	Y	N	Lo	R	PP	Y	—	S	A	Y	65	I	L	21	100	—	—	—	—
2: High Efficacy	I	.76	30	1.14	Y	N	Y	N	Lo	R	PP	Y	—	S	A	Y	65	I	L	21	100	—	—	—	—
Smith & Stutts, 2003																									
1: Males, Overall	B	.29	55	—	N	N	Y	—	No	R	PP	Y	—	L	I	Y	49	I	—	16	—	0	0	0	100
2: Females, Overall	B	.38	76	—	N	N	Y	—	No	R	PP	Y	—	L	I	Y	100	I	—	16	—	16	5	42	34
3: White Subjects	B	.51	61	—	N	N	Y	—	No	R	PP	Y	—	L	I	Y	49	I	—	16	—	0	0	100	0
4: Hispanic Subjects	B	.29	79	—	N	N	Y	—	No	R	PP	Y	—	L	I	Y	0	I	—	16	—	16	5	42	34
5: African-American Subjects	B	.41	24	—	N	N	Y	—	No	R	PP	Y	—	L	I	Y	49	I	—	16	—	100	0	0	0
Stainback & Rogers, 1983																									
1: Immediate Post-Test	I	.65	38	—	Y	Y	Y	—	No	R	PP	N	SEE	S	I	Y	—	I	L	14	0	—	—	—	—
2: Delayed Post-Test	I	1.3	38	—	Y	Y	Y	—	Ne	R	PP	N	SEE	M	I	Y	—	I	L	14	0	—	—	—	—
Stark et al., 2008																									
1: Lozenges	AI	.24	90	—	N	N	Y	Y	Lo	R	PP	N	—	S	—	—	73	I	E	23	100	—	—	—	—
2: Reduced-Exposure Cigarettes	AI	.42	90	—	N	N	Y	Y	Lo	R	PP	N	—	S	—	—	73	I	E	23	100	—	—	—	—
3: Oral Tobacco	AI	.34	90	—	N	N	Y	Y	Lo	R	PP	N	—	S	—	—	73	I	E	23	100	—	—	—	—

Table 2 (cont.)

Paper	AIB	d	N	dfear	Eff	Sus	Sev	V	C	OR	DPP	DP	SE	Delay	AI	HR	%F	IC	SOC	Age	Ed	R1	R2	R3	R4
Stephenson & Witte, 1998	AI	.47	92	—	Y	N	Y	Y	Lo	R	PP	N	SEH	S	A	Y	56	I	E	21	100	—	—	87	—
Struckman-Johnson et al., 1990																									
1: Males	I	-.1	96	—	N	—	—	Y	Lo	R	PP	N	—	S	A	Y	0	I	—	19	0	—	—	—	—
2: Females	I	-.03	95	—	N	—	—	Y	Lo	R	PP	N	—	S	A	Y	100	I	—	19	0	—	—	—	—
Sturges & Rogers, 1996																									
1: Kids, Low Coping	I	.02	30	—	N	Y	Y	—	No	R	PP	N	SEE	S	I	Y	50	I	L	10	0	4	1	93	2
2: Kids, High Coping	I	.43	37	—	Y	Y	Y	—	No	R	PP	N	SEE	S	I	Y	50	I	L	10	0	4	1	93	2
3: Teens, Low Coping	I	.05	23	—	N	Y	Y	—	No	R	PP	N	SEE	S	I	Y	50	I	L	16	0	3	0	94	2
4: Teens, High Coping	I	.32	22	—	Y	Y	Y	—	No	R	PP	N	SEE	S	I	Y	50	I	L	16	0	3	0	94	2
5: Adults, Low Coping	I	-.34	31	—	N	Y	Y	—	No	R	PP	N	SEE	S	I	Y	50	I	L	20	100	17	3	80	0
6: Adults, High Coping	I	.27	38	—	Y	Y	Y	—	No	R	PP	N	SEE	S	I	Y	50	I	L	20	100	17	3	80	0
Tanner et al., 1991	I	.81	60	.78	N	—	—	N	No	R	PP	N	—	S	A	Y	—	I	—	20	100	—	—	—	—
Taubman Ben-Ari et al., 2000																									
1: Study 1, Low Driving-Related Self-Esteem	I	1.06	27	—	N	N	Y	Y	Ne	R	PP	Y	SEH	S	I	Y	0	C	—	20	—	0	0	100	0
2: Study 1, High Driving-Related Self-Esteem	I	.08	27	—	N	N	Y	Y	Ne	R	PP	Y	SEE	S	I	Y	0	C	—	20	—	0	0	100	0
3: Study 2, Low Driving-Related Self-Esteem	B	-.76	27	—	N	N	Y	Y	Ne	R	PP	Y	SEH	S	I	Y	0	C	—	20	—	0	0	100	0
4: Study 2, High Driving-Related Self-Esteem	B	.2	28	—	N	N	Y	Y	Ne	R	PP	Y	SEE	S	I	Y	0	C	—	20	—	0	0	100	0
ter Horst et al., 1985	B	-.12	107	—	Y	Y	Y	N	No	O	PP	N	—	S	A	Y	—	I	E	36	—	—	—	—	—
Thornton et al., 2000	I	-.65	112	—	N	N	Y	Y	Lo	R	PP	N	—	S	I	N	—	I	L	20	100	—	—	—	—
Umeh & Stanley, 2005	I	-.04	100	.32	Y	N	Y	Y	Lo	R	PP	N	—	S	A	Y	0	I	—	20	100	—	—	90	—
Umeh, 2012																									
1: Low Credibility Source	I	.06	134	.75	Y	N	Y	—	Lo	R	D	Y	—	S	A	Y	100	I	—	22	100	—	—	87	—
2: High Credibility Source	I	.25	134	.75	Y	N	Y	—	Lo	R	D	Y	—	S	A	Y	100	I	—	22	100	—	—	87	—
Venkatesan, 2010	A	3.01	72	0	Y	Y	N	—	Lo	O	PP	N	—	L	A	Y	100	I	E	19	100	11	36	38	14
Weinstein et al., 1990	I	.24	264	—	Y	Y	Y	N	Ne	O	D	Y	—	S	A	N	—	I	E	—	—	—	—	—	—
Welbourne et al., 2008	A	0	308	—	N	N	Y	N	Ne	R	PP	Y	—	S	—	N	—	I	E	—	—	—	—	—	—
Wheatley & Oshikawa, 1970																									
1: Low Anxiety	A	.3	49	—	N	N	N	Y	Ne	O	PP	Y	—	S	A	N	—	I	E	20	100	—	—	—	—
2: High Anxiety	A	-.14	47	—	N	N	N	Y	Ne	O	PP	Y	—	S	A	N	—	I	E	20	100	—	—	—	—

Table 2 (cont.)

Paper	AIB	d	N	dfear	Eff	Sus	Sev	V	C	OR	DPP	DP	SE	Delay	AI	HR	%F	IC	SOC	Age	Ed	R1	R2	R3	R4
Will et al., 2009	AB	.54	352	—	Y	N	Y	Y	No	O	PP	N	—	S	A	Y	80	I	E	—	20	59	2	30	4
Witte & Morrison, 1995	AIB	-.32	122	.79	Y	Y	Y	—	Ne	R	PP	N	—	L	A	Y	45	I	—	16	—	36	0	54	9
Witte et al., 1998	AIB	.03	96	—	N	Y	Y	N	No	R	PP	N	—	S	A	Y	100	I	—	20	100	9	6	79	3
Wong & Cappella, 2009																									
1: High Efficacy	I	.81	278	—	Y	N	Y	—	Ne	R	PP	Y	—	S	I	Y	47	I	E	55	91	6	0	85	5
2: Low Efficacy	I	-.01	277	—	N	N	Y	—	Ne	R	PP	Y	—	S	I	Y	47	I	E	55	91	6	0	85	5
Wurtele & Maddux, 1987																									
1: No Efficacy Message	I	1.42	40	—	N	Y	N	N	Ne	R	PP	N	SEE	M	A	Y	100	I	E	20	100	—	—	—	—
2: Self-Efficacy Message	I	-.11	40	—	Y	Y	N	N	Ne	R	PP	N	SEE	M	A	Y	100	I	E	20	100	—	—	—	—
3: Response-Efficacy Message	I	.75	40	—	Y	Y	N	N	Ne	R	PP	N	SEE	M	A	Y	100	I	E	20	100	—	—	—	—
4: Both Efficacy Messages	I	1.22	40	—	Y	Y	N	N	Ne	R	PP	N	SEE	M	A	Y	100	I	E	20	100	—	—	—	—
Wurtele, 1988	IB	.82	49	—	Y	Y	N	N	Ne	R	PP	N	—	M	A	Y	100	I	E	19	100	—	—	—	—
Yoon & Tinkham, 2013																									
1: Low Past Threat, Nonhumor Ads	AI	-.28	48	—	N	N	Y	N	Lo	R	PP	Y	SEH	S	A	Y	—	I	E	20	100	—	—	—	—
2: Low Past Threat, Humor Ads	AI	.6	48	—	N	N	Y	N	Lo	R	PP	Y	SEH	S	A	Y	—	I	E	20	100	—	—	—	—
3: High Past Threat, Nonhumor Ads	AI	.62	48	—	N	N	Y	N	Lo	R	PP	Y	SEH	S	A	Y	—	I	E	20	100	—	—	—	—
4: High Past Threat, Humor Ads	AI	-.58	48	—	N	N	Y	N	Lo	R	PP	Y	SEH	S	A	Y	—	I	E	20	100	—	—	—	—

Note: AIB = Whether *d* was based on attitude (A), intention (I), and/or behavior (B) outcomes. *d* = Standardized mean difference. N = Sample size for treatment plus comparison. d_{Fear} = Standardized mean difference for fear manipulation check items. EFF = Whether an efficacy statement was included (Y) or not (N). Sus = Whether the treatment message was manipulated to be higher in depicted susceptibility than the comparison message (Y) or not (N). Sev = Whether the treatment message was manipulated to be higher in depicted severity than the comparison message (Y) or not (N). V = Whether the message contained vivid information (Y) or not (N). C = Comparison message was low depicted fear (Lo), neutral (Ne), or no message (No). OR = Whether the recommended behavior was one-time (O) or repeated (R). DPP = Whether the recommended behavior was detection (D) or prevention/promotion (PP). DP = Whether the word death was present in the message (Y) or not (N). SE = Whether the recommended behavior was self-esteem enhancing (SEE) or self-esteem hindering (SEH). Delay = Whether the outcome followed exposure to the message by less than 24 hours (S), 1-14 days (M), or more than 14 days (L). AI = Whether the recommended behavior was an action (A) or inaction (I). HR = Whether the recommended behavior was a health behavior (Y) or not (N). %F = Percent of sample that was female (0-100%). IC = Whether the sample was from an individualist (I) or collectivist (C) culture. SOC = Whether the sample was in the early (E) or late (L) stages of change. Age = Average age of the sample. Ed = Percent of the sample that completed high school or higher. R1-R4: Percent of the sample that was respectively African, Asian, European, and Hispanic/Latino(a). Dash (–) indicates the variable was either not relevant for the study or not measured in the study.

