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A Meta-Analysis of Fear Appeals: Implications for Effective Public Health Campaigns

Kim Witte, PhD
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The fear appeal literature is examined in a comprehensive synthesis using meta-analytical techniques. The meta-analysis suggests that strong fear appeals produce high levels of perceived severity and susceptibility, and are more persuasive than low or weak fear appeals. The results also indicate that fear appeals motivate adaptive danger control actions such as message acceptance and maladaptive fear control actions such as defensive avoidance or reactance. It appears that strong fear appeals and high-efficacy messages produce the greatest behavior change, whereas strong fear appeals with low-efficacy messages produce the greatest levels of defensive responses. Future directions and practical implications are provided.

Although considerable laboratory research has shown that fear appeals (persuasive messages that arouse fear) motivate behavior change across a variety of behaviors, public health researchers and practitioners continue to contend that fear appeals backfire.¹⁻³ Given these conflicting viewpoints,⁴⁻⁶ the purpose of this article is to provide a comprehensive review and update of the fear appeal research. The focus in this work will be on the empirical analysis and synthesis of more than 100 fear appeal articles. This analysis updates Sutton's⁷ and Boster and Mongeau's⁸ (and Mongeau's⁹ limited update) fear appeal meta-analyses and examines several variables previously unexamined in meta-analyses (such as threat and efficacy interactions and fear control outcomes). An update of previous work is needed because there has been a tremendous increase in the number of fear appeal articles in the past dozen years.

FEAR APPEAL THEORY: 1953 TO THE PRESENT

Across the nearly 50 years of research on fear appeals, three key independent variables have been identified: fear, perceived threat, and perceived efficacy. Fear is defined as a negatively valenced emotion, accompanied by a high level of arousal.^{4,5} Fear was the primary focus of research from 1953 to about 1975. Perceived threat and perceived efficacy

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were first identified as important variables by Rogers in 1975¹⁰ and 1983.¹¹ Perceived threat is composed of two dimensions: perceived susceptibility to the threat (i.e., the degree to which one feels at risk for experiencing the threat) and perceived severity of the threat (i.e., the magnitude of harm expected from the threat).^{4,5} While fear and threat are conceptually distinct (the former is emotion, the latter is cognition), they are intricately and reciprocally related, such that the higher the perceived threat, the greater the fear experienced.^{4,5} Perceived efficacy also is composed of two dimensions: perceived self-efficacy (i.e., one's beliefs about his or her ability to perform the recommended response) and perceived response efficacy (i.e., one's beliefs about whether the recommended response works in averting the threat).^{4,5} Typically, fear appeal researchers manipulate the strength of a fear appeal in at least two different messages (one strong, one weak), validate the different strengths of fear appeals through manipulation checks (items that assess fear arousal; to be a successful manipulation, these fear arousal items must differ significantly between the strong vs. weak fear appeals), and assess whether the stronger fear appeal produces stronger outcomes than the weaker fear appeal. The outcomes studied in fear appeals appear to fall into two general classes: (1) outcomes related to acceptance of the message's recommendations (i.e., attitudes, intentions, behaviors in line with the recommendations) and (2) outcomes related to rejection of the message (i.e., defensive avoidance, reactance, denial). Fear appeal studies have addressed the most pressing public health issues by focusing on a wide variety of disease prevention/health promotion behaviors such as condom usage to prevent HIV/AIDS, smoking cessation, reduction of alcohol usage while driving, promotion of flossing for dental hygiene, tractor safety behaviors, using sunscreen to prevent skin cancer, breast self-examinations, exercise promotion, and so on.

Throughout the years, there have been several fear appeal reviews and theories offered. Appendix A provides a brief description of the major reviews of the literature. The appendix shows that early reviews tended to be critical essays that identified conceptual, operational, and methodological issues, which might account for the disparate results in the literature,^{12,13} whereas later reviews applied quantitative methods to analyze the fear appeal literature, as in the meta-analyses of Boster and Mongeau,⁸ Sutton,⁷ and Mongeau.⁹ Several reviews discussed the effective use of fear appeals within a disciplinary framework such as marketing^{14,15} and public health.^{16,17} Recent reviews have concentrated on extending previous theoretical perspectives,⁵ distinguishing between different models,¹⁸ or broadening the scope of fear appeals to include other emotions.⁶

Appendix B provides a brief description of the fear appeal theories. Fear appeal theories have tended to build one upon another and reflect the major perspectives of the time period in which they were developed. For example, early fear appeal theories tended to be grounded in learning theory perspectives, which were popular at the time.¹⁹⁻²² Beginning in the 1970s, cognitive perspectives gained favor in fear appeal theories, mirroring the cognitive revolution in the social sciences.¹⁰ More recently, there has been a return to the study of emotion as a driving force in behavior change theories and a concomitant return to a focus on emotion in fear appeal theories.^{4,6} Overall, fear appeal theories can be classified into three major groups, according to Dillard: drive theories, parallel response models, and subjective expected utility (SEU) models.⁶ Each group of theories will be briefly reviewed in order. In addition, Witte's extended parallel process model (EPPM), which integrates these three previous perspectives into one theory, will be discussed separately.^{4,5}

Drive Theories

The earliest fear appeal research used variations of drive theories to explain results.¹⁹⁻²² Drive theories (i.e., Hovland et al.'s fear-as-acquired drive model,¹⁹ Janis's family of curves,²⁰ and McGuire's nonmonotonic models^{21,22}) suggest that the level of fear arousal produced by a fear appeal acts as a drive to motivate actions. However, it was argued that fear could have both facilitating (e.g., motivate appropriate self-protective responses) and interfering (e.g., avoidance) effects. Overall, drive theories suggested an inverted U-shaped relationship between fear and attitude change in which a moderate amount of fear arousal was thought to produce the most attitude change. This class of theories was rejected during the early 1970s due to a lack of support for the inverted U-shaped model.^{7,10,11,23} Additionally, the most prominent of these theories—the fear-as-acquired drive model—was rejected because the model's central hypothesis, that acceptance of the message occurs when fear is reduced, was not supported.²⁴⁻²⁶ Attention then turned to explaining emotional versus cognitive responses to fear appeals.

Parallel Response Models

In 1970, Leventhal proposed, but never explicitly tested, the parallel response or process model.²⁷ The parallel process model suggests that fear appeals produce two separate and potentially interdependent processes: danger control processes (efforts to control the threat/danger) and fear control processes (efforts to control one's fear about the threat/danger). While Leventhal failed to explicitly state when danger control and fear control processes would be initiated, and while the model was subsequently criticized as lacking specificity and being untestable,^{10,23} the model did change current thinking about fear appeals and separated emotional from cognitive processes. Witte later returned to Leventhal's framework as the basis for her theory (to be discussed later).⁴ Beginning about the mid 1970s, other researchers continued to examine the "danger control" or cognitive/rational side of the model.

SEU Models

SEU models, such as Rogers's protection motivation theory (PMT),^{10,11} Beck and Frankel's threat control explanation,²³ and Sutton's SEU model,⁷ attempted to assess in a logical manner what made a fear appeal effective. These models were noted for their cognitive focus. The original and revised versions of Rogers's PMT were the first to identify the components of a fear appeal and the cognitive mediators leading to message acceptance. Fear was given a tangential role in Rogers's work (it was thought to be related to perceptions of severity only). Rogers proposed a four-way interaction between the dimensions of threat and the dimensions of efficacy (i.e., Severity $\times$ Susceptibility $\times$ Response Efficacy $\times$ Self-Efficacy) but ultimately failed to find support for this hypothesis.²⁸ However, studies testing PMT typically found that at least one threat variable (i.e., severity and/or susceptibility) interacted with at least one efficacy variable (i.e., self-efficacy and/or response efficacy) to influence message acceptance outcomes such as attitude, intention, and behavior change.²⁹⁻³³ Overall, if one examines the threat variables and efficacy variables as a whole instead of by their separate dimensions (e.g., threat = susceptibility +

severity; efficacy = response efficacy + self-efficacy), PMT appears to do a good job of explaining when and why fear appeals work (i.e., perceptions of high threat and high efficacy appear to produce the most message acceptance). However, PMT fails to explain when and how fear appeals fail.

While fear was accorded a trivial role in PMT (it was thought to be related to perceptions of severity only), it was virtually ignored in Sutton's SEU model.⁷ In this model, Sutton argued that people choose from competing alternatives a course of action that has the greatest SEU. Tests have produced little support for the SEU model.³⁴⁻³⁷ For example, Sutton and Eiser concluded in one study that there appeared to be "no evidence for the multiplicative combination of utilities and subjective probabilities" (p. 14).³⁴ Furthermore, they found that across studies, fear offered the most reliable influence on intentions, even though it was not an explicit part of the model.

EPPM

The most recent fear appeal theory, Witte's EPPM,^{4,5} traces its lineage through the classic fear appeal theories. Leventhal's model forms the basis of the theory,²⁷ PMT explains the danger control side of the model (i.e., when and why fear appeals work),^{10,11} and portions of Janis and McGuire's explanations can be accounted for under the fear control side of the model (i.e., when and why fear appeals fail).²⁰⁻²² The EPPM explains both successes and failures of fear appeals, and fear is reincorporated as a central variable in the model.

According to the EPPM, the evaluation of a fear appeal initiates two appraisals of the message, which result in one of three outcomes. First, individuals appraise the threat of an issue from a message. The more individuals believe they are susceptible to a serious threat, the more motivated they are to begin the second appraisal, which is an evaluation of the efficacy of the recommended response. If the threat is perceived as irrelevant or insignificant (i.e., low perceived threat), then there is no motivation to process the message further, and people simply ignore the fear appeal.

