Journal of Communication ISSN 0021-9916

ORIGINAL ARTICLE

Self- and Response Efficacy Information in Fear Appeals: A Meta-Analysis

Elisabeth Bigsby[1] & Dolores Albarracín[2]

[1]Department of Communication, University of Illinois at Urbana-Champaign, Urbana, IL, USA
[2]Annenberg School for Communication, University of Pennsylvania, Philadelphia, PA, USA

*Fear appeals are designed to inspire intended and actual actions to avert a danger. Although prior meta-analyses report that the average effect of fear appeals is moderately positive, the role of efficacy information is not completely understood. Prior work and fear appeal theories have argued that the presence of both response and self-efficacy information improves fear appeal success but the individual impacts of each have not been properly estimated. A meta-analysis (*k = 158, N = 19,736*) was conducted to examine the individual and combined effects of response and self-efficacy information contained in fear appeals on behavioral intentions and behaviors. Estimating the impact of fear appeals relative to low and no fear controls, the meta-analysis showed that fear appeals had a stronger influence on behavioral outcomes when they included positive response efficacy information but did not vary as a function of including self-efficacy information or negative response efficacy information.*

Keywords: Fear Appeals, Extended Parallel Process Model, Self-Efficacy, Response Efficacy, Behavioral Outcomes, Meta-Analysis

https://doi.org/10.1093/joc/jqab048

Downloaded from https://academic.oup.com/joc/article/72/2/241/6509143 by University of Pennsylvania Libraries user on 15 June 2022

Existing meta-analyses of fear appeals (messages designed to scare the audience by presenting a threat that will befall those who do not enact the recommended behavior[s]; Dillard, Plotnick, Godbold, Freimuth, & Edgar, 1996; Witte, 1992) have examined extant theories that predict persuasive success or failure (Tannenbaum et al., 2015), common message moderators (de Hoog, Stroebe, & de Wit, 2007; Earl & Albarracín, 2007; Peters, Ruiter, & Kok, 2013; Sutton, 1982; Witte & Allen, 2000), and individual differences in response to the messages (Sutton, 1982; Witte & Allen, 2000). These important research syntheses have shown overall positive effects of fear appeals on attitudes, intentions, and behaviors ranging from $\bar{d}$ = 0.08 to 0.52 (Boster & Mongeau, 1984[1]; Earl & Albarracín, 2007; Floyd, Prentice-Dunn, & Rogers, 2000; Sheeran et al., 2014; Tannenbaum et al., 2015; Witte & Allen, 2000).

Corresponding author: Elisabeth Bigsby; e-mail: ebigsby@illinois.edu

© The Author(s) 2022. Published by Oxford University Press on behalf of International Communication Association. All rights reserved. For permissions, please email: journals.permissions@oup.com

Thus, despite one null effect of fear appeals on behavior, $\bar{d}$ = 0.11, p = .22 (Peters et al., 2013; k = 8), the evidence suggests that fear appeals influence audiences.

Yet, despite this evidence and the importance of fear appeals for a variety of disciplines and topics, the strategy remains controversial. Scholars have objected to their use on the grounds of practicality (i.e., do fear appeals work outside of a lab setting?; Hastings, Stead, & Webb, 2004), potential boomerang effects (Kok, Peters, Kessels, ten Hoor, & Ruiter, 2018), ethical concerns (Hastings et al., 2004; Kok et al., 2018), and low likelihood of behavioral impact (Ruiter, Kessels, Peters, & Kok, 2014). Many of these concerns have been echoed in the media, with news articles titled "Talking Too Tough on Life's Risks?" (Rothenberg, 1990), and "Doubts About Scare Tactics on Drivers Who Text" (Clifford, 2009). Other scholars have cautioned against using fear appeals when the target audience does not possess high levels of *efficacy* (i.e., ability to successfully enact a preventative or protective behavior; Kok et al., 2018; Peters et al., 2013; Witte & Allen, 2000), which is seen as a precondition for people to implement the recommendations a message presents.