Table 3. Effect sizes and sample sizes for each sample included in the linear versus curvilinear test.

			d			
FirstAuthor	N_H	N_M	**Combined Outcomes**	**Attitudes**	**Intentions**	**Behaviors**
Beck & Davis, 1978						
1: Low Interest	14	15	.28	.28	-	-
2: High Interest	14	16	-.45	-.45	-	-
Burnett, 1981	36	43	.51	.73	.28	-
Chu, 1966						
1: Low Efficacy	100	125	1.06	-	-	1.06
2: Medium Efficacy	112	121	-.18	-	-	-.18
3: High Efficacy	120	112	.36	-	-	.36
Hill & Gardner, 1980						
1: Repressors	11	13	-.07	-	-	-.07
2: Sensitizers	15	14	.65	-	-	.65
Leventhal et al., 1965						
1: No Prior Vaccination	22	34	.09	-	-	.09
2: Prior Vaccination	29	30	-2.58	-	-	-2.58
Ramirez & Lasater, 1976	231	231	.00	-	-	.00
Schoenbachler & Whittler, 1996	125	123	.00	.00	.00	-
Skilbeck et al., 1977						
1: Single Exposure	25	18	.58	-	-	.58
2: Multiple Exposures	17	18	-.43	-	-	-.43
Smart & Fejer, 1974						
1: Marijuana, Non-Users	122	119	-.26	-	-.26	-
2: Marijuana, Users	414	441	-.03	-	-.03	-
Yoon & Tinkman, 2013						
1: Low Past Threat, Nonhumor Ads	24	24	-.13	-.23	-.04	-
2: Low Past Threat, Humor Ads	24	24	.30	.41	.19	-
3: High Past Threat, Nonhumor Ads	24	24	.19	.11	.26	-
4: High Past Threat, Humor Ads	24	24	-.48	-.64	-.32	-
Thornton et al., 2000	56	57	-.72	-	-.72	-

Note: *d* = Standardized mean effect size. N_H = Sample size for the high depicted fear group. N_M = Sample size for the medium depicted fear group. Combined outcomes = Average of all attitude, intention, and behavior measures. Dash (–) indicates the variable was not relevant for the study. The attitude, intention, and behavior measures are analyzed separately in Appendix A.

Table 4. Descriptive statistics for the sample.

Variable	Grouping	Relevant Descriptive Statistics			
		M	**Md**	**SD**	**k**
Publication year	By sample	1993	1998	16	248
	By paper	1992	1994	16	127
		Journal Article	**Dissertation/Thesis**	**Conference Proceeding**	**k**
Source type	By sample	91% (226)	8% (21)	< 1% (1)	248
	By paper	91% (116)	8% (10)	< 1% (1)	127
		Laboratory	**Field**		**k**
Setting	By sample	56% (137)	44% (107)		244
	By paper	53% (67)	47% (59)		126
		Disease Prevention	**Smoking**	**HIV/AIDS/STDs**	
Domain	By sample	21% (51)	16% (40)	13% (33)	
		Driving Safety	**Cancer Prevention**	**Drinking/Drugs**	
	By sample	11% (27)	10% (26)	8% (20)	
		Dental Hygiene	**Environment/Society**	**General Safety**	
	By sample	6% (14)	5% (13)	5% (13)	
		Other			**k**
	By sample	4% (11)			248

Note: M = Mean. Md = Median. SD = Standard deviation. k = Number of samples or papers, as specified. For several variables, descriptive statistics were calculated analyzing each paper as a unit ("By paper") and each independent sample within the paper as a unit ("By sample"). Some variables were only appropriate to analyze by sample (e.g., percent of studies that researched smoking behavior).

Table 5. Moderator analysis results for categorical moderators.

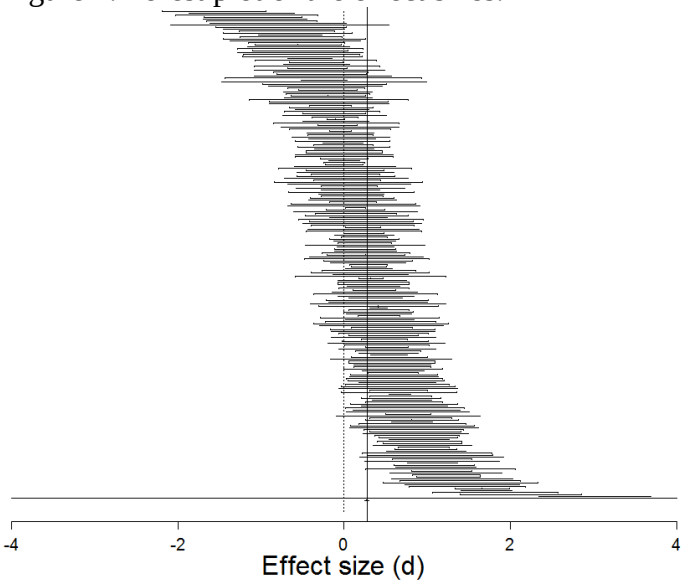
MBA Aspect	Variable	Level	*d*	95% CI	*k*
Message	Efficacy statements	Included	.45	[.41, .49]	92
		Excluded	.19	[.16, .22]	154
	Depicted susceptibility and severity	Both	.34	[.29, .39]	78
		Susceptibility	.42	[.29, .55]	20
		Severity	.25	[.22, .29]	125
		Neither	.10	[-.01, .22]	17
	Vividness of message	High	.31	[.27, .35]	73
		Low	.30	[.26, .35]	93
	Vividness of message crossed with depicted susceptibility and severity	High viv, both	.10	[-.10, .29]	7
		High viv, susceptibility	.31	[-.27, .89]	2
		High viv, severity	.34	[.29, .39]	56
		High viv, neither	-.01	[-.28, .26]	6
		Low viv, both	.32	[.26, .38]	45
		Low viv, susceptibility	.38	[.23, .53]	15
		Low viv, severity	.28	[.20, .35]	27
		Low viv, neither	-	-	-
	Comparison message	Low depicted fear	.25	[.21, .29]	116
		Neutral message	.34	[.29, .38]	87
		No message	.23	[.18, .27]	44
Behavior	One-time versus repeated	One-time	.47	[.42, .52]	82
		Repeated	.21	[.18, .24]	166
	Detection versus promotion/prevention	Detection	.34	[.27, .41]	40
		PP	.26	[.24, .29]	208
	Death and self-esteem	SEE, DP	.48	[.34, .61]	15
		SEE, DA	.07	[-.02, .16]	23
		SEH, DP	-.03	[-.16, .10]	18
		SEH, DA	.58	[.40, .76]	6
	Death and delay	DP, same day	.19	[.14, .25]	70
		DP, 1-14 days	.77	[.63, .91]	5
		DP, 14+ days	.33	[.20, .46]	14
		DA, same day	.26	[.22, .29]	124
		DA, 1-14 days	.02	[-.11, .14]	18
		DA, 14+ days	.39	[.33, .45]	13
	Action and inaction	Action	.28	[.25, .31]	145
		Inaction	.29	[.25, .33]	92
	Health relevant	Yes	.27	[.24, .29]	202
		No	.31	[.25, .37]	43
Audience	Gender	All-female	.41	[.35, .47]	60
		50/50	.11	[-.13, .35]	8
		All-male	.14	[.00, .27]	21

Table 5 (cont.)

MBA Aspect	Variable	Level	*d*	95% CI	*k*
	Culture	Collectivist	.42	[.35, .49]	29
		Individualist	.25	[.23, .28]	219
	Stage of change	Early	.30	[.27, .33]	150
		Late	.20	[.12, .28]	30
	Age	22+ years	.24	[.20, .28]	74
		18-22 years	.35	[.31, .39]	130
		Under 18 years	.19	[.13, .24]	35
	Age crossed with stage of change	22+ years, early	.24	[.20, .29]	57
		18-22 years, early	.41	[.36, .46]	70
		Under 18 years, early	.26	[.19, .33]	14
		22+ years, late	.36	[.20, .52]	10
		18-22 years, late	.22	[.05, .39]	9
		Under 18 years, late	.13	[.02, .23]	11

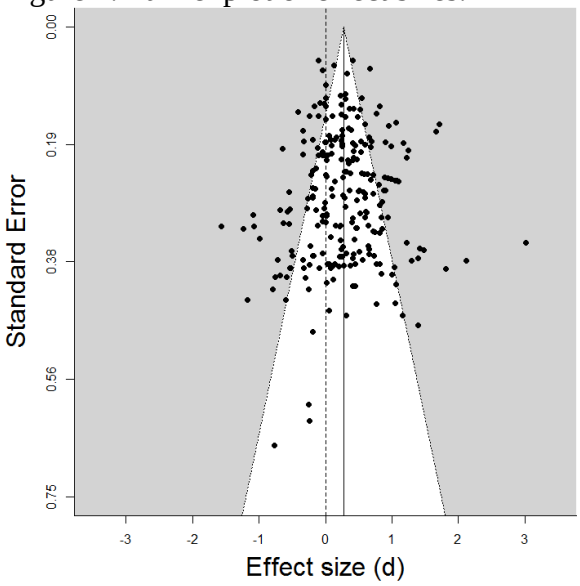
Note: SE = Self-esteem. DP = Death present in message. DA = Death absent in message. PP = Promotion/prevention. SEE = Self-esteem enhancing recommended behaviors. SEH = Self-esteem hindering recommended behaviors. *d* = Standardized mean effect size estimated meta-analytically for the indicated moderator level. 95% CI = The 95% confidence interval for *d*. *k* = The number of studies for each moderator level. Dash (–) indicates there were no observations at a particular moderator level.

Figure 1. Forest plot of the effect sizes.



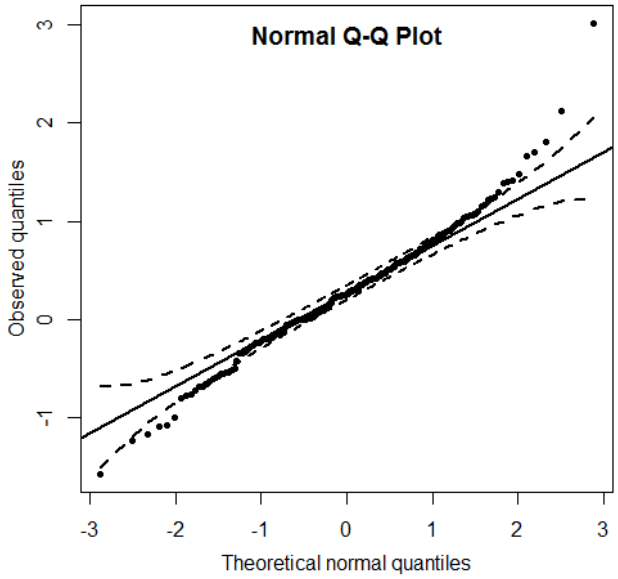
Note: This forest plot includes point estimates and confidence intervals for all studies in the manuscript. The solid vertical line represents the combined effect size from the fixed-effects analysis (*d* = .27).

Figure 2. Funnel plot of effect sizes.



Note: Effect size (*d*) is plotted on the x-axis and standard error on the y-axis. The solid vertical line represents the combined effect size from the fixed-effects analysis (*d* = .27). The dotted line represents the x-intercept (x = 0) for a reference line. The white region represents the inside of the 95% pseudo confidence interval, whereas the shaded region represents the outside (i.e., the area of statistical significance).

Figure 3. Normal quantile plot.



Note: The dashed lines represents a 95% confidence band. The line on the diagonal indicates normality.

REFERENCES

References marked with an asterisk indicate studies included in the meta-analysis.

Albarracin, D., Hepler, J., & Tannenbaum, M. (2011). General action and inaction goals: Their behavioral, cognitive, and affective origins and influences. *Current Directions in Psychological Science, 20*, 119-123.

* Bagley, J.G., & Low, K.G. (1992). Enhancing flossing compliance in college freshmen. *Clinical Preventive Dentistry, 14*, 25-30.

* Bang, H-K. (1993). *The effectiveness of the use of fear appeals depicting legal and physical consequences in anti-drunk driving television public service announcements.* Unpublished doctoral dissertation, Michigan State University.