In contrast, when a threat is portrayed as and believed to be serious and relevant (e.g., "I'm susceptible to contracting a terrible disease"), individuals become scared. Their fear motivates them to take some sort of action—any action—that will reduce their fear. Perceived efficacy (composed of self-efficacy and response efficacy) determines whether people will become motivated to control the danger of the threat or control their fear about the threat. When people believe they are able to perform an effective recommended response against the threat (i.e., high perceived self-efficacy and response efficacy), they are motivated to control the danger and consciously think about ways to remove or lessen the threat. Typically, they think carefully about the recommended responses advocated in the persuasive message and adopt those as a means to control the danger. Alternatively, when people doubt whether the recommended response works (i.e., low perceived response efficacy) and/or whether they are able to do the recommended response (i.e., low perceived self-efficacy), they are motivated to control their fear (because they believe it's futile to control the danger) and focus on eliminating their fear through denial (e.g., "I'm not at risk for getting skin cancer, it won't happen to me"), defensive avoidance (e.g., "This is just too scary, I'm simply not going to think about it"), or reactance (e.g., "They're just trying to manipulate me, I'm going to ignore them").

In sum, the EPPM suggests that perceived threat contributes to the extent of a response to a fear appeal (i.e., how strong the danger or fear control responses are) whereas perceived efficacy (or lack thereof) contributes to the nature of the response (i.e., whether

danger or fear control responses are elicited). If no information with regard to the efficacy of the recommended response is provided, individuals will rely on past experiences and prior beliefs to determine perceived efficacy. It is critical to note for the purposes of the meta-analysis that the dimensions of threat (i.e., severity and susceptibility) are additive, as are the dimensions of efficacy (i.e., response efficacy and self-efficacy), but the relationship between threat and efficacy is multiplicative.

Previous Meta-Analyses

At least three meta-analyses have been conducted on the fear appeal literature. Boster and Mongeau⁸ and Mongeau⁹ examined the influence of a fear appeal on perceived fear (the manipulation check; i.e., did the strong vs. weak fear appeals differ significantly in their influence on measures of reported fear), attitudes, and behaviors. They found that on average, fear appeal manipulations produced moderate associations between reported fear and strength of fear appeal ($r = .36$ in Boster and Mongeau and $r = .34$ in Mongeau) and modest but reliable relationships between the strength of a fear appeal and attitude change ($r = .21$ in Boster and Mongeau and $r = .20$ in Mongeau) and the strength of a fear appeal and behavior change ($r = .10$ in Boster and Mongeau and $r = .17$ in Mongeau). Sutton⁷ used a different meta-analytic statistical method (z scores) and reported significant positive effects for strength of fear appeal on intentions and behaviors. None of the meta-analyses found support for a curvilinear association between fear appeal strength and message acceptance. Overall, the previous meta-analyses suggested that fear appeal manipulations work in producing different levels of fear according to different strengths of fear appeal messages. Furthermore, the meta-analyses suggest that the stronger the fear appeal, the greater the attitude, intention, and behavior change.

The present meta-analysis will update and expand on these results by assessing the relative fit of the data to each fear appeal model and examining the influence of fear appeals on both intended (i.e., attitudes, intentions, behaviors) and unintended (i.e., defensive avoidance, reactance) outcomes.

META-ANALYSIS

Rationale

Meta-analysis is a quantitative method that synthesizes the results of a particular group of studies. Researchers gather all available studies on a topic and then combine these studies statistically to produce an average effect for different variables across the literature. It allows one to see the "big picture."³⁸ Meta-analysis provides a thorough and objective synthesis of the literature that is needed as the literature becomes larger and the issues become more complex. For example, a quantitative analysis not only allows one to establish that one message strategy (or even a level of a message strategy) is more persuasive but also suggests certain explanations as to why some message designs are more effective than others. Furthermore, meta-analysis allows one to examine combinations of message features in a systematic way. Meta-analysis, by establishing consistency in research, can eliminate some possibilities and point out ways of assessing or comparing theories, determine future research agendas by identifying areas of weak or insufficient literature that require additional exploration, and call attention to areas that need further theorizing to explain conflicting results.

Conduct

Literature Search

A complete search of all relevant fear appeal articles was conducted. First, computer databases (e.g., PSYCHLIT, Social Sciences Index, Dissertation Abstracts, etc.) were searched for fear appeal articles with the following keywords: *fear appeal*, *threat appeal*, *scare tactic*, *shock tactic*, *risk message*, *risk perception*, *risk communication*, *negative message*, *protection motivation*, *fear*, and *threat*. Second, reference lists of all manuscripts were examined and missing works collected. Third, personal letters were sent to fear appeal researchers across the nation asking for any recent works on the topic (>40 letters). Articles that cited fear appeal work, used traditional fear appeal methods and measures, and varied the level of either fear or threat in a message were retained for analysis.

To be included in this meta-analysis, fear appeal studies needed to manipulate fear or threat in a fear appeal message (i.e., there had to be at least two levels of a fear appeal in an experimental or quasi-experimental design so that one could assess whether the stronger fear appeal produced significantly stronger fear arousal than the weaker fear appeal). Cross-sectional surveys that simply measured perceptions and correlated them with persuasive outcomes were not included in the meta-analysis. The goal of this meta-analysis was to examine how people reacted (both perceptually and persuasively) to fear appeal messages. Ninety-eight studies met the criteria for inclusion in the meta-analysis. (All coding information for the main effects and the interaction effects for each study are available from the authors upon request.) Ninety-three studies were included in the main effects analysis.^{28,29,58-63,65-68,70,71,77-150} Twenty-three studies were used in the interaction analysis.^{28-30,32,33,58,59,63,65,84,85,102,109,117,124,129-131,141,142,144,147,148} Finally, thirteen studies were used in the fear control response analysis (note that Jepson and Chaiken⁷⁹ is a two-study report).^{58,59,79,101,105,106,124,126,129,144,148,149}

Several studies were excluded from the meta-analysis for the following reasons: (1) features of the message not were manipulated (i.e., nonexperimental design),³⁹⁻⁴³ (2) false physiological feedback was used to manipulate arousal instead of message feature,^{25,44-46} (3) attitude- or behavior-dependent measures were not used,⁴⁷ (4) data were reported in other studies used in the meta-analysis (i.e., did not want to count a single study's effects twice),^{48,49} (5) the study did not vary the level of fear/threat,⁵⁰⁻⁵³ (6) the manipulation check failed (e.g., the items checking perceived threat and/or fear did not differ significantly for strong vs. weak fear appeals),^{54,55} and (7) data were presented in a manner in which the effects were not statistically recoverable.³⁵⁻³⁷

Coded Features

First, each study was coded for sample size and topic by two independent coders. Second, the definitions presented in the introduction were used to classify whether a study assessed perceived fear, perceived severity, perceived susceptibility, perceived response efficacy, and perceived self-efficacy. Third, effect size was extracted from each study by two independent coders for (1) message effects on perceived fear, perceived severity, perceived susceptibility, perceived response efficacy, and perceived self-efficacy; (2) message effects on attitudes, intentions, and behaviors; (3) effects from perceived fear, perceived severity, perceived susceptibility, perceived response efficacy, and perceived self-efficacy on attitudes, intentions, and behaviors; and (4) interaction effects between perceived severity, perceived susceptibility, perceived response efficacy, and perceived

self-efficacy on attitudes, intentions, behaviors, defensive avoidance, and derogation/criticism. Disagreements were virtually nonexistent because the terms used above are fairly standard across fear appeal research and because investigators tend to use similar, if not identical, measures of these constructs. However, it is important to note that we a priori defined our variables and then classified each variable in the individual studies according to our definitions, even though the investigator may have called the variable something different. For example, “reassurances” might be measured with items such as “Brushing my teeth effectively prevents tooth decay” or “Flossing prevents tooth decay.” These items are consistent with our definition of response efficacy (i.e., ascertaining beliefs about whether the recommended response works in preventing the threat) and would be classified as such in the meta-analysis. Thus, instead of simply using the label provided by the investigator, we examined the operationalizations of each variable to assess which variable was actually being measured according to our definitions. Most studies reported an F or t statistic, which was converted to r or η for analytical purposes. All individual effect sizes were corrected for artifacts, specifically attenuated measurement, dichotomization of variables, restriction in range, and regression to the mean (formulas found in Hunter and Schmidt³⁸). Investigators comparing their specific results to our meta-analytic estimates should first correct their results for the same artifacts to get an accurate comparison between their data and our results. Those using the meta-analysis to generate sample size and power estimates should take into account the above-mentioned artifacts as well. In extracting effects, a 0 was entered in a data column when there was no significant effect and no directional data given and $1/2 p$, or $p = .50$ was entered when the results were not significant and the direction was known.⁸

RESULTS

Main Effects of Message Features on Perceptions

This section reports the main effects obtained for each message feature due to the level of fear appeal. The results in Table 1 indicate that the stronger the fear appeal, the greater the fear aroused, the greater the severity of the threat perceived, and the greater the susceptibility to the threat perceived. Similarly, the stronger the efficacy message, the stronger the perceptions of response efficacy and self-efficacy.

These results indicate that fear appeals produce moderate effects for fear arousal, large effects for perceived severity, and moderately large effects for perceived susceptibility. The results also indicate that efficacy messages produce fairly large effects (efficacy manipulations are similar to fear manipulations in that for a successful efficacy message manipulation, there must be significant differences between the efficacy items on a survey for a strong vs. weak efficacy message). The heterogeneity found in these results is expected given that individual investigators vary widely in their fear appeal manipulations. Further tests indicated a significant correlation between year of study and the size of the manipulation such that newer studies obtained larger manipulation effects than did older studies ($r = .13, p < .05$). This finding suggests the possibility that later studies more carefully and specifically constructed and manipulated their messages, with the result being stronger manipulations, presumably leading to stronger effects.

