Sixty years of fear appeal research: Current state of the evidence

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Fear arousal is widely used in persuasive campaigns and behavioral change interventions. Yet, experimental evidence argues against the use of threatening health information. The authors reviewed the current state of empirical evidence on the effectiveness of fear appeals. Following a brief overview of the use of fear arousal in health education practice and the structure of effective fear appeals according to two main theoretical frameworks—protection motivation theory and the extended parallel process model—the findings of six meta-analytic studies in the effectiveness of fear appeals are summarized. It is concluded that coping information aimed at increasing perceptions of response effectiveness and especially self-efficacy is more important in promoting protective action than presenting threatening health information aimed at increasing risk perceptions and fear arousal. Alternative behavior change methods than fear appeals should be considered.

Keywords: Fear appeals; Literature review; Threat information; Persuasion; Behavior change.
health warnings on cigarette packages in 2002 was accompanied by wide-scale media attention on television, radio and in newspapers throughout Europe. Soon after the introduction of these messages, national polls were presented that suggested that people smoked less because of the new health warnings. Discussion programs on radio and television featured people who quit smoking sometime after the introduction of the health warnings—while ignoring the fact that many of these people would relapse (e.g., Zhou et al., 2009). Also among those involved in intervention design there is a strong belief in the persuasive efficacy of threatening health messages (see also Peters, Ruiter, & Kok, 2014). Risk information and information about the (positive/negative) consequences of behavior are among the most widely used behavior change techniques (e.g., Abraham, Krahé, Dominic, & Fritsche, 2002; Albarracín et al., 2005). It is not clear, however, whether this popularity of threatening health information is evidence-based. Questions could be raised about how available scientific evidence for the use of threatening health messages was interpreted, for example by focusing on the scientific evidence that has been used by the European Commission (EC) and World Health Organization (WHO) to argue in favor of implementing graphic warnings on cigarette packages.1

The evidence of the persuasive effects of graphic health warnings on tobacco products has been recently summarized by Hammond (2011). Of the 94 studies included by Hammond, 22 used an experimental design. The other studies had no experimental setup and thus preclude causal conclusions: personal interviews, focus group discussion, and cross-sectional and longitudinal survey studies in which participants are asked to assess prospectively or retrospectively the effects of health warnings on personal risk behavior. The strength of the non-experimental evidence is weak because the chosen study designs do not allow us to draw conclusions about a causal relationship between the introduction of the cigarette warning labels and, for example, reported attempts to quit. Moreover, the impact of unmeasured “third variables” (e.g., price increase, smoking ban) is unknown (see also Marteau & Hall, 2001).

Of the 22 experiments, 18 compared different formats of threatening health messages among each other (e.g., graphic + textual warning vs. only textual warning) and not against a control condition with no or neutral information about the risk behavior. From these studies, it is impossible to make statements about the effectiveness of threatening information. If, for example, scary images are better remembered than written threatening information, neutral information could still be better remembered.

Four experiments are left that compare threatening health information with another behavior change method or no method. In none of these studies is behavior an outcome variable; outcome variables are limited to soft indicators of behavior, often measures of attitude and intention. Although large to medium changes in intention have been found responsible for medium to small changes in behavior (Webb & Sheeran, 2006), these measures are not an acceptable indicator of the persuasiveness of threatening health messages because changes in knowledge, attitude and intention might not result in changes in behavior due to defensive responses toward the health information (e.g., Ben-Ari, Florian, & Mikulincer, 2000).

Finally, we do acknowledge that studies into the effectiveness of policy changes are difficult to carry out when implementation is at the national level, making causal conclusions almost impossible. However, the difficulty to experimentally test policy measures is not a license to claim causal effects (see also Ruiter & Kok, 2005, 2006).

1We as authors would like to point out that using threat communications in the domain of smoking prevention as illustrative examples does not imply that our arguments against threatening health messages and in favor of a theory-based approach towards effective fear appeal design would also not apply to other health domains such as alcohol use and unsafe sex or safety-related concerns such as traffic behavior. They do apply as we discuss psychological theory explaining general human behavior. There is no reason to believe a specific behavior such as smoking would form an exception.

coping appraisal includes assessments of the effectiveness of threat severity and personal susceptibility, whereas coping appraisal. Threat appraisal includes assessments instigate two evaluative processes, threat appraisal and applied scientific model. PMT suggests that fear appeals for designing effective fear appeals has been designed by Witte, Meyer, and Martell (2001).  