* Beach, R.I. (1966). The effect of a 'fear-arousing' safety film on physiological, attitudinal, and behavioral measures: A pilot study. *Research Review, 10*, 53-56.

* Beck, K.H. (1984). The effects of risk probability, outcome severity, efficacy of protection and access to protection on decision making: A further test of protection motivation theory. *Social Behavior and Personality, 12*, 121-125.

* Beck, K.H., & Davis, C.M. (1978). Effects of fear-arousing communications and topic importance on attitude change. *Journal of Social Psychology, 104*, 81-95.

Becker, M.H. (1974). The health belief model and personal health behavior. *Health Education Monographs, 2*, 324–473.

Becker, M.H., Maiman, L.A., Kirscht, J.P., Haefner, D.P., & Drachman, R.H. (1977). The health belief model and prediction of dietary compliance: A field experiment. *Journal of Health and Social Behavior, 18*, 348-366.

Becker, M.H., Radius, S.M., & Rosenstock, I.M. (1978). Compliance with a medical regimen for asthma: A test of the health belief model. *Public Health Reports, 93*, 268-277.

Begg, C. B., & Mazumdar, M. (1994). Operating characteristics of a rank correlation test for publication bias. *Biometrics, 50*, 1088–1101.

* Berkowitz, J.M. (1998). *The influence of sensation-seeking and message choice on responses to fear appeals*. Unpublished doctoral dissertation, Michigan State University.

Berkowitz, L., & Cottingham, D. R. (1960). The interest value and relevance of fear-arousing communications. *Journal of Abnormal and Social Psychology, 60*, 37-43.

Boster, F.J., & Mongeau, P. (1984). Fear-arousing persuasive messages. In R.N. Bostrom & B.H. Westley (Eds.), *Communication Yearbook 8* (pp. 330-375). Beverly Hills, CA: Sage.

Briñol, P., & Petty, R.E. (2009). Source factors in persuasion: A self-validation approach. *European Review of Social Psychology, 20*, 49-96.

* Brouwers, M.C., & Sorrentino, R.M. (1993). Uncertainty orientation and protection motivation theory: The role of individual differences in health compliance. *Journal of Personality and Social Psychology, 65*, 102-112.

* Brown, R.A. (1979). Fear-induced attitude change as a function of conformity and drinking pattern in alcoholics. *Journal of Clinical Psychology, 35*, 454-456.

* Burnett, J.J. (1981). Internal-external locus of control as a moderator of fear appeals. *Journal of Applied Psychology, 66*, 390-393.

* Calantone, R.J., & Warshaw, P.R. (1985). Negating the effects of fear appeals in election campaigns. *Journal of Applied Psychology, 70*, 627-633.

* Carey, J.C. (1990). *The influence of involvement on cognitive and emotional responses to fear appeals*. Unpublished doctoral dissertation, The University of Texas at Austin.

Cauberghe, V., de Pelsmacker, P., Janssens, W., & Dens, N. (2009). Fear, threat and efficacy in threat appeals: Message involvement as a key mediator to message acceptance. *Accident Analysis & Prevention, 41*, 276-285.

Centers for Disease Control and Prevention. (2014). CDC's Tips From Former Smokers campaign provided outstanding return on investment [Press release]. Retrieved from http://www.cdc.gov/media/releases/2014/p1210-tips-roi.html

Cesario, J., Higgins, E.T., & Scholer, A.A. (2008). Regulatory fit and persuasion: Basic principles and remaining questions. *Social and Personality Psychology Compass, 2*, 444-463.

* Chang, A., Hearey, C.D., Gallagher, K.D., English, P., & Chang, P.C. (1989). Promoting child passenger safety in children served by a health maintenance organization. *Patient Education and Counseling, 13*, 297-307.

* Cho, H., & Salmon, C.T. (2006). Fear appeals for individuals in different stages of change: Intended and unintended effects and implications on public health campaigns. *Health Communication, 20*, 91-99.

* Chu, G.C. (1966). Fear arousal, efficacy, and imminency. *Journal of Personality and Social Psychology, 4*, 517-524.

Colburn, C. W. II. (1967). *An experimental study of the relationship between fear appeal and topic importance in persuasion*. Unpublished doctoral dissertation, Indiana University.

* Cooper, D. P., Goldenberg, J. L., & Arndt, J. (2014). Perceived efficacy, conscious fear of death and intentions to tan: Not all fear appeals are created equal. *British Journal of Health Psychology, 19*, 1-15.

* Dabbs, J.M., & Leventhal, H. (1966). Effects of varying the recommendations in a fear-arousing communication. *Journal of Personality and Social Psychology, 4*, 525-531.

* Dahl, D.W., Frankenberger, K.D., & Manchanda, R.V. (2003). Does it pay to shock? Reactions to shocking and nonshocking advertising content among university students. *Journal of Advertising Research, 43*, 268-280.

* Das, E.H.H.J., de Wit, J.B.F., & Stroebe, W. (2003). Fear appeals motivate acceptance of action recommendations: Evidence for a positive bias in the processing of persuasive messages. *Personality and Social Psychology Bulletin, 29*, 650-664.

* de Hoog, N., Stroebe, W., & de Wit, J.B.F. (2005). The impact of fear appeals on processing and acceptance of action recommendations. *Personality and Social Psychology Bulletin, 31*, 24-33.

de Hoog, N., Stroebe, W., & de Wit, J.B.F. (2007). The impact of vulnerability to and severity of a health risk on processing and acceptance of fear-arousing communications: A meta-analysis. *Review of General Psychology, 11*, 258.

* de Hoog, N., Stroebe, W., & de Wit, J.B.F. (2008). The processing of fear-arousing communications: How biased processing leads to persuasion. *Social Influence, 3*, 84-113.

* Dembroski, T.M., Lasater, T.M., & Ramirez, A. (1978). Communicator similarity, fear arousing communications, and compliance with health care recommendations. *Journal of Applied Social Psychology, 8*, 254-269.

DiClemente, C.C., Prochaska, J.O., Fairhurst, S.K., Velicer, W.F., Velasquez, M.M., & Rossi, J.S. (1991). The process of smoking cessation: An analysis of precontemplation, contemplation, and preparation stages of change. *Journal of Consulting and Clinical Psychology, 59*, 295–304.

* Dijkstra, A., & Bos, C. (2015). The Effects of Repeated Exposure to Graphic Fear Appeals on Cigarette Packages: A Field Experiment. *Psychology of Addictive Behaviors*. Advance online publication. http://dx.doi.org/10.1037/adb0000049

Dillard, J.P., Plotnick, C.A., Godbold, L.C., Freimuth, V.S., & Edgar, T. (1996). The multiple affective outcomes of AIDS PSAs: Fear appeals do more than scare people. *Communication Research, 23,* 44-72.

Drug Free Action Alliance, 2013. *Why scare tactics in drug messaging prevention don't work.* Columbus, OH: Drug Free Action Alliance.

* Duke, J. C., Nonnemaker, J. M., Davis, K. C., Watson, K. A., & Farrelly, M. C. (2014). The impact of cessation media messages on cessation-related outcomes: Results from a national experiment of smokers. *American Journal of Health Promotion, 28,* 242-250.

Earl, A., & Albarracin, D. (2007). Nature, decay, and spiraling of the effects of fear-inducing arguments and HIV counseling and testing: a meta-analysis of the short- and long-term outcomes of HIV-prevention interventions. *Health Psychology, 26,* 496–506.

* Evans, R.I., Rozelle, R.M., Lasater, T.M., Dembroski, T.M., & Allen, B.P. (1968). New measures of effects of persuasive communications: A chemical indicator of toothbrushing behavior. *Psychological Reports, 23,* 731-736.

* Evans, R.I., Rozelle, R.M., Lasater, T.M., Dembroski, T.M., & Allen, B.P. (1970). Fear arousal, persuasion, and actual versus implied behavioral change: New perspective utilizing a real-life dental hygiene program. *Journal of Personality and Social Psychology, 16,* 220-227.

* Feenstra, H., Ruiter, R. A., & Kok, G. (2014). Evaluating traffic informers: Testing the behavioral and social-cognitive effects of an adolescent bicycle safety education program. *Accident Analysis & Prevention, 73*, 288-295.

Floyd, D. L., Prentice-Dunn, S., & Rogers, R. W. (2000). A meta-analysis of research on protection motivation theory. *Journal of Applied Social Psychology, 30,* 407–429.

* France, K. E., Donovan, R. J., Bower, C., Elliott, E. J., Payne, J. M., D'Antoine, H., & Bartu, A. E. (2014). Messages that increase women's intentions to abstain from alcohol during pregnancy: Results from quantitative testing of advertising concepts. *BMC Public Health, 14*, 30.

* Frandsen, K.D. (1963). Effects of threat appeals and media of transmission. *Speech Monographs, 30*, 101-104.

Frijda, N. H. (1986). *The emotions*. Cambridge: Cambridge University Press.

* Fukada, H. (1973). Effects of fear arousal, sex, and anxiety predisposition of subjects on attitude change. *Japanese Journal of Experimental Social Psychology, 13*, 40-54.

* Fukada, H. (1975). Fear arousal and persuasion: A re-examination of the defensive avoidance hypothesis. *Japanese Journal of Experimental Social Psychology, 15*, 12-24.

* Fukada, H. (1983). Forewarning effects in fear-arousing communications. *Japanese Journal of Psychology, 54*, 286-292.

* Fukada, H. (1983). Persuasion facilitating effects under irrelevant fear-arousing situations. *Japanese Journal of Experimental Social Psychology, 23*, 83-90.

* Fukada, H. (1988). Effects of fear-arousing communications on resistance to subsequent counterpropaganda. *Japanese Journal of Experimental Social Psychology, 27*, 149-156.

* Fukada, H. (1991). Effects of communicator credibility on persuasion under irrelevant fear-arousing situations. *Japanese Journal of Experimental Social Psychology, 31,* 94-103.

* Gleicher, F., & Petty, R.E. (1992). Expectations of reassurance influence the nature of fear-stimulated attitude change. *Journal of Experimental Social Psychology, 28,* 86-100.

Glenn, N. D. (1980). Values, attitudes, and beliefs. In O. G. Brim, Jr., & J. Kagan (Eds.), *Constancy and change in human development* (pp. 596-640). Cambridge, MA: Harvard University Press.

* Goldenbeld, C., Twisk, D., & Houwing, S. (2008). Effects of persuasive communication and group discussions on acceptabiity of anti-speeding policies for male and female drivers. *Transportation Research Part F, 11*, 207-220.

Goldenberg, J.L., & Arndt, J. (2008). The implications of death for health: A terror management health model for behavioral health promotion. *Psychological Review, 115,* 1032–1053.

Greenfield, P. M., Keller, H., Fuligni, A., & Maynard, A. (2003). Cultural pathways through universal development. *Annual Review of Psychology, 54*, 461-490.

* Griffeth, R.W., & Rogers, R.W. (1976). Effects of fear-arousing components of driver education on students' safety attitudes and simulator performance. *Journal of Educational Psychology, 68*, 501-506.

Haddock, C.K., Rindskopf, D., & Shadish, W.R. (1998). Using odds ratios as effect sizes for meta-analysis of dichotomous data: a primer on methods and issues. *Psychological Methods, 3*, 339.

* Hass, J.W., Bagley, G.S., & Rogers, R.W. (1975). Coping with the energy crisis: Effects of fear appeals upon attitudes toward energy consumption. *Journal of Applied Psychology, 60*, 754-756.