Table 1. Effects of Fear Appeal Message Features on Perceptions

	Fear	Severity	Susceptibility	Response Efficacy	Self-Efficacy
<i>k</i>	51	33	29	24	17
<i>N</i>	12,735	5,531	4,731	4,739	2,731
<i>r</i>	.297*	.439*	.301*	.358*	.361*
95% confidence interval	±.089	±.109	±.077	±.113	±.117
χ^2	276.31*	200.31*	140.73*	263.35*	99.72*

NOTE: *k* = number of studies, *N* = number of research participants.**p* < .05.

Main Effects of Message Features on Message Acceptance Dependent Variables

Table 2 shows that all of the message feature manipulations—fear, severity, susceptibility, self-efficacy, and response efficacy—result in greater positive levels of attitude, intentions, and behavior change. Response efficacy and self-efficacy exhibit homogeneous effects for behavior; all other observed effects are heterogeneous. This heterogeneity indicates that one should cautiously interpret the average correlation because a moderator variable influencing acceptance of a message may exist. This caution may be tempered by the fact that the effects of the variables are all positive, indicating that the moderator variable moderates between a higher and a lower positive correlation rather than between a positive and a negative correlation. Thus, the expected relationship between the theoretical variables of interest and the outcome variables should be in the same direction even if significant moderator variables are discovered.

No evidence was found for any kind of curvilinear relationship between fear appeals and outcomes. The shape of the effects is most consistent with a positive linear-shaped function ($t = 5.09, p < .0001$). There is no support for hypothesized negative linear effects ($t = -.509, p = .999$), a U-shaped function ($t = .054, p = .957$), or an inverted U-shaped function ($t = -.054, p = .999$).

In sum, the stronger the fear appeal, the greater the attitude, intention, and behavior changes. Similarly, the stronger the severity and susceptibility in the message, the more attitude, intention, and behavior changes. Finally, the stronger the response efficacy and self-efficacy in a message, the stronger the attitudes, intentions, and behaviors toward the recommended response.

Interactions Between Variables

Interactions between threat and efficacy were examined in a two (high and low threat) by two (high and low efficacy) design. PMT and the EPPM consistently collapse severity and susceptibility into a single variable called threat, and consistently collapse response efficacy and self-efficacy into a single variable called efficacy. At least two studies have demonstrated with factor analyses that severity and susceptibility are separate dimensions that combine to compose a higher order factor of threat, and that response efficacy and self-efficacy are separate dimensions that combine to compose a higher order factor of efficacy.⁵⁶ Therefore, studies were included in the analyses only if they used at least one type of threat (i.e., susceptibility and/or severity) and one type of efficacy (i.e., self-effi-

Table 2. Effects of Message Feature on Attitudes, Intentions, and Behaviors

	Fear	Severity	Susceptibility	Response Efficacy	Self-Efficacy
Attitudes					
<i>k</i>	34	14	11	11	8
<i>N</i>	7,514	2,195	1,606	1,849	1,348
<i>r</i>	.147	.149	.119	.139	.116
95% confidence interval	.022	.041	.048	.044	.052
χ^2	79.99*	49.23*	50.86*	40.72*	44.85*
Intention					
<i>k</i>	43	26	27	24	21
<i>N</i>	9,686	3,923	3,948	4,348	3,873
<i>r</i>	.126	.142	.171	.166	.173
95% confidence interval	.020	.030	.030	.029	.030
χ^2	212.95*	81.80*	105.08*	99.29*	82.10*
Behavior					
<i>k</i>	28	16	11	12	11
<i>N</i>	4,666	2,528	1,797	1,608	1,475
<i>r</i>	.158	.132	.138	.129	.126
95% confidence interval	.028	.038	.045	.048	.050
χ^2	142.69*	34.28*	22.23*	16.74	20.46

NOTE: *k* = number of studies, *N* = number of research participants.

* $p < .05$.

cacy and/or response efficacy) variable. Studies using more than one type of threat or efficacy had the effects averaged. This approach yielded 23 studies appropriate for the interaction analysis.^{28-30,32,33,58,59,63,65,84,85,102,109,117,124,129-131,141,142,144,147,148}

Four cells were created: high threat-high efficacy (HTHE), high threat-low efficacy (HTLE), low threat-high efficacy (LTHE), and low threat-low efficacy (LTLE). A *z* score was estimated for each cell mean compared with the grand mean. A positive *z* score indicated a value greater than the overall mean, and a negative *z* score indicated a value less than the grand mean. (The representation of the values for each of the cells of the studies is available from the authors upon request.)

The next step was to conduct a standard 2×2 analysis of variance. The analysis indicated a significant main effect for threat, $F(1, 117) = 32.75$, $\eta^2 = .468$, $\eta^2 = .22$, $p < .05$, and efficacy, $F(1, 117) = 16.17$, $\eta^2 = .357$, $\eta^2 = .13$, $p < .05$, and a nonsignificant interaction effect, $F(1, 117) = 1.17$, $p > .05$. The use of the least squares distribution and Tukey's post hoc tests ($p < .05$) for significant differences between cells found that the HTHE group ($M = .40$, $SD = .49$) had a significantly greater persuasive effect than did the HTLE ($M = .07$, $SD = .31$) and the LTLE ($M = .03$, $SD = .30$), which did not differ significantly from one another. The LTLE ($M = -.27$, $SD = .44$) resulted in significantly less persuasive effects than all of the other groups.

Additionally, two effects-coded models were examined: an additive model and the EPPM model. The additive model treated the effect of threat and efficacy as separate and independent, such that higher levels of each would produce greater means. The HTHE group was coded as having the highest mean, the HTLE and LTLE groups were coded as

having means equal to each other but lower than the HTHE mean, and the LTLE group was coded as having the lowest mean. The additive effects-coded model fit the data, $t(112) = 6.83$, $\eta = .542$, $\eta^2 = .294$, $p < .05$.

The second model used effects coding consistent with EPPM predictions (note that these tests also may be appropriate for the PMT model, except that the PMT does not make specific predictions about what causes fear appeals to fail). According to both the EPPM and PMT, the HTHE group should have the highest mean. The other three groups should produce lower means that are relatively similar. Specifically, the EPPM suggests that low-threat messages with any level of efficacy produce weaker responses to fear appeals when compared to HTHE messages, since low-threat messages fail to motivate action. HTLE messages also are hypothesized to have weaker effects on attitudes, intentions, and behaviors, since they motivate qualitatively different actions (such as defensive avoidance) that interfere with attitude, intention, or behavior changes. Therefore, HTLE conditions often mimic the low-threat responses to the fear appeal—even though they may be producing strong fear control responses such as defensive avoidance. In addition, the HTLE group may even produce boomerang responses, although this is less common. The EPPM effects-coded model fit the data, $t(112) = 5.47$, $\eta = .459$, $\eta^2 = .211$, $p < .05$.

In sum, both the additive model and the EPPM model appear to fit the data. An examination of the cell means tends to favor the additive model over the EPPM, however. Specifically, the additive model suggests that higher levels of each variable would lead to more persuasiveness. Indeed, the means indicate that higher levels of both threat and efficacy, in their various combinations, lead to more persuasion (e.g., the high-high groups are more persuasive than the groups with high-low combinations, which are more persuasive than the low-low groups). The EPPM suggests that HTHE would be the most persuasive and that the low-threat groups should not be significantly different from each other. The EPPM also suggests that the HTLE group would either be no different from the low-threat groups or even result in negative effects. The results indicate only partial support for the EPPM. Specifically, the HTHE group is the most persuasive and the low-threat groups (LTHE, LTLE) are the least persuasive. However, while the HTLE group is not significantly different from the LTHE group (as expected), it is significantly more persuasive than the LTLE group (which is not expected). Overall, the additive model receives the greatest support in these analyses.

Moderator Analyses—Trait Anxiety

A wide variety of variables have been studied in connection with fear appeals.⁵ However, typically no more than three to four studies exist for each variable. Similarly, no key moderator variable has emerged as theoretically important when examining the effects of fear appeals (except perceived efficacy). A search for moderator variables without theoretical guidance would be unwise because of the large numbers of variables studied in connection with fear appeals; we would simply be capitalizing on chance for our analyses. However, there does appear to be at least one variable with a critical mass of studies that has the potential to be theoretically important in the persuasive effect of fear appeals: trait anxiety. Trait anxiety, or one's characteristic level of anxiety with regard to personal threats, has also been variously labeled repression-sensitization or avoider/coper in the literature (for a thorough review of this literature, see Witte and Morrison⁵⁷). One's characteristic level of anxiety has been hypothesized to affect how one processes fear appeals, such that one's trait level of anxiety may influence how one reacts to strong fear appeals (if one is scared and characteristically anxious, then the fear appeal may backfire).

The effect of trait anxiety directly on persuasive outcomes, as well as a moderator of persuasive outcomes, was examined. The results indicate that trait anxiety is unrelated to persuasive outcomes ($r = .015$, n.s., $k = 9$, $N = 2,729$, $\chi^2 = 15.21$, 95% confidence interval [CI] = $\pm .16$). That is, one's level of trait anxiety is not associated with attitudes, intentions, or behaviors toward recommended responses. Similarly, the interaction between trait anxiety and fear appeal does not significantly influence persuasive outcomes ($\eta = .007$, n.s., $k = 8$, $N = 2,645$, $\chi^2 = 3.78$, 95% CI = $\pm .16$). Thus, it appears not to matter whether individuals are anxious or repressors by nature; their response to fear appeals is not affected by their level of trait anxiety.