THEORIES ON FEAR APPEALS IN BEHAVIOR CHANGE

A fear appeal is defined as a persuasive communication that attempts to arouse fear in order to promote precautionary motivation and self-protective action (Rogers & Deckner, 1975). Fear arousal is defined as an unpleasant emotional state triggered by the perception of threatening stimuli. It is assumed that such emotional states involve physiological arousal as well as cognitive, affective and behavioral responses directed toward reduction or elimination of fear.

Theoretically, fear appeals provide two types of information. First, an attempt is made to arouse fear by presenting a threat (e.g., “cancer”) to which the recipient is believed to be susceptible (e.g., “smoking cigarettes puts you at risk of lung cancer”) and which is severe (e.g., “lung cancer is a deadly disease”). Severity and personal susceptibility information are both necessary to arouse fear. Consider, for example, the case of testicular cancer, which might be a threatening and fear-arousing disease for (young) males, but not for women. Second, opportunities for averting the threat are presented by recommending health-protective action. Acceptance of the recommended action is promoted by presenting the action as effective in neutralizing the threat. This is referred to as response efficacy; e.g., “quitting smoking helps you to prevent lung cancer.” In addition, readers are reassured that the efficacious protective action is easy to execute, that is, readers’ self-efficacy is boosted, for example, “free smoking cessation groups are widely available and can be easily joined.” A practical guide for designing effective fear appeals has been designed by Witte, Meyer, and Martell (2001).

Several theoretical frameworks have been applied to the study of fear appeals. Protection Motivation Theory (PMT; Rogers, 1983) is the most widely applied scientific model. PMT suggests that fear appeals instigate two evaluative processes, threat appraisal and coping appraisal. Threat appraisal includes assessments of threat severity and personal susceptibility, whereas coping appraisal includes assessments of the effectiveness of potential responses (i.e., response efficacy) and one’s ability to undertake these successfully (i.e., self-efficacy). Together these appraisals generate protection motivation or “the intent to adopt the communicator’s recommendation” (Rogers, 1983, p. 158).

The Extended Parallel Process Model (EPPM; Witte et al., 2001) further develops these ideas and proposes that threat perception initially instigates danger control processes. Danger control is positive because it motivates the reader to take protective, risk-reducing action. So, if the recommended action is seen to be effective and feasible, the person receiving the threat message is likely to follow protective recommendations. However, if coping appraisal suggests that no action is available that is effective in averting the threat and easy to perform, then continuing threat perception will result in ongoing fear arousal. The danger cannot be averted, so another way must be found to control fear, for example, derogating or denying the threat message. So while danger cannot be averted the reader can still control and escape fear by message rejection (fear control). The EPPM, unlike PMT, incorporates both danger control and fear control processes.

META-ANALYSES ON FEAR APPEALS

Fear appeals have been extensively tested, and empirical findings have been summarized in several meta-analyses. These meta-analyses describe studies on fear appeals, focusing on the four major variables: severity and susceptibility (often combined as threat) and response efficacy and self-efficacy (often combined as efficacy). The analyses are based to a large extent on a similar set of empirical studies, which is not surprising given that the first three meta-analyses summarized below were published in the same year. These analyses further come to similar conclusions suggesting strong positive effects of coping information on motivating precautionary action and only weak effects of information showing the negative consequences of risky action.

For example, Floyd, Prentice-Dunn, and Rogers (2000) reported on a meta-analysis of 65 studies on PMT. They described the separate effects of severity, susceptibility, response and self-efficacy on intention (27 studies), behavior (22) and both together (16). Increases in severity, susceptibility, response and self-efficacy significantly facilitated adaptive responses. Also, decreases in maladaptive response rewards (i.e., implicit and explicit benefits associated with continuing the risky behavior) and adaptive response costs significantly increased adaptive responses. All effect sizes were moderate, with self-efficacy showing the strongest impact on protection motivation, followed by response efficacy, the combination of severity and susceptibility and...
response costs (i.e., any costs of engaging in the recommended action, e.g., temporal, monetary, personal, effort-related). Floyd et al. (2000) conclude that coping appraisal variables have more impact than threat appraisal variables. Higher quality studies showed a stronger impact of self-efficacy. Response and self-efficacy (coping appraisal) showed more impact on cessation behavior than on initiation behavior. Response and self-efficacy were also related to maintaining attitude and behavior change. Floyd et al. suggested that some target behaviors may inherently carry with them greater response costs than others and that it would help to identify what is asked of the person in terms of response and self-efficacy against response costs.