Although fear appeals generally depict the severity of a threat (i.e., *severity*; de Hoog et al., 2007; Rogers, 1975; Witte, 1992; Witte & Allen, 2000) as well as the risk of experiencing a negative outcome (i.e., *susceptibility*; de Hoog et al., 2007; Rogers, 1975; Witte, 1992; Witte & Allen, 2000), the content of fear appeals varies widely (de Hoog et al., 2007). In addition to depictions of severity and susceptibility, fear appeals often recommend a behavior that is efficacious to avert the threat (i.e., *response efficacy*; Leventhal, 1970; Rogers, 1975; Witte, 1992; Witte & Allen, 2000), provide demonstrations of skills necessary or helpful for successful behavior performance (i.e., *behavioral skills*; Fisher & Fisher, 1992; Fisher, Fisher, & Harman, 2003), and/or present reassuring descriptions of recipients' ability to perform a behavior (i.e., *self-efficacy*; Bandura, 1997; Leventhal, 1970; Witte, 1992; Witte & Allen, 2000). It is the role of efficacy information in fear appeals that we examined in this meta-analysis.

The role of response and self-efficacy information in fear appeals

From a message design perspective, fear appeals can include positive efficacy information, lack efficacy information, or include negative efficacy information. These design choices are reflected in experimental studies, which manipulate efficacy information by comparing either or both: (a) fear appeals with efficacy information versus fear appeals without efficacy information and (b) fear appeals with high efficacy information versus fear appeals with low efficacy information. Whereas no efficacy information provides a baseline, high efficacy information is intended to increase confidence in the recommended action and/or individual ability (positive efficacy information) and low efficacy information casts doubt on the recommended action and/or individual ability (negative efficacy information). In the following section, we discuss variations in both efficacy information type (response efficacy, self-efficacy) and efficacy information valence (positive, absent, negative).

Downloaded from https://academic.oup.com/joc/article/72/2/241/6509143 by University of Pennsylvania Libraries user on 15 June 2022

Conceptually, *positive response efficacy information* increases confidence in the recommended behavior as a solution for the danger. For example, a message might state: "Hygiene of the wound is important but the single most efficacious measure to prevent this problem [tetanus] is a correct [tetanus] vaccine" (Ordoñana, González-Javier, Espín-López, & Gómez-Amor, 2009, pp. 219–220). Increased behavioral confidence presumably helps the audience accept the message recommendation as an appropriate way of coping with the threat (de Hoog et al., 2007; Leventhal, 1970; Rogers, 1975; Witte, 1992; Witte & Allen, 2000). *Negative response efficacy information* presents the message recommendation as ineffective. For example, "the low efficacy condition asserted that breast self-exams were … less effective at detecting breast cancer" (Roskos-Ewoldsen, Yu, & Rhodes, 2004, p. 56). Thus, in traditional conceptualizations of fear appeals, messages should have a more positive impact on intentions and behaviors when their arguments successfully convey that the proposed behavior or *response* effectively reduces the threat. In contrast, messages should have less impact when they do not include response efficacy information (Tannenbaum et al., 2015; Witte & Allen, 2000) or when they include negative response efficacy information.

Self-efficacy is the perception that one can execute a behavior even in the presence of obstacles (Bandura, 1997). *Positive* self-efficacy information addresses the audience's ability to engage in the recommended behavior and is intended to increase confidence in the self rather than in the behavioral response (Bandura, 1997; Witte, 1992). Perceptions of self-efficacy also consider the amount of effort required to achieve the goal or the ease or difficulty of performing the behavior (Bandura, 1997; Fishbein & Ajzen, 2010). Thus, positive self-efficacy information often emphasizes the ease of performing the behavior to increase the audiences' *perceived* self-efficacy, or belief in their ability to perform the behavior (Witte, 1992). For example, "you can easily minimize the possibility of suffering a cyber-attack if you choose safe connections, remember to log out and use secure passwords (e.g., combining lower and upper cases, numbers and symbols)" (van Bavel, Rodríguez-Priego, Vila, & Briggs, 2019, p. 32). Overlapping with self-efficacy, behavioral skills entail "an individual's objective abilities and sense of self-efficacy" (Fisher et al., 2003, p. 85). Positive behavioral skills information contains instructions about steps and facilitators of a behavior with the goal of enabling recipients to acquire the behavioral repertoire that they need (Fisher & Fisher, 1992). The latter half of the cyber-attack message, for example, emphasized steps or actions recipients can implement to successfully enact the recommendation (e.g., "remember to log out;" van Bavel et al., 2019, p. 32). *Negative self-efficacy information*, in contrast, questions the audience's ability to perform the recommended behavior or states that the behavior is difficult to perform. For example, "the low efficacy condition asserted that breast self-exams were difficult to carry out" (Roskos-Ewoldsen et al., 2004, p. 56).