Fear Control Responses

The analyses heretofore have focused on danger control responses (i.e., attitudes/intentions/behaviors leading to message acceptance). Previously, no meta-analysis has assessed the degree to which fear appeals produce fear control responses. Fear control responses are defined as those reactions that occur when an individual uses psychological defense tactics to resist a message. Previous studies have called psychologically based motivated resistances to messages "defensive avoidance," "issue derogation," "minimization," "denial," "perceived manipulation," "wishful thinking," and so on. Fear control responses appear to be highly intercorrelated and have been treated as a single construct in Witte⁵⁸ and more recently in Smalec.⁵⁹ In each of these studies, reliability of the overall fear control (defensive responses) measure was good.

Thirteen studies could be found that assessed the relationship between strength of a fear appeal and defensive/resistant responses (note that Jepson and Chaiken⁷⁹ is a two-study report).^{58,59,79,101,105,106,124,126,129,144,148,149} (The studies used in this analysis, their effects, and the type of fear control/defensive response measured is available from the authors upon request.) The results indicate that as the fear appeal increases in strength, so do defensive responses ($r = .195$, $p < .05$, $k = 13$, $N = 1,431$, $\chi^2 = 8.59$, n.s., 95% CI = $.155$). In addition, the weaker the efficacy message, the greater the fear control response ($r = -.105$, $p < .05$, $k = 8$, $N = 1,033$, $\chi^2 = 7.22$, n.s., 95% CI = $.059$). Furthermore, defensive responses are negatively correlated with danger control responses ($r = -.18$, $p < .05$, $k = 7$, $N = 955$, $\chi^2 = 0.0$, n.s., 95% CI = $.10$). These findings tell us that fear appeals appear to produce one of two competing responses—either self-protective actions (such as attitude, intention, and behavior changes) or defensive responses—and that these responses are inversely related. Because these two responses cancel each other out (i.e., if one is defensively responding to a fear appeal and rejecting it, one is not making attitude, intention, or behavior changes), it is difficult to tell whether danger control or fear control processes are dominating unless one has measured and/or manipulated perceived efficacy.

DISCUSSION

Consistent with previous meta-analyses, this study suggests that the stronger the fear aroused by a fear appeal, the more persuasive it is. For example, the fear manipulation-attitude correlation was .21 in Boster and Mongeau,⁸ .20 in Mongeau,⁹ and .14 in this study (Sutton's study used a different type of analysis with a combined z score that is not comparable to the correlation⁷). Similarly, we found a correlation between the fear manipulation and behavior at .15, compared with Boster and Mongeau's .10 and Mongeau's .17. While Boster and Mongeau did not assess the influence of fear manipula-

tion on intentions, our study indicates that the relationship is within the range of the other danger control responses at .11. Overall, fear appears to have a relatively weak but reliable effect on attitudes, intentions, and behaviors. The differences between the findings of our meta-analysis and the previous meta-analyses may be accounted for by the more consistent and careful operationalizations of attitudes and behaviors in recent studies. For example, the early studies measured attitudes in a wide variety of ways. These measures may not have been comparable, and some attitude measures may actually have measured intentions. More recent research has consistently defined attitudes as evaluations of certain behaviors, intentions as one's intentions to perform a certain behavior, and behaviors as self-report indicators of the degree to which one did what the recommended response advocated. It is interesting to note that in this meta-analysis, the effects of the fear manipulation on attitudes, intentions, and behaviors were relatively consistent (i.e., .14, .11, .15, respectively).

The specific message features in fear appeals also appear to have moderately low but reliable effects on attitudes, intentions, and behaviors in this meta-analysis. Specifically, severity and susceptibility manipulations produced effects on persuasive outcomes in the range of .11 to .17. Response efficacy and self-efficacy manipulations produced slightly stronger effects on persuasive outcomes, in the range of .13 to .18. These findings indicate that specific attention should be given to these message features in future fear appeal studies because each produces positive persuasive effects.

It should be noted that the strength of each of these correlations is rather low and that significant heterogeneity exists for nearly all of the findings. This heterogeneity suggests that there is a significant moderator variable that may explain why some fear appeals work better than others. However, the results indicate that all of the defined message features in fear appeals produce positive results. Thus, any moderators will only further explain the differences between two types of positive outcomes (i.e., strong and weak), not between positive and negative outcomes. Future research should focus on identifying plausible moderators.

Individual differences do not appear to have much influence on the processing of fear appeals, given the results of this meta-analysis and other studies. This meta-analysis tested trait anxiety both by itself for its persuasive impact and as a moderator with fear (i.e., a fear by anxiety interaction). In both cases, trait anxiety was completely unrelated to persuasive outcomes.⁵⁷ Many other fear appeal studies have been conducted with individual difference variables, with inconclusive findings. Generally, studies have found no effect on acceptance of fear appeal recommendations due to gender, age, ethnicity, or group membership.⁶⁰⁻⁶³ However, at least two other studies have found significant interacting effects between need for cognition and strength of fear appeal⁶⁴ and uncertainty orientation and fear appeal.⁶⁵ Most often, however, individual difference variables directly influenced persuasive outcomes without interacting with the level of the fear appeal.⁶⁶⁻⁶⁸ Overall, the effect of individual differences on persuasive outcomes in the context of fear appeals appears highly unique to the specific individual differences examined and rarely interacts with the level of fear appeal in its effects on outcomes.

Fear appeal manipulations appeared to have improved over the years, given the correlation of .13 between year of study and manipulation effect. This improvement probably stems from more precise message definitions and more careful message construction. Severity manipulations in fear appeals appear to produce the strongest effects on perceptions (.44). Fear, susceptibility, response efficacy, and self-efficacy manipulations all produce moderate effects at .30, .30, .36, and .36, respectively. The stronger severity manipulations probably can be accounted for by the vivid and often gruesome pictures

accompanying fear appeals (as part of the manipulations). These gruesome pictures are likely to be novel and attended to more carefully than other less striking features of the message. Thus, they are likely to have a stronger effect on perceptions. The fear manipulation effect found in this study is a bit weaker (.30) than that found in previous studies (.36 in Boster and Mongeau⁸ and .35 in Mongeau⁹). An explanation for this is that far fewer studies are focusing on fear manipulations and are instead focusing on threat manipulations, with fear being measured as a double check on the threat message's status as a "fear appeal." Thus, because threat is the variable being manipulated directly in the current literature, with the assumption that fear will follow suit, we would expect larger threat manipulation-perceived threat effects (which were found in this study) than fear manipulation-perceived fear effects.

Theoretical Implications

The remaining results have strong theoretical implications and will be discussed with reference to each theoretical approach. First, there was no support for the drive model's curvilinear hypothesis. Specifically, the results provide absolutely no evidence supportive of any kind of quadratic effects (either U shaped or inverted U shaped). Similarly, there was no support for any hypothesized negative effects from fear appeals. Thus, the drive model's theoretical predictions do not appear to be consistent with the data.

Second, the fear control/danger control data appear generally consistent with the parallel process model (and the subsequent EPPM) in that the stronger the fear appeal manipulation, the stronger the danger control and fear control responses. In fact, the results indicate that as a fear appeal increases in strength, it produces stronger fear control/defensive responses ($r = .20$) than danger control responses such as change in attitude ($r = .14$), intention ($r = .11$), or behavior ($r = .15$). Furthermore, fear control responses are inversely correlated with danger control responses ($r = -.18$) such that the more one is defensively resisting a recommendation, the less one is making appropriate changes in line with the message's recommendations. These findings confirm Leventhal's²⁷ and Witte's⁴ suggestion that fear appeals produce two competing responses that interfere with each other. Furthermore, consistent with the EPPM's predictions, the weaker the efficacy message, the greater the fear control/defensive responses ($r = -.11$), such that messages that fail to make people believe the recommended response is effective and/or that they are able to perform the recommended response produce stronger fear control/defensive responses. In sum, the EPPM's specifications with regard to fear control and danger control outcomes appear to be consistent with these data.

Third, the interaction data suggest mixed support for the SEU models and the EPPM model. Specifically, the interaction analysis indicated only main effects for threat and efficacy on outcomes such that the higher levels of each, the greater the persuasive impact. No significant interaction emerged in these analyses between threat and efficacy. However, the tests for interactions were inconclusive in that both the additive and the EPPM (interactive) effects-coded models fit the data. Theoretically, all three models (SEU, PMT, and the EPPM) state that the HTHE group should result in the greatest persuasive impact, which was true in the current study. However, support for the additive model probably is most consistent with Sutton's SEU model.⁷ Sutton argues that increases in subjective utilities (e.g., the degree to which one cares about being harmed appears to be related to perceived severity), increases in probability differences (e.g., the difference between experiencing the health threat minus the decrease in the perceived probability of experiencing the health threat if the recommended response is adopted

appears to be a combination of perceived susceptibility and response efficacy), and increases in confidence (e.g., whether one thinks she or he can succeed in performing the recommended response appears to be related to self-efficacy) result in greater persuasive impact.³⁵ Thus, the main effect and additive model findings appear to be most consistent with the SEU model.

However, other results in the study offer support for PMT and the EPPM (both suggest threat by efficacy interactions; recall that PMT is contained within the EPPM and that PMT explains the danger control portion of the model but does not address the fear control side of the model). Again, it is not clear whether interactions exist in the literature. While the analysis of variance interaction test in this study indicated no significant interaction, the effects-coded model testing for PMT/EPPM type interactions was significant. Because interactions need more power to emerge as statistically significant, there may have been a power problem given the low number of studies included in the analyses.

The cell means, while consistent with an additive model in their order of effects (i.e., HTHE > HTLE and LTLE > LTLE), are not entirely inconsistent with EPPM predictions. The EPPM states that when individuals perceive low threat, they do not process the message any further. Indeed, this study showed that the two low-threat groups had the least persuasive impact. Furthermore, the EPPM predicts that the HTHE group would have the most persuasive impact, which it did. The unexpected finding was that the HTLE group was more persuasive than the LTLE group. A plausible explanation for this finding is that individuals are motivated to process all high-threat messages regardless of efficacy level. The EPPM suggests that threat motivates action while efficacy appraisal determines the direction of that action—either danger control or fear control. The data suggest that any high-threat message—regardless of what it was combined with—produces greater effects than any low-threat message.