In another review of PMT, Milne, Sheeran, and Orbell (2000) report on a vote-count and meta-analysis of a total of 21 studies. They describe the separate effects of severity, susceptibility, fear (severity and susceptibility combined), response and self-efficacy and response costs on intention, concurrent and subsequent behavior. In the meta-analysis on intention (12 studies), all variables were found to be significantly associated with intention. Severity had the weakest association, self-efficacy the strongest. In the vote-count (i.e., counting the number of times the PMT variables were significantly associated with intention; 21 studies), severity and susceptibility were least frequently associated with intention, whereas self-efficacy was found most often significantly associated with intention. In the meta-analysis on concurrent behavior (8 studies), concurrent behavior was best predicted by intention, followed by moderate associations with response efficacy, self-efficacy and response costs. The associations with severity and susceptibility were small. In the vote-count (12 studies), concurrent behavior was again best predicted by intention, followed by self-efficacy, response costs and fear. In the meta-analysis on subsequent behavior (5 studies), subsequent behavior was best predicted by intention, followed by self-efficacy and response costs. The association with susceptibility was small and that with severity was not significant. In the vote-count (8 studies), subsequent behavior was again best predicted by intention, followed by response costs and self-efficacy. The associations with severity and susceptibility were small and that with fear was not significant. Milne et al. (2000) also concluded that coping appraisal variables have stronger associations with intention and behaviors than threat appraisal variables, just as Floyd et al. (2000) did. Moreover, they suggested that threat appraisal variables are poor predictors of intention and behavior and that self-efficacy is a major factor in determining both motivation and health-protective behavior.

Witte and Allen (2000) reported on a meta-analysis of a total of 93 fear appeal studies. The number of studies used varies by analysis between 11 and 43. They described the separate effects of severity, susceptibility, fear, response efficacy and self-efficacy on attitudes, intentions and behaviors. Manipulations of each of the five variables resulted in greater positive levels of attitude, intentions and behavior change. All relationships appeared to be linear. Witte and Allen (2000) divided the studies into four groups, high versus low threat crossed with high versus low efficacy. The high threat, high efficacy combination had the greatest persuasive effect, whereas the low threat, low efficacy had the smallest, with the other two combinations in between. Witte and Allen also described a meta-analysis with 13 studies on fear control responses, or defensive reactions. The results indicate that as the fear appeal increases in strength, so do defensive responses. Moreover, the weaker the efficacy message, the greater the fear control response. Defensive responses turned out to be negatively related to adaptive responses. Witte and Allen concluded that fear appeals appear to be effective when they depict a significant and relevant threat, and when they outline effective responses that appear easy to accomplish (p. 604). Witte and Allen warn that “fear appeals should be used cautiously, since they may backfire if audiences do not believe they are able to effectively avert a threat” (p. 606).

De Hoog, Stroebe, and De Wit (2007) evaluated their hypothesis that defensive reactions may in fact contribute to the effectiveness of fear appeals. They meta-analyzed 105 studies in which severity and susceptibility were manipulated independently and in which at least one of three dependent variables was measured: attitudes, intentions and/or behaviors. They also coded argument quality, the quality of supporting arguments in a recommendation, response efficacy, the effectiveness/probability of success of a recommendation, minimizing thoughts about the fear appeal and positive thoughts about the recommendation (note that self-efficacy was not included). Severity had a positive effect on attitudes, whereas susceptibility did not. Both severity and susceptibility had positive effects on intentions, behaviors, perceived fear and minimizing thoughts about the fear appeal. Susceptibility had a positive effect on positive thoughts about the recommendation. There was no difference in effect between severity manipulations with vivid scary images or just written text. De Hoog et al. (2007) argue that susceptibility in particular causes defensive reactions, such as minimizing threat, but it also causes people to focus on the recommendation. They also conclude “that extremely ‘fear-arousing’ messages are no more effective than messages that simply state the negative consequences of a certain behavior” (p. 280), thus strengthening the argument that fear arousal is not a strong component in motivating behavior change.