As both positive self-efficacy and positive behavioral skills information—both are referred to here as *positive self-efficacy information*—should increase the perceived ease or feasibility of the behavior and confidence in one's ability to execute

Downloaded from https://academic.oup.com/joc/article/72/2/241/6509143 by University of Pennsylvania Libraries user on 15 June 2022

the recommended behavior, the standard prediction is that fear appeals that contain this information are more effective than those that do not (e.g., Rogers, 1975; Tannenbaum et al., 2015; Witte & Allen, 2000). Similarly, fear appeals with positive self-efficacy information should be more effective than fear appeals with negative self-efficacy information.

Although the fear appeal literature has discussed the importance of response and self-efficacy, *how* these types of efficacy work together is surprisingly unclear. For example, most major fear appeal theories, including protection motivation theory (PMT) (Rogers, 1975, 1983) and the extended parallel process model (EPPM) (Witte, 1992; Witte & Allen, 2000), argue that fear appeals only work when recipients perceive high levels of efficacy, which is best accomplished when the fear appeal includes both types of (positive) efficacy information (Witte & Allen, 2000). Other interpretations of PMT, the EPPM, and similar theories have further specified that missing one type of efficacy information in fear appeals is problematic: "Scholars believe that an effective message must attempt to influence both response and self-efficacy perceptions—having only one can negate the one that is present causing the individual to reject a message's recommendation" (Smalec & Klingle, 2000, p. 41).

Despite speculation, prior meta-analyses have not established whether positive response and positive self-efficacy information are both necessary for fear appeals to be effective, leaving an important theoretical puzzle open. Prior meta-analyses, which are summarized in Table 1, have examined (a) only response efficacy information (de Hoog et al., 2007; Sheeran et al., 2014), (b) the combined effect of self- and response efficacy information (Peters et al., 2013; Sheeran et al., 2014), or (c) messages with either type of efficacy information together vis-à-vis messages with both types of efficacy information (Tannenbaum et al., 2015). One exception is Witte and Allen's (2000) meta-analysis, in which self- and response efficacy information were found to be independently and positively correlated with persuasion outcomes ($r = .12$–$.17$). However, their final analyses were a series of analysis of variances (ANOVAs) in which messages were categorized into the combinations of two levels of threat (high vs. low) crossed with two levels of efficacy (high vs. low). In this case, a high efficacy message could include either or both efficacy types, thus obscuring any possible differences between response and self-efficacy information.

In addition, although fear appeal theories, such as PMT and the EPPM, do not make explicit predictions with respect to the valence of efficacy information, prior experimental research has generally treated negative efficacy information and the absence of efficacy information the same. Across studies, both manipulations are expected to lower perceived efficacy more than the positive efficacy information condition and thus lead to fear control and maladaptive actions. However, it is reasonable to expect a difference between fear appeals with negative efficacy information and those without efficacy information. In the absence of efficacy information, "individuals will rely on past experiences and prior beliefs to determine perceived efficacy" (Witte & Allen, 2000, p. 595). But presenting an audience with information intended to create "beliefs that one cannot avert a threat, and even if she/he [sic]

Downloaded from https://academic.oup.com/joc/article/72/2/241/6509143 by University of Pennsylvania Libraries user on 15 June 2022

Table 1 Summary of Efficacy Results in Prior Meta-Analyses of Fear Appeals

Meta-Analysis	Predictor	Outcome	*d*	*k*
de Hoog et al. (2007)	Interaction between severity and response efficacy information	Intention	.09	–
		Behavior	.09	–
	Interaction between susceptibility and response efficacy information	Intention	.10	–
		Behavior	.14	–
Peters et al. (2013)	High fear appeals when efficacy (both self- and response) is high versus when either or both are low	Behavior	.31	6
Sheeran et al. (2014)	Risk appraisal interventions that increased only perceived response efficacy versus interventions that did not increase perceived response efficacy	Intention and behavior	.38	8
	Risk appraisal interventions that increased both self- and response efficacy versus interventions with no increase in self- and response efficacy	Intention and behavior	.98	7
Tannenbaum et al. (2015)	High fear appeals with an efficacy statement (self-efficacy, response efficacy, or both) versus low fear appeals	Attitude, intention, and behavior	.43	92
Witte and Allen (2000)	Low and high fear appeals with response efficacy statements	Attitude	.28	11
		Intention	.34	24
		Behavior	.26	12
	Low and high fear appeals with self-efficacy statements	Attitude	.23	8
		Intention	.35	21
		Behavior	.25	11