Hasselblad, V., & Hedges, L.V. (1995). Meta-analysis of screening and diagnostic tests. *Psychological Bulletin, 117,* 167.

Heine, S. J., Lehman, D. R., Markus, H. R., & Kitayama, S. (1999). Is there a universal need for positive self-regard? *Psychological Review, 106,* 766.

* Hendrick, C., Giesen, M., & Borden, R. (1975). False physiological feedback and persuasion: Effect of fear arousal vs. fear reduction on attitude change. *Journal of Personality, 43,* 196-214.

Hepler, J., & Albarracin, D. (2013). Complete unconscious control: Using (in)action primes to demonstrate completely unconscious activation of inhibitory control mechanisms. *Cognition, 128,* 271-279.

Hepler, J., & Albarracin, D. (2014). Liking more means doing more: Dispositional attitudes predict patterns of general action. *Social Psychology, 45,* 391-398.

Hepler, J., Albarracin, D., McCulloch, K. C., & Noguchi, K. (2012). Being active and impulsive: The role of goals for action and inaction in self-control. *Motivation and Emotion, 36,* 416-424.

Hepler, J., Wang, W., & Albarracin, D. (2012). Motivating exercise: The interactive effect of general action goals and past behavior on physical activity. *Motivation and Emotion, 36,* 365-370.

Higbee, K.L. (1969). Fifteen years of fear arousal: Research on threat appeals: 1953-1968. *Psychological Bulletin, 6,* 426-444.

Higgins, E.T., Pierro, A., & Kruglanski, A.W. (2008). Re-thinking culture and personality: How self-regulatory universals create cross-cultural differences. In R. M. Sorrentino & S.

Yamaguchi (Eds.), *Handbook of motivation and cognition across cultures* (pp. 161 – 190). New York: Elsevier.

* Hill, D., & Gardner, G. (1980). Repression-sensitization and yielding to threatening health communications. *Australian Journal of Psychology, 3*, 183-193.

* Hoeken, H., & Geurts, D. (2005). The influence of exemplars in fear appeals on the perception of self-efficacy and message acceptance. *Information Design Journal & Document Design, 13*, 238-248.

Hofstede, G. (1980). *Culture's consequences*. Thousand Oaks, California: Sage Publications.

* Horowitz, I.A. (1969). Effects of volunteering, fear arousal, and number of communications on attitude change. *Journal of Personality and Social Psychology, 11*, 34-37.

* Horowitz, I.A., & Gumenick, W.E. (1970). Effects of the volunteer subject, choice, and fear arousal on attitude change. *Journal of Experimental Social Psychology, 6*, 293-303.

Hovland, C., Janis, I., & Kelly, H. (1953). *Communication and persuasion*. New Haven, CT: Yale University Press.

* Insko, C.A., Arkoff, A., & Insko, V.M. (1965). Effects of high and low fear-arousing communications upon opinions toward smoking. *Journal of Experimental Social Psychology, 1*, 256-266.

Ireland, M., Hepler, J., Li, H., & Albarracin, D. (in press). Neuroticism and attitudes toward action in 19 countries. *Journal of Personality*. DOI: 10.1111/jopy.12099

Janis, I.L. (1967). Effects of fear arousal on attitude change: Recent developments in theory and experimental research. In L. Berkowitz (Ed.), *Advances in experimental social psychology, Volume 3* (pp. 166-225). New York: Academic Press.

Janis, I.L. (1968). *The Contours of Fear*. New York: John Wiley & Sons, Inc.

Janis, I.L., & Feshbach, S. (1953). Effects of fear-arousing communications. *Journal of Abnormal and Social Psychology, 48*, 78-92.

* Janis, I.L., & Feshbach, S. (1954). Personality differences associated with responsiveness to fear-arousing communications. *Journal of Personality, 23*, 154-166.

Janis, I.L., & Leventhal, H. (1968). Human reactions to stress. In E. Borgatta & W. Lambert (Eds.), *Handbook of personality theory and research*. Chicago, IL: Rand McNally Press.

* Janis, I.L., & Terwilliger, R.F. (1962). An experimental study of psychological resistances to fear arousing communications. *Journal of Abnormal and Social Psychology, 65*, 403-410.

Janssen, E., van Osch, L., de Vries, H., & Lechner, L. (2013). *The influence of narrative risk communication on feelings of cancer risk. British Journal of Health Psychology, 18*, 407-419.

* Janssens, W., & de Pelsmacker, P. (2007). Fear appeal in traffic safety advertising: The moderating role of medium context, trait anxiety, and differences between drivers and non-drivers. *Psychologica Belgica, 47*, 173-193.

Jennings, M.K., & Markus, G.B. (1984). Partisan orientations over the long haul: Results from the three-wave political socialization panel study. *American Political Science Review, 78*, 1000-1018.

Jennings, M. K., & Niemi, R. G. (1981). *Generations and politics*. Princeton, NJ: Princeton University Press.

Johnson, B. T., & Eagly, A. H. (2014). Meta-analysis of research in social personality and personality psychology. In H. T. Reis & C. M. Judd (Eds.), *Handbook of research methods in social and personality psychology* (2nd Ed., pp. 675-707). London: Cambridge University Press.

* Johnston, A.C. (2006). *An empirical investigation of the influence of fear appeals on attitudes and behavioral intentions associated with recommended individual computer security actions.* Unpublished doctoral dissertation, Mississippi State University.

* Jones, S.C., & Owen, N. (2006). Using fear appeals to promote cancer screening -- are we scaring the wrong people? *International Journal of Nonprofit and Voluntary Sector Marketing, 11*, 93-103.

* Kareklas, I., & Muehling, D. D. (2014). Addressing the Texting and Driving Epidemic: Mortality Salience Priming Effects on Attitudes and Behavioral Intentions. *Journal of Consumer Affairs, 48*, 223-250.

* Keller, P.A. (1999). Converting the unconverted: The effect of inclination and opportunity to discount health-related fear appeals. *Journal of Applied Psychology, 84*, 403-415.

* Keller, P.A., & Block, L.G. (1996). Increasing the persuasiveness of fear appeals: The effect of arousal and elaboration. *Journal of Consumer Research, 22*, 448-459.

* Kim, P., Sorcar, P., Um, S., Chung, H., & Lee, Y.S. (2009). Effects of episodic variations in web-based avian influenza education: Influence of fear and humor on perception, comprehension, retention, and behavior. *Health Education Research, 24*, 369-380.

* Kirscht, J.P., Becker, M.H., Haefner, D.P., & Maiman, L.A. (1978). Effects of threatening communications and mothers' health beliefs on weight change in obese children. *Journal of Behavioral Medicine, 1*, 147-157.

* Kirscht, J.P., & Haefner, D.P. (1973). Effects of repeated threatening health communications. *International Journal of Health Education, 16*, 268-277.

Kitayama, S., Markus, H. R., Matsumoto, H., & Norasakkunkit, V. (1997). Individual and collective processes of self-esteem management: Self-enhancement in the United States and self-depreciation in Japan. *Journal of Personality and Social Psychology, 72*, 1245-67.

* Kleinot, M.C., & Rogers, R.W. (1982). Identifying effective components of alcohol misuse prevention programs. *Journal of Studies on Alcohol, 43*, 802-811.

* Klohn, L.S., Rogers, R.W. (1991). Dimensions of the severity of a health threat: The persuasive effects of visibility, time of onset, and rate of onset on young women's intentions to prevent osteoporosis. *Health Psychology, 10*, 323-329.

Kok, G., Bartholomew, L. K., Parcel, G. S., Gottlieb, N. H., & Fernández, M. E. (2014). Finding theory-and evidence-based alternatives to fear appeals: Intervention Mapping. *International Journal of Psychology, 49*, 98-107.

Kumkale, G. T., & Albarracín, D. (2004). The sleeper effect in persuasion: A meta-analytic review. *Psychological Bulletin, 130*, 143.

Kumkale, G.T., Albarracín, D., & Seignourel, P.J. (2010). The effects of source credibility in the presence or absence of prior attitudes: Implications for the design of persuasive communication campaigns. *Journal of Applied Social Psychology, 40*, 1325-1356.

Kurman, J., & Hui, C. (2011). Promotion, prevention, or both: Regulatory focus and culture, revisited. *Online Readings in Psychology and Culture*, Unit 5. Retrieved from http://scholarworks.qvsu.edu/orpc/vol5/iss3/3.

* LaTour, M.S., Snipes, R.L., & Bliss, S.J. (1996). Don't be afraid to use fear appeals: An experimental study. *Journal of Advertising Research, 2*, 59-67.

* LaTour, M.S., & Tanner, J.F. (2003). Radon: Appealing to our fears. *Psychology & Marketing, 20*, 377-394.

Leventhal, H. (1970). Findings and theory in the study of fear communications. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 5, pp. 119-186). New York: Academic Press.

* Leventhal, H., & Niles, P. (1964). A field experiment on fear arousal with data on the validity of questionnaire measures. *Journal of Personality, 32*, 459-479.

* Leventhal, H., Singer, R., & Jones, S. (1965). Effects of fear and specificity of recommendation upon attitudes and behavior. *Journal of Personality and Social Psychology, 2*, 20-29.

* Leventhal, H., & Watts, J.C. (1966). Sources of resistance to fear-arousing communications on smoking and lung cancer. *Journal of Personality, 34*, 155-175.

* Leventhal, H., Watts, J.C., & Pagano, F. (1967). Effects of fear and instructions on how to cope with danger. *Journal of Personality and Social Psychology, 6*, 313-321.

* Levin, A.M., Dato-on, M.C., & Manolis, C. (2007). Deterring illegal downloading: The effects of threat appeals, past behavior, subjective norms, and attributions of harm. *Journal of Consumer Behavior, 6*, 111-122.

* Lewis, I., Watson, B., & White, K. M. (2008). An examination of message-relevant affect in road safety messages: Should road safety advertisements aim to make us feel good or bad? *Transportation Research Part F: Traffic Psychology and Behaviour, 11*, 403-417.

* Lewis, I.M., Watson, B., & White, K.M. (2010). Response efficacy: The key to minimizing rejection and maximizing acceptance of emotion-based anti-speeding messages. *Accident Analysis and Prevention, 42*, 459-467.

* Li, Y. (2002). *Outcome as a determinant of threat ads' effectiveness.* Unpublished doctoral dissertation, University of Minnesota.

* Liberman, A., & Chaiken, S. (1992). Defensive processing of personally relevant health messages. *Personality and Social Psychology Bulletin, 18*, 669-679.

Lockwood, P., Marshall, T.C., & Sadler, P. (2005). Promoting success or preventing failure: Cultural differences in motivation by positive and negative role models. *Personality and Social Psychology Bulletin, 31*, 379-392.

* Lwin, M. O., & Malik, S. (2014). Can exergames impart health messages? Game play, framing, and drivers of physical activity among children. *Journal of Health Communication, 19*, 136-151.

Maddux, J.E., & Rogers, R.W. (1983). Protection motivation and self-efficacy: A revised theory of fear appeals and attitude change. *Journal of experimental social psychology, 19,* 469-479.

McGuire, W.J. (1968). Personality and susceptibility to social influence. In E. Borgatta & W. Lambert (Eds.), *Handbook of personality theory and research*. Chicago: Rand McNally Press.

McGuire, W.J. (1969). The nature of attitudes and attitude change. In G. Lindzey & E. Aronson (Eds.), *The handbook of social psychology* (Vol. 3, pp. 136-314). Reading, MA: Addison-Wesley.

* McMath, B.F., & Prentice-Dunn, S. (2005). Protection motivation theory and skin cancer risk: The role of individual differences in responses to persuasive appeals. *Journal of Applied Social Psychology, 35*, 621-643.