Finally Earl and Albarracín (2007) examined the long-term effects of fear appeals and HIV counseling and testing on knowledge and condom use. They included 76 studies promoting condom use that had a pretest, posttest and follow-up, analyzing data from 150 treatment groups.
and 39 control groups. All interventions were coded for the presence or absence of fear-inducing arguments, related to severity and susceptibility, as well as for the presence or absence of HIV counseling and testing. Earl and Albarracín (2007) found that the presence (vs. absence) of fear-inducing arguments was associated with lower increases in knowledge and condom use, and this negative effect was stronger at follow-up. The presence of HIV counseling and testing was associated with significant increases in knowledge and condom use, and this positive effect was stronger at follow-up. All these effects were stronger in populations with high HIV incidence. There was no indication for any curvilinear effect. Earl and Albarracín examined the interaction of fear-inducing arguments with the presence of recommendations and found that a recommendation without fear was more successful than a recommendation with fear. Earl and Albarracín concluded that “inducing fear is not an effective way to promote HIV-relevant learning or condom use either immediately following the intervention or later on” (p. 504).

According to the five meta-analyses summarized above, then, the elements of fear appeals most likely to motivate risk reduction behaviors are: (a) strengthening self-efficacy (i.e., suggesting that the person can successfully perform the recommended protective actions); (b) promotion of response efficacy (i.e., suggesting that the recommended action will avoid the danger); (c) awareness of susceptibility (i.e., suggesting that the threat is personally relevant); and not, (d) messages suggesting in an emotional way that the threat is severe. Importantly, the above meta-analyses did not find support for the interaction effect between threat and coping variables that is predicted by PMT and EPPM with threat information having a positive impact on behavior only if efficacy beliefs are high. Instead, the reported meta-analyses consistently found main effects of threat and efficacy, implying that higher threat simply results in behavior change. However, this lack of empirical support for the theoretically hypothesized interaction effect can likely be attributed to the flawed methodology in many fear-appeal studies. That is, the meta-analyses of Floyd et al. (2000), Milne et al. (2000) and Earl and Albarracín (2007) included studies that relied on measures of threat and coping beliefs instead of experimental manipulations of the message components of fear appeals, which make sure that reported effects can be attributed to these components. Second, all five meta-analyses included studies that measured proximal determinants of behavior (i.e., attitude, intention) instead of providing an objective measure of behavior, thus ignoring the well-evidenced phenomenon that intention to perform a behavior does not consistently result in subsequent performance (Cooke & Sheeran, 2004).

To counter these methodological limitations, Peters, Ruiter and Kok (2012) recently conducted a meta-analysis in which they reanalyzed the publications that were included in previous meta-analyses, located additional publications of potential relevance and applied very strict criteria for including studies in the statistical analyses, namely full factorial orthogonal manipulation of threat and efficacy and measurement of behavior as an outcome variable (see Peters et al., 2012, for a more detailed argumentation of the need for these strict inclusion criteria). Meta-analysis of the six studies that satisfied the inclusion criteria clearly showed a significant interaction between threat and efficacy in support of the hypothesized dynamics of fear appeals by PMT and the extended parallel process model. That is, threat only had an effect under high efficacy ($d = 0.31$; 95% CI: 0.02–0.60, $p < .05$), and efficacy only had an effect under high threat ($d = 0.71$; 95% CI: 0.40–1.03, $p < .001$). In addition, some support was found for possible negative effects of threatening health information on persuasion if perceived efficacy is low ($d = −0.31$; 95% CI: −0.63 to 0.01, $p = .07$). That is, when acknowledging the threat, but feeling helpless what to do, people might engage in defensive action including more intensive continuation of the health risk behavior (cf. Goldenberg & Arndt, 2008).

Finally, a worrisome finding of the meta-analysis is that after more than 60 years of experimental research into the persuasive effects of fear appeals, only six studies could be identified that provide high quality experimental tests of theoretically hypothesized relationship among fear-appeal components and included a health behavior measure. It is concluded that there is a need for more experimental tests of fear-appeal theory, but at the same time the findings reported in the meta-analysis are robust in terms of effect size and replication strength (Peters et al., 2012).