Notes: The effect sizes reported in de Hoog et al. (2007) were not significant; the rest of the studies reported significant effect sizes. de Hoog et al. (2007) did report the sample for the main effect of response efficacy information on intention ($k = 12$) and behavior ($k = 6$) but did not report the sample size for the interaction between response efficacy information and severity or for the interaction between response efficacy information and susceptibility. Sheeran et al.'s (2014) meta-analysis examined risk appraisal interventions that were designed to increase (a) risk perceptions, (b) anticipatory emotion, (c) anticipated emotion, and/or (d) perceived severity. Thus, they did not exclusively examine fear appeals. Tannenbaum et al. (2015) "… dichotomously coded whether or not an efficacy message was embedded in the fear appeal. The efficacy message could have focused on self-efficacy …, response-efficacy …, or both" (p. 1184). Finally, we converted Witte and Allen's (2000) main effect results from *r* to *d* using Wilson's effect size calculator (Lipsey & Wilson, 2001). Witte and Allen's (2000) final analysis, which examined the interaction between threat and efficacy information, was conducted via standard ANOVA and not meta-ANOVA.

Downloaded from https://academic.oup.com/joc/article/72/2/241/6509143 by University of Pennsylvania Libraries user on 15 June 2022

could, it wouldn't work anyway" (Popova, 2012, p. 460) could result in boomerang effects (Popova, 2012; Witte, 1992). Thus, although the absence of efficacy information should reduce positive behavioral outcomes, the presence of negative efficacy information could result in negative behavioral outcomes (Popova, 2012; Witte, 1992). Prior meta-analyses have not distinguished between absent and negative efficacy information conditions.

The present meta-analyses

Our goal of this article was to contribute to the fear appeal literature by conducting a comprehensive meta-analysis of the individual and combined effects of self- and response efficacy information contained in fear appeals on intentions and behaviors. We began by collecting and examining experiments comparing fear appeals to low or no fear appeal controls, coding the studies for the presence of positive, presence of negative, or absence of response and self-efficacy information. This approach gave us a larger number of studies for which response efficacy and self-efficacy varied, allowing us to examine the moderating effects of efficacy information types on intentions and behaviors. Although similar to prior meta-analyses (e.g., Tannenbaum et al., 2015), our meta-analysis builds on this prior work in two ways. First, we assigned unique codes based on the type(s) of efficacy information that was included in the fear appeal instead of grouping together fear appeals that included *any* type of efficacy information. Second, we coded the presence of negative efficacy information (e.g., information meant to *decrease* perceived efficacy) separately from the simple absence of efficacy information. This distinction could be theoretically important because a fear appeal that argues that a recommended behavior is *not* effective should result in lower intention and behavior than a message that provides no response efficacy information.

We concluded with a subgroup analysis, analyzing only the experiments that manipulated efficacy information as part of a factorial design (e.g., studies in which a participant could be exposed to a fear appeal with response efficacy information or a fear appeal without response efficacy information). This approach allowed for a cleaner comparison of the effect of efficacy information in fear appeals because differences are compared within studies and thus control for other characteristics that may vary between studies.

Method

Inclusion criteria

We began with the list of studies identified in Tannenbaum et al.'s (2015) meta-analysis. However, our meta-analysis had different inclusion criteria, including different outcome variable criteria.[2] To add to this initial list, we searched the *Communication Source* (which includes conference papers), *PsychInfo*, and *Medline*

Downloaded from https://academic.oup.com/joc/article/72/2/241/6509143 by University of Pennsylvania Libraries user on 15 June 2022

databases using the following keywords (fear appeal *or* fear message *or* fear communication *or* shock tactic *or* scare tactic *or* fear argument). Our search included all available manuscripts through September 2019 and resulted in 821 potential manuscripts.