Overall, the evidence is not conclusive for one model over another. What is clear is that there is no quadratic effects, so the drive model does not offer an adequate explanation of the data. There is evidence supportive of Sutton's SEU model in the main effects and additive model tests. There also is evidence supportive of the EPPM (and, by extension, PMT) in that fear appeals produce both danger and fear control responses, and the stronger the threat in a message, the more motivated individuals appear to be to process the message. There is no support for trait anxiety as a moderator variable.

In sum, fear appeals appear to be effective when they depict a significant and relevant threat (to increase perceptions of severity and susceptibility) and when they outline effective responses that appear easy to accomplish (to increase perceptions of response efficacy and self-efficacy). Low-threat fear appeals appear to produce little, if any, persuasive effects. Thus, regardless of which theoretical model is advocated, the advice to message designers is the same: A persuader should promote high levels of threat and high levels of efficacy to promote attitude, intention, and behavior changes.

Future Directions

The areas for future research in fear appeals are numerous. For example, much more information is needed on how people process fear appeals, as well as what triggers danger control and fear control responses. Additionally, future research should measure both fear control and danger control responses to determine the potentially interfering and competing effects on each other. Recent research suggests that fear appeals produce multiple affective responses beyond fear.⁶⁹⁻⁷³ For example, Dillard et al.⁶⁹ found that while the strongest emotion produced by fear appeals was fear, fear appeals also produced signifi-

cant levels of surprise, puzzlement, anger, and sadness. Other affective outcomes produced by fear appeals include irritation,⁷⁰ disgust and feelings of impotence,⁷³ tension and energy,⁷² and varying degrees of emotional instability including anxiety, loss of pleasure, and depression.⁷¹ The exact relationship between these other emotions and persuasive outcomes is unknown.

The majority of fear appeal studies have been conducted in laboratory settings or in experiments where study participants are forced to process fear appeals. Naturalistic studies are desperately needed to assess selective exposure, attention, and comprehension issues. We have no idea, for example, whether the average television viewer actually watches a fear appeal if exposed, or whether she or he immediately changes the channel. Most of our fear appeal results come from contrived, artificial settings. Future research should examine the effects of fear appeals in more realistic, natural settings.

One relatively new way to look at fear appeals is through the message-processing models of Chaiken^{74,75} (systematic-heuristic model) and Petty and Cacioppo⁷⁶ (elaboration likelihood model). Although there are differences between the models, each model suggests two general routes to persuasion. Thus far, the research testing these dual-process models with fear appeals has been mixed. Some scholars have found that strong fear appeals promote systematic/central processing,⁷⁷ whereas others have found that strong fear appeals promote heuristic/peripheral processing.^{78,79} A possible explanation for the inconsistency in these results is that strong fear appeals may promote biased defensive systematic/central processing and not the "normal" kind of systematic/central processing tested for in the two studies that found support for heuristic/peripheral processing.^{78,79} For example, Liberman and Chaiken⁷⁷ found that fear appeals were processed in a defensively biased manner such that threatening information was critically evaluated but reassuring information was not. For high-relevance participants (those at risk for harm by the health threat), the defensive systematic processing was even more pronounced. Other researchers also have found selective and biased processing of fear appeals.³⁹ Theoretically, the greatest degree of biased defensive systematic processing should occur in the HTLE condition (according to the EPPM). Unfortunately, none of the studies using Chaiken's or Petty and Cacioppo's models have examined how combined threat (defined as severity and susceptibility) and efficacy (defined as response efficacy and self-efficacy) messages influence message processing and subsequent outcomes. (Gleicher and Petty⁸⁰ examined only response efficacy and not overall efficacy.) One avenue for future research, therefore, is to examine message-processing routes to assess how individuals process fear appeals and why they respond to them the way they do.

Methodologically, future research should carefully define and operationalize fear appeal constructs and assess fear control responses such as defensive avoidance, denial, and reactance, in addition to traditional danger control outcomes (i.e., attitudes, intentions, behaviors). Additionally, thought-listing tasks should be included in fear appeal studies, since they allow one to examine message-processing issues and to validate one's fear control response measures (i.e., look for defensive avoidance, reactance in thoughts). Finally, to enable future researchers to extract generalizable data from studies, it would be useful if researchers could include correlation matrices and report standard deviations in their articles.

Practical Implications

Fear appeals motivate attitude, intention, and behavior changes—especially fear appeals accompanied by high-efficacy messages. Therefore, they can be quite useful to

practitioners. However, fear appeals should be used cautiously, since they may backfire if target audiences do not believe they are able to effectively avert a threat. Following are specific recommendations for practitioners based on the results of this meta-analysis:

1. Practitioners can develop effective fear appeal messages by increasing references to the severity of the threat (i.e., the magnitude of harm) and references to the target population's susceptibility to the threat (i.e., their likelihood of experiencing the threat). Vivid language and pictures that describe the terrible consequences of a health threat increase perceptions of severity of threat. Personalistic language (e.g., "You face a 30% chance of experiencing the threat") that emphasizes the similarities between victims of a health threat and the target audience increase perceptions of susceptibility.
2. Messages that make a health issue seem serious and likely to happen will be the most motivating (i.e., strong severity and susceptibility messages). The results indicate that weak fear appeals do not promote behavior change and suggest that fear motivates attitude, intention, and behavior changes.
3. Strong fear appeals work only when accompanied by equally strong efficacy messages. Efficacy messages must make target populations believe they are able to perform a recommended response (i.e., strong self-efficacy perceptions) and that recommended responses work in averting or minimizing a threat (i.e., strong response efficacy perceptions). To increase perceptions of self-efficacy, practitioners should identify barriers that inhibit one's perceived ability to perform a recommended action and directly address these in a message (i.e., skills, costs, beliefs, emotions, etc.). For example, if individuals lack the skills to negotiate condom use to prevent HIV infection, it may be useful for practitioners to offer role-playing sessions in which audience members successfully negotiate condom use. To increase perceptions of response efficacy, practitioners should clearly outline how, why, and when a recommended response eliminates or decreases the chances of experiencing the health threat.
4. Individual differences such as personality traits or demographic characteristics (e.g., gender) do not appear to influence processing of fear appeal messages, except on rare occasions. In general, the results of this meta-analysis suggest that practitioners do not need to address individual differences for fear appeal campaigns.
5. Both danger control responses such as attitude, intention, and behavior changes and fear control responses such as denial, defensive avoidance, and reactance should be assessed in evaluations. It is important to measure unintended outcomes (such as fear control responses) because in the event of campaign failure, one can determine whether a campaign simply had no effect (which means that perceptions of threat need to be increased to motivate action) or a strong effect of undesired fear control outcomes (which means that efficacy messages need to be strengthened to promote danger control outcomes).

In sum, practitioners should always ensure that a high-threat fear appeal is accompanied by an equally high-efficacy (or greater) message (given the findings that low-efficacy messages produce greater fear control responses). Messages should always be carefully pretested to ensure they are producing high-threat and, more important, high-efficacy perceptions. If fear appeals are disseminated without efficacy messages, or

with a one-line recommendation, they run the risk of backfiring, since they may produce defensive responses in people with low-efficacy perceptions. Fortunately, practitioners can easily make their fear appeals effective by providing high-efficacy messages.

Conclusion

Fear appeals have been used since antiquity by preachers and teachers alike. They are used by doctors, parents, police officers, and politicians—all in an effort to get individuals to think or act in a certain way. This study provided supportive evidence for the persuasive effects of fear appeals accompanied by high-efficacy messages. Fear appears to be a great motivator as long as individuals believe they are able to protect themselves.

APPENDIX A Fear Appeal Reviews

Miller identifies conceptual, operational, and methodological problems in previous research.¹³ Miller points out a lack of isomorphism problem in what constitutes a fear appeal (the stimuli) and how one measures fear or anxiety, and suggests that violation of expectations may account for increases in anxiety. Higbee reviews fear appeal research from 1953 to 1968 in five areas: nature of communication, personality characteristics, source credibility, learning, and interest value.¹² Higbee proposes a curvilinear explanation to reconcile findings. Ray and Wilkie summarize and discuss fear appeal research through 1969 for a marketing audience.¹⁴ Sternthal and Craig review fear appeal literature through 1973.¹⁵ They address methodological issues and examine the effect of fear appeals on consumer behavior. Boster and Mongeau perform a meta-analytic review of fear appeal literature.⁸ They investigate the relationships between message manipulations-perceived fear, perceived fear-attitudes, and perceived fear-behaviors, as well as the variables sidedness, volunteer status, target of the threat, and so on. Boster and Mongeau propose fear by age and fear by anxiety models to explain attitudinal and behavioral responses to fear appeals. Prentice-Dunn and Rogers compare and contrast protection motivation theory with the health belief model.¹⁸ Job reviews fear appeal theories with a primary critique of protection motivation theory and concludes that fear appeals should be used with caution and only when an efficacious response accompanies them.¹⁷ Mongeau updates and replicates the Boster and Mongeau meta-analysis.⁹ Mongeau reviews a few of Rogers's protection motivation articles and assesses the role of topic as explanatory variable. Dillard extensively reviews the fear and emotion literature and makes a case for studying multiple emotions when assessing the effects of fear appeals (e.g., anger, sadness, joy, etc.).⁶ Hale and Dillard perform an applied analysis of how public health practitioners should generate and use fear appeals to achieve maximum effectiveness.¹⁶ Finally, Witte reviews research testing the extended parallel process model.⁵ Witte identifies parts of the model that need modification and proposes modifications and future research directions.