* Meijnders, A.L., Midden, C.J.H., & Wilke, H.A.M. (2001). Communications about environmental risks and risk-reducing behavior: The impact of fear on information processing. *Journal of Applied Social Psychology, 31*, 754-777.

* Meijnders, A.L., Midden, C.J.H., & Wilke, H.A.M. (2001). Role of negative emotion in communication about CO_2 risks. *Risk Analysis, 21,* 955-966.

Meyerowitz, B. E., & Chaiken, S. (1987). The effect of message framing on breast self-examination attitudes, intentions, and behavior. *Journal of Personality and Social Psychology, 52*, 500.

Millman, S. (1968). Anxiety, comprehension, and susceptibility to social influence. *Journal of Personality and Social Psychology, 9*, 251-256.

Milne, S., Sheeran, P., & Orbell, S. (2000). Prediction and intervention in health-related behavior: A meta-analytic review of protection motivation theory. *Journal of Applied Social Psychology, 30,* 106–143.

Mongeau, P. (1998). Another look at fear-arousing persuasive appeals. In M. Allen & R. W. Preiss (Eds.), *Persuasion: Advances through meta-analysis* (pp. 53-68). Cresskill, NJ: Hampton Press.

* Morales, A.C., Wu, E.C., & Fitzsimons, G.J. (2012). How disgust enhances the effectiveness of fear appeals. *Journal of Marketing Research, 49,* 383-393.

* Morris, K. L., Cooper, D. P., Goldenberg, J. L., Arndt, J., & Gibbons, F. X. (2014). Improving the efficacy of appearance-based sun exposure interventions with the terror management health model. *Psychology & Health, 29,* 1245-1264.

* Muthusamy, N., Levine, T.R., & Weber, R. (2009). Scaring the already scared: Some problems with HIV/AIDS fear appeals in Namibia. *Journal of Communication, 59,* 317-344.

Nabi, R. L., Roskos-Ewoldsen, D., & Dillman Carpentier, F. (2008). Subjective knowledge and fear appeal effectiveness: Implications for message design. *Health Communication, 23,* 191-201.

Nisbett, R., & Ross, L. (1980). *Human Inference: Strategies and Shortcomings of Social Judgment*. Englewood Cliffs, NJ: Prentice-Hall.

O'Keefe, D.J. (2013). The relative persuasiveness of different message types does not vary as a function of the persuasive outcome assessed: Evidence from 29 meta-analyses of 2,062 effect sizes for 13 message variations. In E. L. Cohen (Ed.), *Communication Yearbook 37* (pp. 221-249). New York: Routledge.

* Ordonana, J. R., Gonzalez-Javier, F., Espin-Lopez, L., & Gomez-Amor, J. (2009). Self-report and psychophysiological responses to fear appeals. *Human Communication Research, 35*, 195-220.

Oyserman, D., Coon, H. M., & Kemmelmeier, M. (2002). Rethinking individualism and collectivism: evaluation of theoretical assumptions and meta-analyses. *Psychological Bulletin, 128,* 3.

* Pengchit, W. (2010). *Not too scared to think carefully: Optimism fosters processing of self-relevant threatening persuasive messages.* Unpublished doctoral dissertation, The University of Utah.

* Pepper, G. V., & Nettle, D. (2014). Out of control mortality matters: the effect of perceived uncontrollable mortality risk on a health-related decision. *PeerJ, 2*, e459.

Peters, G.-J. Y., Ruiter, R.A.C., & Kok, G. (2012). Threatening communication: a critical re-analysis and a revised meta-analytic test of fear appeal theory. *Health Psychology Review, 7,* S8–S31. doi: 10.1080/17437199.2012.703527.

Petty, R.E., & Cacioppo, J.T. (1986). *The elaboration likelihood model of persuasion*. New York: Academic Press.

Popova, L. (2012). The extended parallel process model: Illuminating the gaps in research.

Health Education and Behavior, 39, 455-473.

Pornpitakpan, C. (2004). The persuasiveness of source credibility: A critical review of five decades' evidence. *Journal of Applied Social Psychology, 34,* 243-281.

* Powell, F.A. (1965). The effect of anxiety-arousing messages when related to personal, familial, and impersonal referents. *Speech Monographs, 32,* 102-106.

* Priolo, D., & Milhabet, I. (2008). Quand l'engagement précède l'appel à la peur: Une forme de communication engageante. *L'annee Psychologique, 108,* 207-241.

Prochaska, J.O., & DiClemente, C.C. (1983). Stages and processes of self-change of smoking: Toward an integrative model of change. *Journal of Consulting and Clinical Psychology, 51,* 390-395.

Prochaska, J.O., DiClemente, C.C., & Norcross, J.C. (1992). In search of how people change. *American Psychologist, 47,* 1102-1114.

Prochaska, J.O., DiClemente, C.C. and Norcross, J.C. (2002). In Search of How People Change: Applications to Addictive Behavior. *American Psychologist, 47,* 1102-1114.

Prochaska, J.O., & Velicer, W.F. (1997). The transtheoretical model of health behavior change. *American Journal of Health Promotion, 12,* 38-48.

Pyszczynski, T., Greenberg, J., & Solomon, S. (1999). A dual-process model of defense against conscious and unconscious death-related thoughts: An extension of Terror Management Theory. *Psychological Review, 106,* 835–845.

* Radelfinger, S. (1965). Some effects of fear-arousing communications on preventive health behavior. *Health Education Monographs, 19,* 2-15.

* Raleigh, K.V. (2002). *AIDS prevention: The effects of components of protection motivation theory on intentions to comply with safer sex recommendations*. Unpublished doctoral dissertation, University of Alabama.

* Ramirez, A., & Lasater, T.L. (1976). Attitudinal and behavioral reactions to fear-arousing communications. *Psychological Reports, 38*, 811-818.

* Ramirez, A., & Lasater, T.L. (1977). Ethnicity of communicator, self-esteem, and reactions to fear-arousing communications. *Journal of Social Psychology, 102*, 79-91.

* Rippetoe, P.A., & Rogers, R.W. (1987). Effects of components of protection-motivation theory on adaptive and maladaptive coping with a health threat. *Journal of Personality and Social Psychology, 52*, 596-604.

Robbins, P. R. (1962). Self-reports of reactions to fear-arousing information. *Psychological Reports, 11*, 761-764.

Robertson, L.S. (1975). Behavioral research and strategies in public health: A demur. *Social Science and Medicine, 9*, 165-170.

* Rodriguez, J.I. (1995). *Confounds in fear-arousing persuasive messages: Do the paths less traveled make all the difference?* Unpublished doctoral dissertation, Michigan State University.

* Rogers, R.W., & Deckner, C.W. (1975). Effects of fear appeals and physiological arousal upon emotion, attitudes, and cigarette smoking. *Journal of Personality and Social Psychology, 32*, 222-230.

* Rogers, R.W., & Mewborn, C.R. (1976). Fear appeals and attitude change: Effects of a threat's noxiousness, probability of occurrence, and the efficacy of coping responses. *Journal of Personality and Social Psychology, 34*, 54-61.

* Rogers, R.W., & Thistlethwaite, D.L. (1970). Effects of fear arousal and reassurance on attitude change. *Journal of Personality and Social Psychology, 15,* 227-233.

* Rosen, T.J., Terry, N.S., & Leventhal, H. (1982). The role of esteem and coping in response to a threat communication. *Journal of Research in Personality, 16,* 90-107.

Rosenstock, I.M. (1966). Why people use health services. *The Milbank Memorial Fund Quarterly*, 94-127.

Rosenstock, I.M. (1974). Historical origins of the health belief model. *Health Education Monographs, 2*, 328-335.

* Rosenthal, L.H. (1997). *A new perspective on the relation between fear and persuasion: The application of dual-process models.* Unpublished doctoral dissertation, University of Massachusetts at Amherst.

* Roskos-Ewoldsen, D.R., Yu, H.J., & Rhodes, N. (2004). Fear appeal messages affect accessibility of attitudes toward the threat and adaptive behaviors. *Communication Monographs, 71*, 49-69.

Rothman, A.J., Martino, S.C., Bedell, B.T., Detweiler, J.B., & Salovey, P. (1999). The systematic influence of gain- and loss-framed messages on interest in and use of different types of health behavior. *Personality and Social Psychology Bulletin, 25*, 1355–1369.

Rothman, A.J., & Salovey, P. (1997). Shaping perceptions to motivate healthy behavior: The role of message framing. *Psychological Bulletin*, *121*, 3–19.

Ruiter, R. A., Kessels, L. T., Peters, G. J. Y., & Kok, G. (2014). Sixty years of fear appeal research: Current state of the evidence. *International Journal of Psychology, 49,* 63-70.

* Ruiter, R.A.C., Verplanken, B., Kok, G., & Werrij, M.Q. (2003). The role of coping appraisal in reactions to fear appeals: Do we need threat information? *Journal of Health Psychology, 8*, 465-474.

Sampson, J., Witte, K., Morrison, K., Liu, W.-Y., Hubbell, A.P. Hubbell, & Murray-Johnson, L. (2001). Addressing cultural orientations in fear appeals: Promoting AIDS-protective behaviors among Mexican immigrant and African American adolescents and American and Taiwanese College Students. *Journal of Health Communication: International Perspectives, 6*, 335-358.

* Schmitt, C.L., & Blass, T. (2008). Fear appeals revisited: Testing a unique anti-smoking film. *Current Psychology, 27,* 145-151.

* Schoenbachler, D.D., & Whittler, T.E. (1996). Adolescent processing of social and physical threat communications. *Journal of Advertising, 25*, 37-54.

Schwartz, S. H. (2009). Culture matters: National value cultures, sources, and consequences. In R. S. Wyer, C. Chiu, & Y. Hong (Eds.), *Understanding culture: Theory, research, and application* (pp. 127-150). New York: Psychology Press.

Sears, D.O. (1983). The persistence of early political predispositions: The roles of attitude object and life stage. In L. Wheeler & P. Shaver (Eds.), *Review of Personality and Social Psychology Vol. 4* (pp. 79-116). Beverly Hills: Sage.

Sears, D.O. (1986). College sophomores in the laboratory: Influences of a narrow data base on social psychology's view of human nature. *Journal of Personality and Social Psychology, 51,* 515-530.

* Self, C.A., & Rogers, R.W. (1990). Coping with threats to health: Effects of persuasive appeals on depressed, normal, and antisocial personalities. *Journal of Behavioral Medicine, 13*, 343-357.

* Shehryar, O., & Hunt, D. (2005). A terror management perspective on the persuasiveness of fear appeals. *Journal of Consumer Psychology, 15*, 275-287.

* Shelton, M.L., & Rogers, R.W. (1981). Fear-arousing and empathy-arousing appeals to help: The pathos of persuasion. *Journal of Applied Social Psychology, 11*, 366-378.

* Shen, L. (2011). The effectiveness of empathy-versus fear-arousing antismoking PSAs. *Health Communication, 26*, 404-415.

Sherer, M., & Rogers, R.W. (1984). The role of vivid information in fear appeals and attitude change. *Journal of Research in Personality, 18*, 321-334.

* Siero, S., Kok, G., & Pruyn, J. (1984). Effects of public education about breast cancer and breast self-examination. *Social Science and Medicine, 18*, 881-888.

* Skilbeck, C., Tulips, J., & Ley, P. (1977). The effects of fear arousal, fear position, fear exposure, and sidedness on compliance with dietary instructions. *European Journal of Social Psychology, 7*, 221-239.

* Smalec, J.L., & Klingle, R.S. (2000). Bulimia interventions via interpersonal influence: The role of threat and efficacy in persuading bulimics to seek help. *Journal of Behavioral Medicine, 23*, 37-57.