To be included, studies had to meet the following criteria:

a. Employ an experimental design with a group exposed to a threat message intended to induce fear;
b. Include a comparison group (no message, message that was not a fear appeal, or a weaker fear appeal);
c. Measure either or both intention and behavior as an outcome;
d. Provide enough information about the fear appeal(s) that the presence and valence or absence of self- and response efficacy information could be determined; and
e. Contain statistics that allowed us to calculate an effect size (e.g., means and *SD*s, correlations).

If a study did not contain the appropriate statistics, but did meet the other criteria, we contacted the authors to ask for the appropriate information (e.g., *M*s and *SD*s). We contacted the authors of three manuscripts for additional information; two authors responded and provided us with additional statistical information. In total, 84 of the 821 potential manuscripts met our inclusion criteria, which provided 158 independent group comparisons (k) and 19,736 total participants (N) for our meta-analysis. Fifty-four percent of Tannenbaum et al.'s (2015) sample was included in our meta-analysis; our search added 15 independent group comparisons.

Calculating effect sizes

Effect sizes compared the treatment group (group that received the fear appeal or stronger fear appeal) to a comparison group (no message, message that was not a fear appeal, or weaker fear appeal) on one or both of the outcome variables (intentions and behaviors). For each sample, we calculated one effect size (Cohen's d) for intention or behavior by computing the standardized mean difference between the treatment and comparison groups, using a sample size bias-corrected procedure (Hedges & Olkin, 1980). We calculated effect sizes from provided statistics, including means and standard deviations, t tests, F-ratios, and odds ratios (ORs). When necessary, we calculated d from ORs by dividing the log of the OR by 1.81 (Chinn, 2000).

Some samples ($k = 19$) included both intention and behavior but the majority measured only one outcome ($k = 139$). For the studies that measured both outcomes, we calculated an average d value from the d values for intention and behavior. Similarly, if a sample included more than one measure of an outcome (e.g., intention to use sunscreen, intention to stay away from tanning beds, and intention to check skin for moles and sun damage regularly), each measure was included in

Downloaded from https://academic.oup.com/joc/article/72/2/241/6509143 by University of Pennsylvania Libraries user on 15 June 2022

an average *d*. Thus, a single effect size per sample was included in our meta-analysis. The combination of intention and behavior is appropriate when examining the relative persuasiveness of message features (O'Keefe, 2013), and allowed for a larger sample of effects for the meta-analysis. Of note, we considered implementing robust variance estimates instead of simply averaging effect sizes (Fisher & Tipton, 2015), but these methods have not been implemented for the Vevea and Woods' (2005) publication bias analysis we used in this article.

We calculated effect sizes so that a positive number indicated more positive intentions and/or behaviors in the fear-treatment group, in line with the message's recommendations. We made this decision to help with the interpretation of the results because the direction of the outcomes varied by study. Some studies assessed intentions and behaviors toward a behavior discouraged in the message (e.g., unprotected anal sex among men who have sex with men), whereas other studies assessed a recommended behavior (e.g., intention to quit smoking). Thus, in all cases, a positive effect size indicates that the fear treatment was more effective than the comparison conditions, whereas a negative effect size indicates that the fear treatment was less effective than the comparison conditions.

Coding moderator variables

For each study included in our database, we coded the content of the fear appeal to indicate presence or absence of response efficacy information and self-efficacy information. To do this, as outlined in our inclusion criteria, the manuscript had to provide: (a) the messages or example messages used in the study, (b) the exact text used to vary efficacy information across conditions, or (c) a description of relevant information if messages could not be included (e.g., descriptions of videos, speeches). We also coded for other features of the manuscripts, including message topics (e.g., smoking, environment). Coding was completed by four trained, independent coders, who coded for a variety of study features. Intercoder reliability was calculated using Cohen's kappa (κ) for the categorical variables (i.e., efficacy information type) used in our study. Intercoder reliability on 20% of the database was excellent, average κ = .93 (*SD* = .06, minimum = .80). Coding disagreements were discussed and resolved. Efficacy information type and topic frequencies are presented in the Online Appendix, Table A1.