APPENDIX B Fear Appeal Theoretical Approaches

Fear-as-acquired-drive model^{19,20}—Developed out of learning theory approaches. States that first people have to learn to fear a threat (usually through a persuasive message). Fear arousal then acts as a drive to motivate action. Once in a drive state, recommended responses are given to decrease the drive (or fear). Anything that decreases one's fear (drive) acts as a reinforcer (because it is rewarding) and becomes the habitual response to a threat. If the recommended response reduces fear, it becomes the habitual response. If defensive avoidance reduces fear, it becomes the habitual response. Janis²⁰ extended the drive model with the

family-of-curves model (representing inverted U shapes). According to Janis, there is an optimal fear arousal level at which fear will facilitate vigilant action, but beyond that optimal point emotional tension will become so high that motivated resistances will set in and, subsequently, interfere with the effectiveness of a fear appeal.

Nonmonotonic model^{21,22}—Advances a two-factor theory. Argues that when fear acts as a drive, it motivates acceptance of recommendations. When fear acts as a cue, it elicits habitual responses that interfere with message acceptance. Proposes that these two factors (i.e., cues and drives) combine to yield an overall inverted U-shaped relationship between fear arousal and attitude change, where a moderate amount of fear arousal would produce the most message acceptance.

Parallel process model²⁷—Identifies two separate processes that occur in response to fear appeals: an emotional fear control response and a cognitive danger control response. Argues that protective behavior stems from attempts to control the danger or threat (cognitions), not from attempts to control the fear (emotions).

Protection motivation theory (PMT)^{10,11}—Specifies the components of a fear appeal to be magnitude of noxiousness (severity), probability that an event will occur (vulnerability), and response efficacy. These fear appeal components result in corresponding cognitive mediators that combine multiplicatively to produce some level of protection motivation (a variable that arouses and directs activity). The more protection motivation elicited, the greater the attitude, intention, or behavior change. In a revised PMT, self-efficacy was added to severity, vulnerability, and response efficacy, and the variables were said to work together in either threat or coping appraisals. In threat appraisal, maladaptive behaviors were said to be a function of one's perceived severity and susceptibility to a threat subtracted from one's perceived rewards of performing a maladaptive behavior. For coping appraisal, adaptive behaviors were said to be a function of the response costs of performing the adaptive behavior subtracted from perceived response/self-efficacy. Also, the former multiplicative relationship between variables was modified to be additive within threat and coping appraisals, and multiplicative between threat and coping appraisals. In both the original PMT and the revised PMT, fear is predicted to "only indirectly" affect message acceptance "through the appraisal of severity" (p. 169).¹¹

Threat control²³—Expands on protection motivation theory by distinguishing the difference between response efficacy and personal efficacy (later known as self-efficacy). Argues that both threat and threat control (i.e., response and personal efficacy) issues need to be addressed in a fear appeal.

Subjective expected utility (SEU) model⁷—Starts off as meta-analytic review of the relationships between fear intentions, fear behaviors, fear response efficacy, specific instructions, position of recommendations, communication factors, and recipient factors. Culminates in presentation of an SEU model that states people choose from competing alternatives a course of action that has the greatest SEU. An SEU is "a function of the subjective values or utilities attached to the possible outcomes of the alternative and the subjective probabilities that the alternative will lead to those outcomes" (p. 325). Fear has no causal role and is regarded as merely a by-product of cognitions about a threat.

Extended parallel process model⁴—Returns to the parallel process model as a base and integrates previous perspectives into an expanded version of the model. States that message depictions of threat (severity and susceptibility) and efficacy (response efficacy and self-efficacy) produce corresponding perceptions of threat and efficacy, which interact to produce either danger control actions (self-protective attitudes, intentions, behaviors) or fear control actions (defensive avoidance, denial, reactance). Fear arousal is caused by perceived threat and may reciprocally influence perceptions of threat under certain conditions. Suggests that threat (and corresponding fear) motivates a response and efficacy determines the nature of that response (either danger or fear control actions). If perceived threat is low, then there is no further processing of the fear appeal (and thus no response) because people lack motivation to do so. Under high perceived threat conditions, high-efficacy perceptions result in danger control actions and low-efficacy perceptions result in high levels of fear leading to fear control actions. Thus, cognitions about the threat and efficacy are the direct causes of danger control actions and the emotion fear is the direct cause of fear control actions.

References

1. Finckenaue JO: *Scared Straight and the Panacea Phenomenon*. Englewood Cliffs, NJ, Prentice Hall, 1982.
2. Covello V, von Winterfeldt D, Slovic P: Risk communication: A review of the literature. *Risk Abstracts* 3:171-182, 1986.
3. Geller ES: Using television to promote safety belt use, in Rice RE, Atkin CK (eds.): *Public Communication Campaigns*. Newbury Park, CA, Sage, 1989, pp. 201-203.
4. Witte K: Putting the fear back into fear appeals: The extended parallel process model. *Comm Monographs* 59:329-349, 1992.
5. Witte K: Fear as motivator, fear as inhibitor: Using the EPPM to explain fear appeal successes and failures, in Andersen PA, Guerrero LK (eds.): *The Handbook of Communication and Emotion*. New York, Academic Press, 1998, pp. 423-450.
6. Dillard JP: Rethinking the study of fear appeals: An emotional perspective. *Comm Theory* 4:295-323, 1994.
7. Sutton SR: Fear-arousing communications: A critical examination of theory and research, in Eiser JR (ed.): *Social Psychology and Behavioral Medicine*. London, Wiley, 1982, pp. 303-337.
8. Boster FJ, Mongeau P: Fear-arousing persuasive messages, in Bostrom RN, Westley BH (eds.): *Communication Yearbook* 8. Beverly Hills, CA, Sage, 1984, pp. 330-375.
9. Mongeau P: Another look at fear arousing messages, in Allen M, Preiss R (eds.): *Persuasion: Advances Through Meta-Analysis*. Cresskill, NJ, Hampton Press, 1998, pp. 53-68.
10. Rogers RW: A protection motivation theory of fear appeals and attitude change. *J Psych* 91:93-114, 1975.
11. Rogers RW: Cognitive and physiological processes in fear appeals and attitude change: A revised theory of protection motivation, in Cacioppo J, Petty R (eds.): *Social Psychophysiology*. New York, Guilford Press, 1983, pp. 153-176.
12. Higbee KL: Fifteen years of fear arousal: Research on threat appeals: 1953-1968. *Psych Bull* 6:426-444, 1969.
13. Miller GR: Studies on the use of fear appeals: A summary and analysis. *Central States Speech J* 14:117-125, 1963.
14. Ray ML, Wilkie WL: Fear: The potential of an appeal neglected by marketing. *J Marketing* 34:54-62, 1970.
15. Sternthal B, Craig CS: Fear appeals: Revisited and revised. *J Consumer Res* 1:22-34, 1974.
16. Hale JL, Dillard JP: Fear appeals in health campaigns: Too much, too little, or just right? in Maibach E, Parrott RL (eds.): *Designing Health Messages*. Thousand Oaks, CA, Sage, 1995, pp. 65-80.
17. Job RFS: Effective and ineffective use of fear in health promotion campaigns. *Am J Public Health* 78:163-167, 1988.
18. Prentice-Dunn S, Rogers RW: Protection motivation theory and preventive health: Beyond the health belief model. *Health Educ Res* 1:153-161, 1986.
19. Hovland C, Janis I, Kelly H: *Communication and Persuasion*. New Haven, CT, Yale University Press, 1953.
20. Janis IL: Effects of fear arousal on attitude change: Recent developments in theory and experimental research, in Berkowitz L (ed.): *Advances in Experimental Social Psychology* (Vol. 3). New York, Academic Press, 1967, pp. 166-225.
21. McGuire WJ: Personality and susceptibility to social influence, in Borgatta E, Lambert W (eds.): *Handbook of Personality Theory and Research*. Chicago, Rand McNally, 1968, pp. 1130-1187.
22. McGuire WJ: The nature of attitudes and attitude change, in Lindzey G, Aronson E (eds.): *The Handbook of Social Psychology* (Vol. 3). Reading, MA, Addison-Wesley, 1969, pp. 136-314.
23. Beck KH, Frankel A: A conceptualization of threat communications and protective health behavior. *Social Psych Q* 44:204-217, 1981.