* Smart, R.G., & Fejer, D. (1974). The effects of high and low fear messages about drugs. *Journal of Drug Education, 4*, 225-235.

* Smerecnik, C.M.R., & Ruiter, R.A.C. (2010). Fear appeals in HIV prevention: The role of anticipated regret. *Psychology, Health, and Medicine, 15*, 550-559.

* Smith, K.H., & Stutts, M.A. (2003). Effects of short-term cosmetic versus long-term health fear appeals in anti-smoking advertisements on the smoking behaviour of adolescents. *Journal of Consumer Behavior, 3*, 157-177.

Solomon, S., Greenberg, J., & Pyszczynski, T. (1991). A terror management theory of social behavior: The psychological functions of self-esteem and cultural worldviews. *Advances in Experimental Social Psychology, 24*, 93-159.

* Stainback, R.D., & Rogers, R.W. (1983). Identifying effective components of alcohol abuse prevention programs: Effects of fear appeals, message style, and source expertise. *The International Journal of the Addictions, 18*, 393-405.

* Stark, E., Kim, A., Miller, C., & Borgida, E. (2008). Effects of including a graphic warning label in advertisements for reduced-exposure products: Implications for persuasion and policy. *Journal of Applied Social Psychology, 38*, 281-293.

* Stephenson, M.T., & Witte, K. (1998). Fear, threat, and perceptions of efficacy from frightening skin cancer messages. *Public Health Reviews, 26*, 147-174.

* Struckman-Johnson, C.J., Gilliland, R.C., Struckman-Johnson, D.L., & North, T.C. (1990). The effects of fear of AIDS and gender on responses to fear-arousing condom advertisements. *Journal of Applied Social Psychology, 20*, 1396-1410.

* Sturges, J.W., & Rogers, R.W. (1996). Preventive health psychology from a developmental perspective: An extension of protection motivation theory. *Health Psychology, 15*, 158-166.

Sutton, S.R. (1982). Fear-arousing communications: A critical examination of theory and research. In J.R. Eiser (Ed.), *Social Psychology and Behavioral Medicine* (pp. 303-337). London: Wiley.

Tannenbaum, M., Hepler, J., & Albarracin, D. (2011). General action and inaction goals: Definitions and effects. *Inquisitive Mind, 12,* Retrieved from http://beta.in-mind.org/

* Tanner, J.F., Hunt, J.B., & Eppright, D.R. (1991). The protection motivation model: A normative model of fear appeals. *Journal of Marketing, 55,* 36-45.

* Taubman Ben-Ari, O.T., Florian, V., & Mikulincer, M. (2000). Does a threat appeal moderate reckless driving? A terror management theory perspective. *Accident Analysis & Prevention, 32,* 1-10.

Tay, R., Ozanne, L., & Santiono, J. (2000). Advertising and road safety: A segmentation approach. *Proceedings of the 2000 Australian and New Zealand Marketing Academy: Visionary Marketing for the 21st Century: Facing the Challenges*, 1248-1251.

ten Hoor, G.A., Peters, G.-J.Y., Kalagi, J., de Groot, L., Grootjans, K., Huschens, A., Kohninger, C., Kolgen, L., Pelssers, I., Schutt, T., Thomas, S., Ruiter, R.A.C., & Kok, G. (2012). Reactions to threatening health messages. *BMC Public Health, 12*, 1011-1018.

* ter Horst, G., Hoogstraten, J., de Haan, W. (1985). Stimulating dental attendance in the Netherlands: Comparison of three conceptual frameworks. *Community Dental & Oral Epidemiology, 13*, 136-139.

* Thornton, J., Rossiter, J., & White, L. (2000). The persuasive effectiveness of varying levels of fear appeals: an anti-speeding advertising experiment. In *Proceedings of ANZMAC*.

Triandis, H. C. (1994). *Culture and social behavior*. New York, NY: Mcgraw-Hill.

Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science, 211,* 453-458.

* Umeh, K. (2012). Does a credible source also need a fearful audience? *Journal of Applied Social Psychology, 42*, 1716-1744.

* Umeh, K., & Stanley, S. J. (2005). Effects of communicator credibility and fear on adaptive and maladaptive coping reactions to the HIV threat. *Journal of Applied Biobehavioral Research, 10*, 183-198.

van't Riet, J., Cox, A. D., Cox, D., Zimet, G. D., De Bruijn, G. J., Van den Putte, B., ... & Ruiter, R. A. (2014). Does perceived risk influence the effects of message framing? A new investigation of a widely held notion. *Psychology & Health, 29*, 933-949.

* Venkatesan, A.M. (2010). *An event-related potential (ERP) study of attention allocation in the processing of a fear appeal and its relation to HPV vaccine acceptance*. Unpublished doctoral dissertation, Rutgers University.

Viechtbauer, W. (2010). Conducting meta-analyses in R with the metafor package. *Journal of Statistical Software, 36*, 1–48.

Wang, M. C., & Bushman, B. J. (1999). *Integrating results through meta-analytic review using SAS software*. Cary, NC: SAS Institute

* Weinstein, N.D., Sandman, P.M., & Roberts, N.E. (1990). Determinants of self-protective behavior: Home radon testing. *Journal of Applied Social Psychology, 20*, 783-801.

* Welbourne, J.L., Hartley, T.A., Ott, S.D., & Robertson, S. (2008). Effects of risk-focused and recommendation-focused mental imagery on occupational risk communication. *Health Communication, 23*, 473-482.

* Wheatley, J.J., & Oshikawa, S. (1970). The relationship between anxiety and positive and negative advertising appeals. *Journal of Marketing Research, 7*, 85-90.

* Will, K.E., Sabo, C.S., & Porter, B.E. (2009). Evaluation of the 'Boost 'em in the Back Seat Program': Using fear and efficacy to increase booster seat use. *Accident Analysis and Prevention, 41*, 57-65.

Wilson, E.J., & Sherrell, D.L. (1993). Source effects in communication and persuasion research: A meta-analysis of effect size. *Journal of the Academy of Marketing Science, 21,* 101-112.

Witte, K. (1992). Putting the fear back into fear appeals: The extended parallel process model. *Communication Mongraphs, 59,* 329-349.

Witte, K. (1998). Fear as motivator, fear as inhibitor: Using the EPPM to explain fear appeal successes and failures. In P.A. Andersen & L.K. Guerrero (Eds.), *The handbook of communication and emotion* (pp. 423-450). New York: Academic Press.

Witte, K., & Allen, M. (2000). A meta-analysis of fear appeals: Implications for effective public health campaigns. *Health Education & Behavior, 27,* 591-615.

* Witte, K., Berkowitz, J.M., Cameron, K.A., & McKeon, J.K. (1998). Preventing the spread of genital warts: Using fear appeals to promote self-protective behaviors. *Health Education & Behavior, 25,* 571-585.

* Witte, K., & Morrison, K. (1995). Using scare tactics to promote safer sex among juvenile detention and high school youth. *Journal of Applied Communication Research, 23,* 128-142.

* Wong, N.C.H., & Cappella, J.N. (2009). Antismoking threat and efficacy appeals: Effects on smoking cessation intentions for smokers with low and high readiness to quit. *Journal of Applied Communication Research, 37,* 1-20.

* Wurtele, S.K. (1988). Increasing women's calcium intake: The role of health beliefs, intentions, and health value. *Journal of Applied Social Psychology, 18,* 627-639.

* Wurtele, S.K., Maddux, J.E. (1987). Relative contributions of protection motivation theory components in predicting exercise intentions and behavior. *Health Psychology, 6,* 453-466.

Xu, X., Alexander, R.L., Jr., Simpson, S.A., Goates, S., Nonnemaker, J.M., Davis, K.C., & McAfee, T. (2014). A cost-effectiveness analysis of the first federally funded antismoking campaign. *American Journal of Preventive Medicine*. Advance online publication. doi:10.1016/j.amepre.2014.10.011

* Yoon, H. J., & Tinkham, S. F. (2013). Humorous Threat Persuasion in Advertising: The Effects of Humor, Threat Intensity, and Issue Involvement. *Journal of Advertising, 42*, 30-41.

APPENDIX A: FIXED-EFFECTS ANALYSES FOR INDIVIDUAL OUTCOMES

In the body of the manuscript, I presented fixed-effects analyses for a combined measure averaging across attitudes, intentions, and behaviors. Here, I present the analyses done separately for each type of measure.

First, the overall average effect size comparing treatment to comparison groups separately for attitudes, intentions, and behaviors was respectively d = 0.20 (95% CI: [0.16, 0.24], k = 110), d = 0.28 (95% CI: [0.25, 0.31], k = 163), and d = 0.35 (95% CI: [0.32, 0.39], k = 70).

To examine the linear and curvilinear hypotheses for each outcome, I computed the average weighted effect size comparing outcomes for high fear versus moderate fear groups. For attitudes, intentions, and behaviors, the results were respectively d = 0.06 (95% CI: [-0.11, 0.22], k = 8), d = -0.08 (95% CI: [-0.17, 0.02], k = 9), and d = 0.15 (95% CI: [0.04, 0.25], k = 10).

To examine the gender hypothesis, I regressed outcomes onto the percent of the sample that was female. The results for attitudes, intentions, and behaviors were respectively b = 0.0039 (SE = 0.0010, 95% CI for the slope: [0.0020, 0.0057], p < .001, k = 72), b = 0.0033 (SE = 0.0007, 95% CI for the slope: [0.0018, 0.0047], p < .001, k = 119), and b = -0.0009 (SE = 0.0012, 95% CI for the slope: [-0.0034, 0.0015], p = .45, k = 49).

To examine the education hypothesis, I regressed outcomes onto the percent of the sample that had attained a high school degree or higher. The results for attitudes, intentions, and behaviors were respectively b = 0.0013 (SE = 0.0005, 95% CI for the slope: [0.0003, 0.0024], p = .01, k = 86), b = 0.0030 (SE = 0.0004, 95% CI for the slope: [0.0022, 0.0038], p < .0001, k = 140), and b = -0.0019 (SE = 0.0005, 95% CI for the slope: [-0.0029, -0.0009], p = .0001, k = 46).

To examine the race hypotheses, I regressed outcomes onto the percent of the sample that was African, Asian, European, and Hispanic/Latino(a) for each of the potential outcomes. The results for attitudes were respectively b = 0.0049 (SE = 0.0011, 95% CI for the slope: [0.0027, 0.0071], p < .0001, k = 31), b = -0.0017 (SE = 0.0008, 95% CI for the slope: [-0.0033, -0.0000], p = .046, k = 31), b = -0.0015 (SE = 0.0008, 95% CI for the slope: [-0.0031, 0.0001], p = .06, k = 32), and b = 0.0571 (SE = 0.0116, 95% CI for the slope: [0.0343, 0.0799], p < .0001 , k = 31). The results for intentions were respectively b = -0.0041 (SE = 0.0013, 95% CI for the slope: [-0.0066, -0.0017], p = .001, k = 62), b = 0.0017 (SE = 0.0006, 95% CI for the slope: [0.0006, 0.0028], p = .003, k = 62), b = -0.0010 (SE = 0.0006, 95% CI for the slope: [-0.0021, 0.0001], p = .09, k = 67), and b = 0.0005 (SE = 0.0077, 95% CI for the slope: [-0.0147, 0.0156], p = .95, k = 62). The results for behaviors were respectively b = -0.0047 (SE = 0.0010, 95% CI for the slope: [-0.0067, -0.0027], p < .0001 , k = 35), b = -0.0012 (SE = 0.0008, 95% CI for the slope: [-0.0026, 0.0003], p = .13, k = 34), b = 0.0048 (SE = 0.0007, 95% CI for the slope: [0.0034, 0.0063], p < .0001 , k = 35), and b = -0.0032 (SE = 0.0023, 95% CI for the slope: [-0.0078, 0.0014], p = .17, k = 34).