Response efficacy information

The coders read each message or message description and classified each as including *positive* response efficacy information, *negative* response efficacy information, or no response efficacy information (*absent*). We coded messages as including positive response efficacy information when the message explicitly stated that the recommended behavior successfully led to the expected response. For example, Smerecnik and Ruiter's (2010) study included messages with the statement, "… it is possible to prevent HIV infection by safe sexual intercourse: use a condom" (pp. 552–553). We

Downloaded from https://academic.oup.com/joc/article/72/2/241/6509143 by University of Pennsylvania Libraries user on 15 June 2022

coded messages as including negative response efficacy information when the message explicitly stated that the recommended behavior would not successfully protect the recipient or if it included information intended to decrease confidence in the recommended behavior. For example, Smerecnik and Ruiter (2010) also used messages that stated, "Even while using a condom, it is possible to become infected with HIV" (p. 553), which calls the efficacy of the recommended action into question. Finally, we coded messages as *not* including response efficacy information when the message did not link the recommended behavior to a successful outcome or when the response efficacy information was purposely removed from the message. See Table 2 for the frequency of each type of response efficacy information in our review.

Self-efficacy information

We coded messages for self-efficacy information in a similar way. We coded messages as including *positive* self-efficacy information if they emphasized that message recipients had personal control over the recommended behavior, stated that they could execute the behavior if they wanted, that they could execute it in the presence of obstacles, or trained the skills necessary to enact the advocated behavior. For example, Smalec and Klingle's (2000) study included messages with the statement, "It'll be easy, don't worry. All you have to do is talk to someone who is there to help you" (p. 47). We coded messages as including *negative* self-efficacy information if they explicitly stated that the recommended behavior was difficult to perform. For example, Smalec and Klingle's (2000) study included messages with the statement, "I know it's not going to be easy for you. It will probably be pretty difficult to admit to some stranger" (p. 47). Finally, messages were coded as having *absent* self-efficacy information if they did not contain any positive or negative self-efficacy information. Unlike response efficacy information, the majority (66%) of our sample did not include any self-efficacy information; see Table 2 for the frequency of types of self-efficacy information in our sample.

Control factors

To control for the variety of topics used in fear appeal research, we coded the content of the message and included it as a covariate in our analyses. The following 10 content categories were coded with indicator variables (1= Yes, 0 = No): dental hygiene; driving; human immunodeficiency virus (HIV) or sexually transmitted diseases (STDs); alcohol or drug use; tobacco or smoking; cancer; vaccines, other diseases, or weight; safety; environment or society concerns; and other (Table 2).

Results

First, we examined the data for publication bias. Specifically, as recommended by Viechtbauer (2010), we used metafor version 2 in R to examine the data for outliers,

Downloaded from https://academic.oup.com/joc/article/72/2/241/6509143 by University of Pennsylvania Libraries user on 15 June 2022

Table 2 Mean Effects and Weighted Mixed-Effects Meta-Regression Results ($k = 158$, $N = 19{,}736$)

					Mixed-effects		
					$d = 0.31$		
					$Q_{total} = 203.74(157)$, $p = 0.007$, $I^2 = 22.94\%$		
IV	*k*	*n*	*d* [CI] for presence	*d* [CI] for absence	*b*	95% CI	*b**
Positive response efficacy[a]	81	10254	.35 [0.33, 0.37]	.18 [0.08, 0.27]	.49	[0.27, 0.71]	.39*
Negative response efficacy[a]	17	1311	.23 [0.19, 0.28]	–[b]	.14	[−0.22, 0.51]	.06
Positive self-efficacy[c]	44	6336	.29 [0.24, 0.33]	.31 [0.29, 0.34]	.11	[−0.29, 0.50]	.04
Negative self-efficacy[c]	10	575	.09 [−0.05, 0.23]	–[b]	−.10	[−0.83, 0.63]	−.02
Positive efficacy interaction[d]	37	5835	.25 [0.20, 0.25]	.17 [0.14, 0.19]	.21	[−0.02, 0.42]	.16
Negative efficacy interaction[d]	8	543	.17 [0.07, 0.27]	–[b]	−.24	[−0.62, 0.13]	−.10
Topic							
1. Dental hygiene[e]	11	930	.10 [0.04, 0.17]		–	–	–
2. Driving	6	962	.13 [0.06, 0.19]		.15	[−0.10, 0.40]	.10
3. HIV/STDs	33	3169	.32 [0.28, 0.36]		.18	[<0.01, 0.36]	.26*
4. Alcohol/drug use	8	704	.25 [0.17, 0.33]		.26	[0.03, 0.49]	.20*
5. Tobacco/smoking	29	2781	.27 [0.23, 0.31]		.18	[<0.01, 0.35]	.24*
6. Cancer	16	1994	.55 [0.50, 0.60]		.28	[0.08, 0.47]	.30*
7. Vaccine/disease/weight	30	2612	.52 [0.48, 0.57]		.23	[0.06, 0.40]	.32*
8. Safety	3	687	.16 [0.08, 0.24]		.04	[−0.28, 0.37]	.02
9. Environment	11	2228	.06 [0.02, 0.11]		<−.01	[−0.22, 0.21]	<−.01
10. Other	11	3670	.13 [0.09, 0.16]		.08	[−0.12, 0.29]	.07