24. Giesen M, Hendrick C: Effects of false positive and negative arousal feedback on persuasion. *J Personality Social Psych* 4:449-457, 1974.
25. Hendrick C, Giesen M, Borden R: False physiological feedback and persuasion: Effect of fear arousal vs. fear reduction on attitude change. *J Personality* 43:196-214, 1975.
26. Mewborn CR, Rogers RW: Effects of threatening and reassuring components of fear appeals on physiological and verbal measures of emotion and attitudes. *J Exp Social Psych* 15:242-253, 1979.
27. Leventhal H: Findings and theory in the study of fear communications, in Berkowitz L (ed.): *Advances in Experimental Social Psychology* (Vol. 5). New York, Academic Press, 1970, pp. 119-186.
28. Rogers RW: Attitude change and information integration in fear appeals. *Psych Rep* 56:179-182, 1985.
29. Kleinot MC, Rogers RW: Identifying effective components of alcohol misuse prevention programs. *J Stud Alcohol* 43:802-811, 1982.
30. Maddux JE, Rogers RW: Protection motivation and self-efficacy: A revised theory of fear appeals and attitude change. *J Exp Social Psych* 19:469-479, 1983.
31. Mulilis JP, Lippa R: Behavioral change in earthquake preparedness due to negative threat appeals: A test of protection motivation theory. *J Appl Social Psych* 20:619-638, 1990.
32. Rogers RW, Mewborn CR: Fear appeals and attitude change: Effects of a threat's noxiousness, probability of occurrence, and the efficacy of the coping responses. *J Personality Social Psych* 34:54-61, 1976.
33. Wurtele SK, Maddux JE: Relative contributions of protection motivation theory components in predicting exercise intentions and behavior. *Health Psych* 6:453-466, 1987.
34. Sutton SR, Eiser JR: The effects of fear-arousing communications on cigarette smoking: An expectancy-value approach. *J Behav Med* 7:13-33, 1984.
35. Sutton SR, Hallett R: Understanding the effects of fear-arousing communications: The role of cognitive factors and amount of fear aroused. *J Behav Med* 11:353-360, 1988.
36. Sutton SR, Hallett R: The contribution of fear and cognitive factors in mediating the effects of fear-arousing communications. *Social Behav* 4:83-98, 1989.
37. Sutton SR, Hallett R: Understanding seat-belt intentions and behavior: A decision-making approach. *J Appl Social Psych* 19:1310-1325, 1989.
38. Hunter JE, Schmidt FL: *Methods of Meta-Analysis*. Newbury Park, CA, Sage, 1990.
39. Alvaro EM, Burgoon M: Individual differences in responses to social influence attempts: Theory and research on the effects of misanthropy. *Comm Res* 22:347-384, 1995.
40. Ben-Sira Z: Latent fear-arousing potential of fear-moderating and fear-neutral health promoting information. *Social Sci Med* 15:105-112, 1981.
41. Kline K: *Applying Witte's Extended Parallel Process Model to Pamphlets Urging Women to Engage in BSE: Where Are the Efficacy Messages?* Paper presented at the annual meeting of the Speech Communication Association, San Antonio, TX, 1995.
42. Ragsdale J, Durham K: Audience response to religious fear appeals. *Rev Religious Res* 28:40-50, 1986.
43. Wolf S, Gregory WL, Stephan WG: Protection motivation theory: Prediction of intentions to engage in anti-nuclear war behaviors. *J Appl Social Psych* 16:310-321, 1986.
44. Harris VA, Jellison JM: Fear-arousing communications, false physiological feedback, and the acceptance of recommendations. *J Exp Social Psych* 7:269-279, 1971.
45. Horowitz IA: Attitude change as a function of perceived arousal. *J Social Psych* 87:117-126, 1972.
46. Beck KH: The effects of positive and negative arousal upon attitudes, belief acceptance, behavioral intention, behavior. *J Social Psych* 107:239-251, 1979.
47. Boyle GJ: Effects of viewing a road trauma film on emotional and motivational factors. *Accident Analysis Prev* 16:383-386, 1984.
48. Burnett JJ, Oliver RL: Fear appeal effects in the field: A segmentation approach. *J Marketing Res* 16:181-190, 1979.

49. Hale JL, Mongeau PA, Lemieux R: *Trait Anxiety and Fear-Arousing Messages Regarding Sun Exposure*. Paper presented at the annual meeting of the Speech Communication Association, Miami Beach, FL, 1993.
50. McCrosky JC, Wright DW: A comparison of the effects of punishment-oriented and reward-oriented messages in persuasive communications. *J Comm* 21:83-93, 1971.
51. Powell FA, Miller GR: Social approval and disapproval cues in anxiety-arousing communications. *Speech Monographs* 34:152-159, 1967.
52. Stephenson MT, Witte K: Fear, threat, and perceptions of efficacy from frightening skin cancer messages. *Public Health Rev* 26:147-174.
53. Wheatley J, Oshikawa S: The relationship between anxiety and positive and negative advertising appeals. *J Marketing Res* 7:85-89, 1970.
54. Meyerowitz BE, Chaiken S: The effect of message framing on breast self-examination attitudes, intentions, and behavior. *J Personality Social Psych* 52:500-510, 1987.
55. Moltz H, Thislethwaite DL: Attitude modification and anxiety reduction. *J Abnormal Social Psych* 50:231-237, 1955.
56. Witte K, Cameron KA, McKeon J, Berkowitz JM: Predicting risk behaviors: Development and validation of a diagnostic scale. *J Health Comm* 1:317-341, 1996.
57. Witte K, Morrison K: Examining the influence of trait anxiety/repression-sensitization on individuals' reactions to fear appeals. *Western J Comm* 64:1-29, 2000.
58. Witte K: Fear control and danger control: A test of the Extended Parallel Process Model (EPPM). *Comm Monographs* 61:113-134, 1994.
59. Smalec J: *Bulimia Interventions via Interpersonal Influence: The Role of Threat and Efficacy in Persuading Bulimics to Seek Help*. *J Behav Med* 1:37-57, 2000.
60. Insko CA, Arkoff A, Insko VM: Effects of high and low fear-arousing communications upon opinions toward smoking. *J Exp Social Psych* 1:256-266, 1965.
61. Kirscht JP, Becker MH, Haefner DP, Maiman LA: Effects of threatening communications and mothers' health beliefs on weight change in obese children. *J Behav Med* 1:147-157, 1978.
62. Leventhal H, Jones S, Trembly G: Sex differences in attitude and behavior change under conditions of fear and specific instructions. *J Exp Social Psych* 2:387-399, 1996.
63. Rhodes P, Wolitski RJ: Perceived effectiveness of fear appeals in AIDS education: Relationship to ethnicity, gender, age, and group membership. *AIDS Educ Prev* 2:1-11, 1990.
64. Stout PA, Sego T: *The Role of Need for Cognition in Response to Threat Appeals in AIDS Messages*. Paper presented at the annual meeting of the Speech Communication Association, 1994.
65. Brouwers MC, Sorrentino RM: Uncertainty orientation and protection motivation theory: The role of individual differences in health compliance. *J Personality Social Psych* 65:102-112, 1993.
66. Burnett JJ: Internal-external locus of control as a moderator of fear appeals. *J Appl Psych* 66:390-393, 1981.
67. Horowitz IA: Effects of volunteering, fear arousal, and number of communications on attitude change. *J Personality Social Psych* 11:34-37, 1969.
68. Horowitz IA, Gumenik WE: Effects of the volunteer subject, choice, and fear arousal on attitude change. *J Exp Social Psych* 6:293-303, 1970.
69. Dillard JP, Plotnick CA, Godbold LC, Freimuth VS, Edgar T: The multiple affective outcomes of AIDS PSAs: Fear appeals do more than scare people. *Comm Res* 23:44-72, 1996.
70. Kirscht JP, Haefner DP: Effects of repeated threatening health communications. *Int J Health Educ* 16:268-277, 1973.
71. Kohn PM, Goodstadt MS, Cook GM, Sheppard M, Chan G: Ineffectiveness of threat appeals about drinking and driving. *Accident Analysis Prev* 14:457-464, 1982.
72. LaTour MS, Pitts RE: Using fear appeals in advertising for AIDS prevention in the college-age population. *J Health Care Marketing* 9:5-14, 1989.
73. Leventhal H, Trembly G: Negative emotions and persuasion. *J Personality* 36:154-168, 1968.

74. Chaiken S: Heuristic versus systematic information processing and the use of source versus message cues in persuasion. *J Personality Social Psych* 39:752-766, 1980.
75. Chaiken S: The heuristic model of persuasion, in Zanna MP, Olson JM, Herman CP (eds.): *Social Influence: The Ontario Symposium* (Vol. 5). Hillsdale, NJ, Lawrence Erlbaum, 1987, pp. 3-39.
76. Petty RE, Cacioppo JT: The elaboration likelihood model of persuasion, in Berkowitz L (ed.): *Advances in Experimental Social Psychology* (Vol. 19). New York, Academic Press, 1986, pp. 123-205.
77. Liberman A, Chaiken S: Defensive processing of personally relevant health messages. *Personality Social Psych Bull* 18:669-679, 1992.
78. Hale JL, Lemieux R, Mongeau PA: Cognitive processing of fear-arousing message content. *Comm Res* 22:459-474, 1995.
79. Jepson C, Chaiken S: Chronic issue-specific fear inhibits systematic processing of persuasive communications. *J Social Behav Personality* 5:61-84, 1990.
80. Gleicher F, Petty RE: Expectations of reassurance influence the nature of fear-stimulated attitude change. *J Exp Social Psych* 28:86-100, 1992.
81. Bang HK: *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, 1993.
82. Beach RI: The effect of a "fear-arousing" safety film on physiological, attitudinal, and behavioral measures: A pilot study. *Res Rev* 53-57, 1956.
83. Beck KH, Davis CM: Effects of fear-arousing communications and topic importance on attitude change. *J Social Psych* 104:81-95, 1978.
84. Beck KH, Lund AK: The effects of health threat seriousness and personal efficacy upon intentions and behavior. *J Appl Social Psych* 11:401-405, 1981.
85. Beck KH: 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 Behav Personality* 12:121-125, 1984.
86. Berkowitz L, Cottingham DR: The interest value and relevance of fear arousing communications. *J Abnormal Social Psych* 1:37-43, 1960.
87. Boer H, Seydel E: Protection motivation theory, in Connor M, Norman P (eds.): *Predicting Health Behavior: Research and Practice With Social Cognition Models*. Buckingham, PA, Open University Press, 1996, pp. 95-120.
88. Brown RA: Fear-induced attitude change as a function of conformity and drinking pattern in alcoholics. *J Clin Psych* 35:454-456, 1979.
89. Calantone RJ, Warshaw PR: Negating the effects of fear appeals in election campaigns. *J Appl Psych* 70:627-633, 1985.
90. Carey JC: *The Influence of Involvement on Cognitive and Emotional Responses to Fear Appeals*. Unpublished master's thesis, University of Texas at Austin, 1990.
91. Chang JL: *Emotional Response and the Use of Threat Appeals*. Unpublished master's thesis, University of Texas at Austin, 1989.
92. Chu GC: Fear arousal, efficacy, and imminency. *J Personality Social Psych* 4:517-524, 1966.
93. Dabbs JM, Leventhal H: Effects of varying the recommendations in a fear-arousing communication. *J Personality Social Psych* 4:525-531, 1966.
94. Dembroski TM, Lasater TM, Ramirez A: Communicator similarity, fear arousing communications, and compliance with health care recommendations. *J Appl Social Psych* 8:254-269, 1978.
95. DeWolfe G: Fear and attitude change. *J Abnormal Social Psych* 69:119-123, 1964.
96. Dziokonski W, Weber SJ: Repression-sensitization, perceived vulnerability, and the fear appeal communication. *J Social Psych* 102:105-112, 1977.
97. Evans RI, Rozelle RM, Lasater TM, Dembroski TM, Allen BP: Fear arousal, persuasion, and actual versus implied behavioral change: New perspective utilizing a real-life dental hygiene program. *J Personality Social Psych* 2:220-227, 1970.