The results for all categorical moderator analyses are presented in Table A.1.

Table A.1. Fixed-effects moderator analyses done separately for attitudes, intentions, and behaviors.

MBA Aspect	Variable	Level	Attitudes			Intentions			Behaviors		
			d	95% CI	*k*	*d*	95% CI	*k*	*d*	95% CI	*k*
Message	Efficacy statements	Included	.44	[.36, .52]	38	.40	[.35, .46]	61	.44	[.38, .50]	32
		Excluded	.12	[.07, .17]	72	.23	[.19, .27]	100	.29	[.24, .34]	38
	Depicted susceptibility and severity	Both	.20	[.12, .28]	33	.27	[.22, .33]	62	.45	[.38, .53]	29
		Susceptibility	.33	[.14, .53]	6	.37	[.23, .52]	18	.44	[.03, .84]	2
		Severity	.20	[.15, .24]	62	.30	[.25, .34]	68	.34	[.29, .38]	34
		Neither	.22	[.02, .42]	9	.13	[-.02, .28]	7	.02	[-.22, .26]	4
	Vividness of message	High	.24	[.18, .31]	34	.26	[.20, .31]	45	.57	[.51, .63]	18
		Low	.20	[.12, .27]	35	.27	[.22, .32]	78	.36	[.28, .45]	25
	Vividness of message crossed with depicted susceptibility and severity	High viv, both	-	-	-	.06	[-.13, .25]	7	.74	[.31, 1.16]	2
		High viv, susceptibility	-	-	-	.31	[-.27, .89]	2	-	-	-
		High viv, severity	.25	[.18, .31]	32	.29	[.23, .35]	33	.58	[.52, .64]	13
		High viv, neither	.08	[-.32, .48]	2	-.51	[-1.21, .19]	1	.06	[-.36, .49]	3
		Low viv, both	.22	[.11, .32]	18	.28	[.22, .35]	39	.36	[.27, .45]	20
		Low viv, susceptibility	.21	[-.03, .46]	3	.39	[.23, .55]	14	.44	[.03, .84]	2
		Low viv, severity	.17	[.07, .28]	14	.22	[.13, .32]	19	.75	[.47, 1.04]	2
		Low viv, neither	-	-	-	-	-	-	-	-	-
	Comparison message	Low depicted fear	.15	[.09, .21]	55	.28	[.23, .33]	79	.34	[.26, .42]	27
		Neutral message	.19	[.12, .26]	36	.30	[.25, .35]	58	.40	[.33, .47]	23
		No message	.35	[.27, .44]	18	.25	[.19, .31]	25	.33	[.28, .39]	20
Behavior	One-time versus repeated	One-time	.46	[.38, .53]	48	.43	[.37, .50]	48	.50	[.42, .57]	26
		Repeated	.09	[.05, .14]	62	.23	[.19, .26]	115	.31	[.26, .35]	44
	Detection versus promotion/prevention	Detection	.22	[.10, .34]	16	.40	[.33, .48]	35	.29	[.18, .41]	12
		PP	.20	[.16, .24]	94	.25	[.22, .28]	128	.36	[.32, .40]	58
	Death and self-esteem	SEE, DP	.14	[-.09, .37]	6	.35	[.17, .53]	8	.79	[.58, 1.00]	5
		SEE, DA	-.11	[-.28, .06]	4	.13	[.04, .22]	20	-.69	[-1.04, -.33]	3
		SEH, DP	-.24	[-.48, .00]	7	.08	[-.06, .21]	14	.28	[.06, .50]	4
		SEH, DA	.42	[.01, .83]	1	.61	[.43, .80]	4	.31	[-.32, .94]	2

Table A.1 (cont.)

MBA Aspect	Variable	Level	Attitudes			Intentions			Behaviors		
			d	95% CI	*k*	*d*	95% CI	*k*	*d*	95% CI	*k*
	Death and delay	DP, same day	.08	[.00, .16]	33	.20	[.14, .27]	49	.52	[.39, .65]	11
		DP, same day	.10	[-.41, .60]	1	-	-	-	.83	[.68, .97]	4
		DP, 1-14 days	.68	[.40, .97]	4	.22	[-.10, .55]	2	.21	[.06, .36]	9
		DP, 14+ days	.35	[.30, .41]	54	.31	[.27, .35]	91	.13	[.07, .19]	23
		DA, same day	-.15	[-.31, .02]	9	.25	[.10, .40]	12	-.08	[-.22, .05]	13
		DA, 1-14 days	-.05	[-.16, .05]	6	.31	[.23, .38]	8	.60	[.54, .67]	10
	Action and inaction	Action	.27	[.21, .32]	70	.31	[.27, .36]	99	.22	[.17, .27]	47
		Inaction	.14	[.07, .21]	34	.25	[.21, .29]	59	.58	[.52, .64]	20
	Health relevant	Yes	.21	[.16, .26]	74	.29	[.26, .33]	140	.26	[.22, .30]	64
		No	.18	[.10, .25]	33	.22	[.15, .30]	20	1.20	[1.08, 1.32]	6
Audience	Gender	All-female	.29	[.19, .39]	19	.41	[.35, .48]	51	.37	[.25, .50]	14
		50/50	.10	[-.28, .49]	2	.11	[-.13, .35]	8	-	-	-
		All-male	.27	[.08, .47]	10	.00	[-.20, .20]	8	.02	[-.27, .32]	5
	Culture	Collectivist	.02	[-.11, .14]	10	.39	[.31, .48]	22	.42	[.33, .51]	14
		Individualist	.22	[.18, .27]	100	.26	[.23, .30]	141	.34	[.39, .38]	56
	Stage of change	Early	.25	[.21, .30]	69	.32	[.28, .36]	98	.36	[.31, .40]	46
		Late	.39	[.23, .54]	9	.08	[-.01, .17]	21	.63	[.43, .83]	5
	Age	22+ years	.35	[.28, .42]	40	.28	[.23, .33]	39	.19	[.14, .25]	30
		18-22 years	.21	[.15, .27]	50	.27	[.32, .41]	101	.53	[.44, .62]	22
		Under 18 years	-.10	[-.19, -.01]	13	.08	[.01, .15]	17	.56	[.48, .63]	18
	Age crossed with stage of change	22+ years, early	.36	[.28, .43]	31	.30	[.25, .36]	33	.19	[.13, .24]	25
		18-22 years, early	.26	[.18, .33]	26	.44	[.38, .51]	54	.73	[.59, .87]	12
		Under 18 years, early	-.08	[-.20, .03]	5	.10	[-.00, .20]	5	.62	[.54, .71]	9
		22+ years, late	.75	[.48, 1.02]	4	.15	[-.14, .44]	3	.21	[-.02, .44]	4
		18-22 years, late	.50	[.22, .78]	2	.08	[-.13, .28]	8	-	-	-
		Under 18 years, late	-.02	[-.27, .24]	3	.07	[-.04, .18]	10	1.97	[1.56, 2.38]	1

Table A.1 (cont.)

MBA Aspect	Variable	Level	Attitudes			Intentions			Behaviors		
			d	95% CI	*k*	*d*	95% CI	*k*	*d*	95% CI	*k*

Note: SE = Self-esteem. DP = Death present in message. DA = Death absent in message. PP = Promotion/prevention. SEE = Self-esteem enhancing recommended behaviors. SEH = Self-esteem hindering recommended behaviors. *d* = Standardized mean effect size estimated meta-analytically for the indicated moderator level. 95% CI = The 95% confidence interval for *d*. *k* = The number of studies for each moderator level. Dash (–) indicates there were no observations at a particular moderator level.

APPENDIX B: RANDOM-EFFECTS ANALYSES

In the body of the manuscript, I presented fixed-effects analyses. I present the corresponding random-effects analyses here.

First, the average weighted effect size comparing treatment to comparison groups for combined outcomes, attitudes, intentions, and behaviors was respectively d = 0.29 (95% CI: [0.22, 0.35]), d = 0.23 (95% CI: [0.11, 0.34]), d = 0.31 (95% CI: [0.24, 0.38]), and d = 0.27 (95% CI: [0.13, 0.42]). The heterogeneity statistics for each measure were respectively Q(247) = 1,287 (I^2 = 85.11, p < .0001), Q(109) = 614 (I^2 = 86.52, p < .0001), Q(162) = 615 (I^2 = 75.48, p < .0001), and Q(69) = 733 (I^2 = 92.37, p < .0001).

Based on the 71 samples that included subjective fear measures, fear appeals were generally successful at inducing experienced fear, such that treatment groups reported more fear than comparison groups, d = 1.00 (95% CI: [0.83, 1.18]), Q(70) = 697, I^2 = 90.67, p < .0001.

To examine the linear and curvilinear hypotheses for each outcome, I computed the average weighted effect size comparing outcomes for high fear versus moderate fear groups. For combined outcomes, attitudes, intentions, and behaviors, the results were respectively d = -0.05 (95% CI: [-0.34, 0.24]), d = 0.05 (95% CI: [-0.27, 0.36]), d = -0.09 (95% CI: [-0.29, 0.11]), and d = -0.04 (95% CI: [-0.63, 0.56]). The heterogeneity statistics for each measure were respectively Q(20) = 154 (I^2 = 92.89, p < .0001), Q(7) = 19 (I^2 = 66.10, p = .009), Q(8) = 19 (I^2 = 65.95, p = .01), and Q(9) = 118 (I^2 = 96.12, p < .0001).

To examine the gender hypothesis, I regressed outcomes onto the percent of the sample that was female. The results for combined outcomes, attitudes, intentions, and behaviors were respectively b = 0.0031 (SE = 0.0012, 95% CI for the slope: [0.0007, 0.0055], p = .01, k = 168), b = 0.0019 (SE = 0.0022, 95% CI for the slope: [-0.0024, 0.0061], p = .38, k = 72), b = 0.0043

(*SE* = 0.0013, 95% CI for the slope: [0.0016, 0.0069], *p* = .002, *k* = 119), and *b* = 0.0037 (*SE* = 0.0028, 95% CI for the slope: [-0.0018, 0.0091], *p* = .19, *k* = 49).

To examine the education hypothesis, I regressed outcomes onto the percent of the sample that had attained a high school degree or higher. The results for combined outcomes, attitudes, intentions, and behaviors were respectively *b* = 0.0011 (*SE* = 0.0010, 95% CI for the slope: [-0.0010, 0.0031], *p* = .30, *k* = 192), *b* = 0.0004 (*SE* = 0.0020, 95% CI for the slope: [-0.0034, 0.0042], *p* = .84, *k* = 86), *b* = 0.0024 (*SE* = 0.0011, 95% CI for the slope: [0.0003, 0.0046], *p* = .03, *k* = 140), and *b* = -0.0001 (*SE* = 0.0018, 95% CI for the slope: [-0.0037, 0.0035], *p* = .95, *k* = 46).