Downloaded from https://academic.oup.com/joc/article/72/2/241/6509143 by University of Pennsylvania Libraries user on 15 June 2022

Notes: d = standardized mean effect size, calculated from weighted analysis of covariance (ANCOVA); CI = the 95% confidence interval; b = the weighted unstandardized regression coefficient; b^* = the weighted standardized regression coefficient.

Two weighted ANOCOVAs were estimated to obtain the *d*s. One included the response efficacy information, self-efficacy information, and the efficacy information interaction terms as independent variables with topic as a covariate; the second included topic as the independent variable and the efficacy information variables as covariates. The CIs for the ANCOVA results were adjusted by multiplying the adjusted standard error (*SE*) by 1.96 and adding/subtracting that number from *d.* SEs were adjusted by dividing the reported *SE* by the square root of the mean square error (MSE). Mixed-effects results were estimated in weighted ordinary least squares (OLS) meta-regression with inverse variance weights. Positive values represent outcomes in favor of message recommendations; negative values represent outcomes opposed to message recommendations. I^2 was calculated from the total Q statistic using the formula provided by Huedo-Medina et al. (2006).

[a]Response efficacy information was dummy coded so that absent response efficacy information ($k = 60$, $n = 8{,}171$) was the comparison condition.

[b]The absent self- and response efficacy information *d*s are reported once (see row above).

[c]Self-efficacy information was dummy coded so that absent self-efficacy information ($k = 104$, $n = 12{,}825$) was the comparison condition.

[d]There were no combinations of positive and negative efficacy information in our dataset (e.g., positive self-efficacy with negative response efficacy). Thus, to run a fully crossed analysis, we collapsed the negative and absent conditions together to calculate the interaction terms for positive self- and positive response efficacy (i.e., positive efficacy interaction) and negative self- and negative response efficacy (i.e., negative efficacy interaction). All remaining combinations (i.e., those absent either or both types of efficacy information) served as the comparison group ($k = 113$, $n = 13{,}358$).

[e]Comparison topic; topic was dummy coded such that dental hygiene was the comparison condition.

*Results are significant if the 95% CI does not cross zero.

Downloaded from https://academic.oup.com/joc/article/72/2/241/6509143 by University of Pennsylvania Libraries user on 15 June 2022

construct a contour-enhanced funnel plot, and run a rank correlation test for funnel plot asymmetry and regression test for funnel plot asymmetry. In addition, we implemented the Vevea and Hedges (1995) weight-function model for publication bias using their shiny application (Vevea & Coburn, n.d.). This approach to publication bias, and other selection methods, perform better than more recent methods (McShane, Böckenholt, & Hansen, 2016). Next, we conducted our main analyses in SPSS using Wilson's meta-analysis macros (Lipsey & Wilson, 2001; Wilson, 2010).[3] We used Wilson's METAREG macro to estimate a mixed-effects, maximum likelihood meta-regression model. When conducting meta-regression, the random-effects model is typically called a mixed-effects model because the inclusion of a moderator(s) introduces a systematic difference between studies; however, the model calculation is based on the random-effects model (Lipsey & Wilson, 2001; Viechtbauer, 2010).