98. Frandsen KD: Effects of threat appeals and media of transmission. *Speech Monographs* 30:101-104, 1963.
99. Fritzen RD, Mazer GE: The effects of fear appeal and communication upon attitudes toward alcohol consumption. *J Drug Educ* 5:171-181, 1975.
100. Fruin DJ, Pratt C, Owen N: Protection motivation and adolescents' perceptions of exercise. *J Abnormal Social Psych* 22:55-69, 1992.
101. Goldstein MJ: The relationship between coping and avoiding behavior and response to fear-arousing propaganda. *J Abnormal Social Psych* 58:247-252, 1959.
102. Griffeth RW, Rogers RW: Effects of fear-arousing components of driver education on students' safety attitudes and simulator performance. *J Educ Psych* 68:501-506, 1976.
103. Haefner DP: Arousing fear in dental health education. *J Public Health Dentistry* 25:140-146, 1965.
104. Hass JW, Bagley GS, Rogers RW: Coping with the energy crisis: Effects of fear appeals upon attitudes toward energy consumption. *J Appl Psych* 60:754-756, 1975.
105. Hill D, Gardner G: Repression-sensitization and yielding to threatening health communications. *Aus J Psych* 32:183-193, 1980.
106. Janis IL, Feshbach S: Effects of fear-arousing communications. *J Abnormal Social Psych* 48:78-92, 1953.
107. Janis IL, Feshbach S: Personality differences associated with responsiveness to fear-arousing communications. *J Personality* 23:154-166, 1954.
108. Janis IL, Terwilliger RF: An experimental study of psychological resistance to fear arousing communications. *J Abnormal Social Psych* 65:403-410, 1962.
109. Kantola SJ, Syme G, Nesdale AR: The effects of appraised severity and efficacy in promoting water conservation: An informational analysis. *J Appl Social Psych* 13:164-182, 1983.
110. Keesling BJ, Friedman H: *Interventions to Prevent Skin Cancer: Experimental Evaluation of Informational and Fear Appeals*. Unpublished manuscript, 1991.
111. Kendall C, Hailey B: The relative effectiveness of three reminder letters on making and keeping mammogram appointments. *Behav Med* 19:29-34, 1993.
112. Kohn LS, Rogers RW: 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 Psych* 10:323-329, 1991.
113. Krisher HP III, Darley SA, Darley JM: Fear-provoking recommendations, intentions to take preventive actions, and actual preventive actions. *J Personality Social Psych* 26:301-308, 1973.
114. LaTour M, Snipes R, Bliss S: Don't be afraid to use fear appeals: An experimental study. *J Advertising Res* 28:59-67, 1996.
115. Lemieux R, Hale J, Mongeau P: *Reducing Risk Behaviors Related to Sun Exposure: The Effects of Fear Appeals, Vividness, and Message Framing*. Paper presented at the Speech Communication Association Convention, Chicago, 1995.
116. Leventhal H, Niles P: A field experiment on fear arousal with data on the validity of questionnaire measures. *J Personality* 32:459-479, 1964.
117. Leventhal H, Singer R, Jones S: Effects of fear and specificity of recommendation upon attitudes and behavior. *J Personality Social Psych* 2:20-29, 1965.
118. Leventhal H, Watts J: Sources of resistance to fear-arousing communications on smoking and lung cancer. *J Personality* 34:155-175, 1966.
119. Leventhal H, Watts J, Pagano F: Effects of fear and instructions on how to cope with danger. *J Personality Social Psych* 3:313-321, 1967.
120. Powell FA: The effect of anxiety-arousing messages when related to personal, familial, and impersonal referents. *Speech Monographs* 32:102-106, 1965.
121. Radelfinger S: Some effects of fear-arousing communications on preventive health behavior. *Health Educ Monographs* 19:2-15, 1965.
122. Ramirez A, Lasater TL: Attitudinal and behavioral reactions to fear-arousing communications. *Psych Rep* 38:811-818, 1976.

123. Ramirez A, Lasater TL: Ethnicity of communicator, self-esteem, and reactions to fear-arousing communications. *J Social Psych* 102:79-91, 1977.
124. Rippetoe PA, Rogers RW: Effects of components of protection-motivation theory on adaptive and maladaptive coping with a health threat. *J Personality Social Psych* 52:596-604, 1987.
125. Rodriguez JI: *Confounds in Fear Arousing Persuasive Messages: Do the Paths Less Traveled Make All the Difference?* Unpublished doctoral dissertation, Michigan State University, 1995.
126. Rogers RW, Thislethwaite DL: Effects of fear arousal and reassurance on attitude change. *J Personality Social Psych* 15:227-233, 1970.
127. Rogers RW, Deckner CW: Effects of fear appeals and physiological arousal upon emotion, attitudes, and cigarette smoking. *J Personality Social Psych* 32:222-230, 1975.
128. Rosen TJ, Terry NS, Leventhal H: The role of esteem and coping in response to a threat communication. *J Res Personality* 16:90-107, 1982.
129. Roser C, Thompson M: Fear appeals and the formation of active publics. *J Comm* 45:103-121, 1995.
130. Self CA, Rogers RW: Coping with threats to health: Effects of persuasive appeals on depressed, normal, and antisocial personalities. *J Behav Med* 13:343-357, 1990.
131. Shelton ML, Rogers RW: Fear-arousing and empathy-arousing appeals to help: The pathos of persuasion. *J Appl Social Psych* 11:366-378, 1981.
132. Siero S, Kok G, Pruyn J: Effects of public education about breast cancer and breast self-examination. *Social Sci Med* 18:881-888, 1984.
133. Skilbeck C, Tulips J, Ley J: The effects of fear arousal, fear position, fear exposure, and sidedness on compliance with dietary instructions. *Eur J Social Psych* 7:221-239, 1977.
134. Smart RG, Fejer D: The effects of high and low fear messages about drugs. *J Drug Educ* 4:225-235, 1974.
135. Smith MJ: The effects of threat to attitudinal freedom as a function of message quality and initial receiver attitude. *Comm Monographs* 44:196-206, 1977.
136. Stainback R, Rogers RW: Identifying effective components of alcohol abuse prevention programs: Effects of fear appeals, message style, and source expertise. *Int J Addict* 18:393-405, 1983.
137. Stanley MA, Maddux JE: Cognitive processes in health enhancement: Investigation of a combined protection motivation and self-efficacy model. *Basic Appl Social Psych* 7:101-113, 1986.
138. Stout P, Sego T: Emotions elicited by threat appeals and their impact on persuasion, in King K (ed.): *The Proceedings of the 1994 Conference of the American Academy of Advertising*. Athens, GA, American Academy of Advertising, 1994, pp. 8-16.
139. Stout P, Sego T: Response to threat appeals in public service announcements, in Madden C (ed.): *The Proceedings of the 1995 Conference of the American Academy of Advertising*. Athens, GA, American Academy of Advertising, 1995, pp. 78-86.
140. Struckman-Johnson CJ, Gilliland RC, Struckman-Johnson DL, North TC: The effects of fear of AIDS and gender on responses to fear-arousing condom advertisements. *J Appl Social Psych* 20:1396-1410, 1990.
141. Sturges J, Rogers RW: Preventive health psychology from a developmental perspective: An extension of protection motivation theory. *Health Psych* 15:158-166, 1996.
142. Tanner JF, Day E, Crask MR: Protection motivation theory: An extension of fear appeals theory in communication. *J Business Res* 19:267-276, 1989.
143. Tanner JF, Hunt JB, Eppright DR: The protection motivation model: A normative model of fear appeals. *J Marketing* 55:36-45, 1991.
144. Van der Velde FW, Van der Pligt J: AIDS-related behavior: Coping, protection motivation, and previous behavior. *J Behav Med* 14:429-451, 1991.
145. Walsh DC, Hingson RW, Merrigan DM, Levenson SM, Coffman GA, Heeren T: The impact of a physician's warning on recovery after alcoholism treatment. *JAMA* 267:663-667, 1992.
146. Watson M, Pettingale KW, Goldstein D: Effects of fear appeal on arousal, self-reported anxiety, and attitude towards smoking. *Psych Rep* 52:139-146, 1983.

147. Weinstein ND, Sandman PM, Roberts NE: Determinants of self-protective behavior: Home radon testing. *J Appl Social Psych* 20:783-801, 1990.
148. Witte K, Morrison K: The use of scare tactics in AIDS prevention: The case of juvenile detention and high school youth. *J Appl Comm Res* 23:128-142, 1995.
149. Witte K, Berkowitz J, Cameron KA, Lillie J: Preventing the spread of genital warts: Using fear appeals to promote self-protective behaviors. *Health Educ Behav* 25:571-585, 1998.
150. Wurtele S: Increasing women's calcium intake: The role of health beliefs, intentions, and health value. *J Appl Social Psych* 18:627-639, 1988.