To examine the race hypotheses, I regressed outcomes onto the percent of the sample that was African, Asian, European, and Hispanic/Latino(a) for each of the potential outcomes. The results for combined outcomes were respectively *b* = 0.0012 (*SE* = 0.0022, 95% CI for the slope: [-0.0031, 0.0055], *p* = .58, *k* = 85), *b* = 0.0026 (*SE* = 0.0013, 95% CI for the slope: [0.0001, 0.0051], *p* = .04, *k* = 84), *b* = -0.0026 (*SE* = 0.0012, 95% CI for the slope: [-0.0050, -0.0002], *p* = .04, *k* = 89), and *b* = 0.0004 (*SE* = 0.0045, 95% CI for the slope: [-0.0085, 0.0093], *p* = .93, *k* = 84). The results for attitudes were respectively *b* = 0.0021 (*SE* = 0.0037, 95% CI for the slope: [-0.0052, 0.0095], *p* = .57, *k* = 31), *b* = -0.0014 (*SE* = 0.0029, 95% CI for the slope: [-0.0071, 0.0044], *p* = .64, *k* = 31), *b* = -0.0003 (*SE* = 0.0029, 95% CI for the slope: [-0.0060, 0.0054], *p* = .92, *k* = 32), and *b* = 0.0697 (*SE* = 0.0353, 95% CI for the slope: [0.0006, 0.1388], *p* = .048, *k* = 31). The results for intentions were respectively *b* = -0.0048 (*SE* = 0.0027, 95% CI for the slope: [-0.0101, 0.0005], *p* = .08, *k* = 62), *b* = 0.0038 (*SE* = 0.0012, 95% CI for the slope: [0.0015, 0.0061], *p* = .001, *k* = 62), *b* = -0.0030 (*SE* = 0.0012, 95% CI for the slope: [-0.0053, -0.0006], *p* = .01, *k* = 67), and *b* = -0.0255 (*SE* = 0.0191, 95% CI for the slope: [-0.0630, 0.0119], *p* = .18 , *k*

= 62). The results for behaviors were respectively b = -0.0005 (*SE* = 0.0028, 95% CI for the slope: [-0.0060, 0.0051], p = 87, k = 35), b = 0.0032 (*SE* = 0.0021, 95% CI for the slope: [-0.0009, 0.0073], p = .13, k = 34), b = -0.0014 (*SE* = 0.0021, 95% CI for the slope: [-0.0055, 0.0027], p = .51, k = 35), and b = 0.0008 (*SE* = 0.0048, 95% CI for the slope: [-0.0086, 0.0101], p = .87, k = 34).

The results for all categorical moderator analyses are presented in Table B.1.

Table B.1. Random-effects moderator analyses done separately for combined outcomes, attitudes, intentions, and behaviors.

			Combined outcomes			Attitudes			Intentions			*Behaviors*		
MBA Aspect	Variable	Level	*d*	95% CI	*k*	*d*	95% CI	*k*	*d*	95% CI	k	*d*	95% CI	*k*
Message	Efficacy statements	Included	.43	[.31, .55]	92	.39	[.13, .64]	38	.40	[.30, .49]	61	.43	[.20, .66]	32
		Excluded	.21	[.13, .29]	154	.14	[.04, .25]	72	.27	[.17, .36]	100	.14	[-.05, .33]	38
	Depicted susceptibility and severity	Both	.39	[.28, .50]	78	.22	[.05, .38]	33	.35	[.23, .47]	62	.44	[.24, .63]	29
		Susceptibility	.43	[.08, .79]	20	.48	[-.51, 1.47]	6	.37	[.15, .59]	18	.45	[.01, .88]	2
		Severity	.23	[.13, .33]	125	.22	[.06, .37]	62	.29	[.20, .39]	68	.17	[-.08, .42]	34
		Neither	.12	[-.03, .27]	17	.19	[-.05, .43]	9	.20	[-.10, .49]	7	.02	[-.22, .26]	4
	Vividness of message	High	.20	[.09, .31]	73	.23	[.06, .40]	34	.22	[.12, .33]	45	.28	[-.09, .65]	18
		Low	.36	[.25, .47]	93	.25	[.07, .42]	35	.33	[.22, .44]	78	.32	[.12, .52]	25
	Vividness of message crossed with depicted susceptibility and severity	High viv, both	.13	[-.13, .39]	7	-	-	-	.08	[-.15, .30]	7	.74	[.31, 1.16]	2
		High viv, susceptibility	.36	[-.96, 1.68]	2	-	-	-	.36	[-.96, 1.68]	2	-	-	-
		High viv, severity	.23	[.10, .36]	56	.24	[.06, .42]	32	.28	[.16, .39]	33	.25	[-.24, .75]	13
		High viv, neither	-.01	[-.28, .26]	6	.08	[-.35, .51]	2	-.51	[-1.21, .19]	1	.06	[-.36, .49]	3
		Low viv, both	.41	[.26, .55]	45	.23	[.05, .42]	18	.38	[.22, .53]	39	.35	[.16, .54]	20
		Low viv, susceptibility	.37	[.13, .61]	15	.16	[-.26, .58]	3	.39	[.12, .65]	14	.45	[.01, .88]	2
		Low viv, severity	.31	[.08, .54]	27	.30	[-.09, .68]	14	.24	[-.00, .47]	19	.30	[-1.08, 1.67]	2
		Low viv, neither	-	-	-	-	-	-	-	-	-	-	-	-
	Comparison message	Low depicted fear	.24	[.13, .35]	116	.16	[-.02, .33]	55	.30	[.22, .39]	79	.16	[-.11, .44]	27
		Neutral message	.29	[.17, .41]	87	.20	[.03, .38]	36	.31	[.17, .44]	58	.29	[.01, .56]	23
		No message	.37	[.25, .49]	44	.49	[.23, .75]	18	.31	[.16, .45]	25	.39	[.18, .60]	20
Behavior	One-time versus repeated	One-time	.43	[.30, .56]	82	.38	[.17, .59]	48	.46	[.35, .57]	48	.49	[.24, .74]	26
		Repeated	.21	[.14, .29]	166	.11	[-.00, .22]	62	.24	[.16, .33]	115	.15	[-.02, .33]	44
	Detection versus promotion/prevention	Detection	.35	[.21, .49]	40	.22	[.03, .42]	16	.46	[.33, .58]	35	.23	[-.15, .61]	12
		PP	.27	[.20, .35]	208	.22	[.10, .35]	94	.27	[.19, .34]	128	.28	[.12, .45]	58
	Death and self-esteem	SEE, DP	.39	[.11, .67]	15	.10	[-.32, .51]	6	.36	[.14, .58]	8	.61	[-.30, 1.52]	5
		SEE, DA	.22	[-.04, .47]	23	-.10	[-.33, .14]	4	.35	[.14, .56]	20	-.74	[-1.48, .01]	3
		SEH, DP	-.11	[-.41, .18]	18	-.29	[-.87, .29]	7	.05	[-.23, .32]	14	-.02	[-.62, .59]	4
		SEH, DA	.48	[.00, .96]	6	.42	[.01, .83]	1	.54	[.13, .95]	4	.39	[-1.56, 2.35]	2

Table B.1 (cont.)

			Combined outcomes			Attitudes			Intentions			*Behaviors*		
MBA Aspect	Variable	Level	*d*	95% CI	*k*	*d*	95% CI	*k*	*d*	95% CI	k	*d*	95% CI	*k*
	Death and delay	DP, same day	.16	[.04, .27]	70	.08	[-.13, .19]	33	.21	[.10, .32]	49	.35	[-.11, .82]	11
		DP, 1-14 days	.79	[.21, 1.37]	5	.10	[-.41, .60]	1	-	-	-	.95	[.33, 1.57]	4
		DP, 14+ days	.35	[.19, .51]	14	.68	[.37, .98]	4	.22	[-.10, .55]	2	.21	[.06, .36]	9
		DA, same day	.34	[.25, .44]	124	.36	[.20, .51]	54	.37	[.27, .46]	91	.27	[.03, .52]	23
		DA, 1-14 days	.02	[-.29, .33]	18	-.15	[-.31, .02]	9	.34	[.04, .65]	12	-.17	[-.46, .13]	13
		DA, 14+ days	.46	[.08, .88]	13	.44	[-.57, 1.45]	6	.25	[.05, .45]	8	.48	[.11, .85]	10
	Action and inaction	Action	.32	[.23, .41]	145	.25	[.09, .41]	70	.32	[.24, .40]	99	.30	[.15, .45]	47
		Inaction	.25	[.13, .37]	92	.18	[.02, .34]	34	.30	[.18, .42]	59	.21	[-.18, .61]	20
	Health relevant	Yes	.28	[.20, .35]	202	.19	[.06, .33]	74	.32	[.25, .40]	140	.21	[.06, .36]	64
		No	.31	[.13, .49]	43	.29	[.05, .52]	33	.22	[.04, .41]	20	1.06	[.82, 1.30]	6
Audience	Gender	All-female	.40	[.25, .56]	60	.37	[.05, .69]	19	.42	[.29, .55]	51	.30	[-.07, .67]	14
		50/50	.11	[-.14, .37]	8	.11	[-.59, .80]	2	.11	[-.15, .37]	8	-	-	-
		All-male	.16	[-.06, .38]	21	.32	[-.04, .67]	10	.00	[-.20, .20]	8	-.05	[-.51, .41]	5
	Culture	Collectivist	.47	[.27, .66]	29	.08	[-.18, .34]	10	.51	[.32, .70]	22	.41	[.10, .71]	14
		Individualist	.26	[.19, .33]	219	.24	[.12, .36]	100	.27	[.20, .35]	141	.24	[.07, .41]	56
	Stage of change	Early	.30	[.21, .40]	150	.32	[.17, .47]	69	.31	[.22, .39]	98	.24	[.05, .43]	46
		Late	.34	[.14, .54]	30	.42	[.07, .77]	9	.22	[.03, .42]	21	.61	[-.32, 1.53]	5
	Age	22+ years	.17	[.05, .28]	74	.29	[.13, .45]	40	.20	[.09, .30]	39	.08	[-.19, .25]	30
		18-22 years	.36	[.26, .46]	130	.21	[.01, .41]	50	.39	[.29, .49]	101	.53	[.36, .71]	22
		Under 18 years	.24	[.07, .41]	35	-.06	[-.24, .13]	13	.11	[-.00, .23]	17	.38	[.05, .71]	18
	Age crossed with stage of change	22+ years, early	.15	[.03, .27]	57	.31	[.15, .47]	31	.20	[.10, .31]	33	-.03	[-.27, .21]	25
		18-22 years, early	.43	[.28, .59]	70	.33	[-.02, .68]	26	.42	[.27, .56]	54	.67	[.43, .90]	12
		Under 18 years, early	.30	[.00, .61]	14	.20	[-.37, .77]	5	.08	[-.10, .27]	5	.46	[.02, .91]	9
		22+ years, late	.45	[.04, .86]	10	.84	[.22, 1.45]	4	.17	[-.25, .59]	3	.23	[-.47, .93]	4
		18-22 years, late	.23	[-.13, .59]	9	.39	[-.16, .94]	2	.21	[-.21, .62]	8	-	-	-
		Under 18 years, late	.33	[.02, .64]	11	-.02	[-.27, .24]	3	.24	[.01, .48]	10	1.97	[1.56, 2.38]	1

Table B.1 (cont.)

			Combined outcomes			Attitudes			Intentions			*Behaviors*		
MBA Aspect	Variable	Level	*d*	95% CI	*k*	*d*	95% CI	*k*	*d*	95% CI	k	*d*	95% CI	*k*

Note: SE = Self-esteem. DP = Death present in message. DA = Death absent in message. PP = Promotion/prevention. SEE = Self-esteem enhancing recommended behaviors. SEH = Self-esteem hindering recommended behaviors. *d* = Standardized mean effect size estimated meta-analytically for the indicated moderator level. 95% CI = The 95% confidence interval for *d*. *k* = The number of studies for each moderator level. Combined outcomes = Average of all attitude, intention, and behavior measures. Dash (–) indicates there were no observations at a particular moderator level.