**HOW TO COMMUNICATE RISKS EFFECTIVELY?**

Some research suggests that we may be able to encourage people to attend to messages conveying threatening health messages, without rejecting them, by using self-awareness techniques. Experimental studies suggest that self-affirmation—a procedure in which people reflect upon cherished values or attributes, for example, responding to questions about their most important values or reflecting on their desirable characteristics—may have the potential to promote more open-minded, balanced appraisal of threatening health messages. For instance, Harris and Napper (2005) found that women who consumed high levels of alcohol but who self-affirmed prior to reading an article about the link between alcohol consumption and breast cancer showed increased message acceptance. These women also saw themselves as more at risk, experienced more fear and exhibited higher intentions to cut down their drinking. In another
study, self-affirmed smokers were less resistant to graphic warnings on cigarette packs than non-affirmed smokers (Harris, Mayle, Mabott, & Napper, 2007). Finally, Klein and Harris (2009) report evidence in support of an attentional bias toward threat-specific information among female alcohol consumers who were self-affirmed before reading a threatening health message about alcohol intake and breast cancer. People thus seem motivated to protect their self-image by denying threatening messages and that self-affirmation can provide a helpful remedy (Sherman & Cohen, 2002; for a review, see Harris & Epton, 2009). However, further research into the potential effectiveness of self-affirmation (or other techniques, see for example Glock, Müller, & Ritter, 2013) and the promotion of self-efficacy is needed (Harris & Epton, 2010; Good & Abraham, 2011; Kok et al., 2014, this issue).

Besides motivating people successfully to form strong intentions to undertake protective action, the use of specific action instructions (Leventhal, Singer, & Jones, 1965) and volitional prompts (Gollwitzer & Schaaf, 1998) can help in bridging what has been called the “intention-behavior gap”. This “gap” arises when people’s good intentions to change current risk behaviors are not translated into the effective uptake of less risky behavioral patterns (Webb & Sheeran, 2006).

Leventhal et al. (1965) studied the relationship between fear arousal and the provision of specific instructions on how to take precautionary action. In one well-known study (Leventhal et al. 1965), participants read a potentially high or low fear-arousing message about the negative consequences of tetanus and were advised to have a vaccination injection at the local hospital. Half the respondents received a map highlighting the location of the hospital and were instructed to think about their daily schedule in order to arrange classes so that they would have time to visit the hospital. This can be seen as an example of combining two behavior change techniques—a fear appeal and an action planning prompt. Results showed that those in the high fear condition had more positive attitudes and intentions toward tetanus injections than those in the low-fear conditions. Thus fear arousal had a positive effect on motivation; however, this effect did not translate into action. By contrast, the provision of planning instructions had no influence on attitudes and intentions but did influence action: 30% of the students receiving action instructions had an injection whereas only 3% did so in the absence of action instructions. But specific action information alone was insufficient as action was initiated only when specific information was combined with threatening health information, thus providing early support for the postulated threat by efficacy interaction (cf. Ruiter, Abraham, & Kok, 2001).

These findings foreshadow more recent work suggesting that post decisional or volitional processes explain why some intenders act whereas others do not (Abraham et al., 1999). Implementation intentions are a specific form of action planning involving “if-then” plans, where the “if” specifies the content in which the action (the then) will be enacted. Gollwitzer has argued that such plans create cues to action in relevant environments, which prompt strong intenders to automatically act in accordance with their plan when the environmental cue is encountered (see Gollwitzer & Sheeran, 2006).

Despite such research evidence, fear arousal is rarely combined with specific action instructions. Typically people are simply advised to “call a help-line,” “use a condom every time you have sex unless you want to get pregnant” and “don’t drink and drive”. Although most people acknowledge the efficacy of these behavioral recommendations in averting the health threats (response efficacy) they do not help readers to translate precautionary motivation into self-protective action (self-efficacy). Clear instructions are needed, from the beginning of the message, about what to do in order to make the health behavior change possible (e.g., “Think about how you will go about saying no the next time someone offers you a cigarette”).

**CONCLUSION**

By focusing primarily on threat severity, the evidence on fear appeals is not translated into the design of health messages. Current evidence shows that information about the severity of possible negative consequences from risk behavior may prompt defensive responses. These counterproductive responses may be avoided by providing instruction on how to successfully implement the recommended actions as well as convincing people that they are personally susceptible to the threat.

First published online February 2014

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