Description of the sample

Online Table A1 presents a description of our sample. Of the 158 independent group comparisons (*k*) included in our meta-analysis, the vast majority of the messages (80%) were about health-related topics (see Table 2 for topic frequencies). The combined *k* resulted in a total of 19,736 participants (*N*), which included a variety of ages, races and ethnicities, and education levels. Of the samples included in this meta-analysis, 5% included 9- to 13-year-olds, 8% included 13- to 18-year-olds, 49% included 18- to 22-year-olds, 14% included 22- to 40-year-olds, 10% included 40+ year-olds, and 15% did not report the ages of the participants or included a wide age range (e.g., 18+ years). On average, the samples were 74% female (SD = 28%) and 79% (SD = 36%) and had at least some college education. Samples were also, on average, 51% White (SD = 41%), 33% Asian or Asian American (SD = 45%), 12% Black (SD = 24%), and 5% Latinx (SD = 15%).

Weighted mean effects and heterogeneity

The overall effect of fear appeals compared to low or no fear appeals on intentions and behaviors was positive ($d = 0.31$, Table 2). Thus, similar to prior meta-analyses (Boster & Mongeau, 1984; Earl & Albarracín, 2007; Floyd et al., 2000; Sheeran et al., 2014; Tannenbaum et al., 2015; Witte & Allen, 2000), we found fear appeals are more likely to result in behavioral outcomes congruent with message recommendations than low or no fear appeals. When interpreting the main effect, it is important to evaluate the level of heterogeneity among studies included in the meta-analysis to determine if variance is due to sampling error or true differences between studies (Huedo-Medina, Sánchez-Meca, Marín-Martínez, & Botella, 2006). Based on I^2, which is not influenced by sample size and is used "to determine what proportion of the observed variance is real" (Borenstein, Hedges, Higgins, & Rothstein, 2009, p. 119), our sample had low heterogeneity (23%, Table 2). Thus, most of the

Downloaded from https://academic.oup.com/joc/article/72/2/241/6509143 by University of Pennsylvania Libraries user on 15 June 2022

variance we observed between studies in our sample is spurious and due to sampling error (Borenstein et al., 2009; Higgins, Thompson, Deeks, & Altman, 2003).

Examining effect sizes for outliers and publication/inclusion bias

The following analyses were conducted to examine publication/inclusion bias in our sample.

1. Using the metafor package in R, we examined the data for outliers. Based on the studentized deleted residuals, Cook's distances, and covariance ratios, we did not identify any clear outliers (Viechtbauer, 2010).[4]
2. We examined the data for inclusion or publication bias using a forest plot (Figure A1), created using Bailey's (2009) forest plot tool, and a contour-enhanced funnel plot (Online Figure A2), created in R. Online Figure A1 shows that the effect sizes appear to be continuous and normal, without evidence of bias. Furthermore, neither the rank correlation test for funnel plot asymmetry, Kendall's $\tau = .02$, $p = .77$, nor the regression test for funnel plot asymmetry, $z = -0.68$, $p = .50$, were significant. Thus, there was no evidence of funnel plot asymmetry, which is an indication of bias. In addition, the contour-enhanced funnel plot (Online Figure A2) provides a visualization of the distribution of effect sizes centered at zero (i.e., the null hypothesis; Peters, Sutton, Jones, Abrams, & Rushton, 2008).
3. We also implemented the Vevea and Hedges (1995) weight-function model for publication bias using their Shiny application (Vevea & Coburn, n.d.). As recommended, we estimated the model several times with different p-value cutoff points (Vevea & Coburn, n.d.). Models with 0.05 and 0.025 p-value cutoff points did not indicate publication bias (results of the likelihood ratio test reported an unadjusted likelihood = −23.39, adjusted likelihood = −23.64, 2 degrees freedom, $p = 0.77$). When 0.005 was used as a cutoff p-value, the likelihood ratio test was significant and may thus provide some evidence of publication bias (unadjusted likelihood = −23.39, adjusted likelihood = −29.12, 3 degrees freedom, $p = 0.009$). However, none of the fear appeal-intention/behavior d estimates changed drastically from the unadjusted d estimate (0.25), with all adjusted estimates ranging between 0.24 and 0.25. Thus, the weight-function model provided little evidence of publication/inclusion bias, and no evidence that any potential bias affected our results.

Testing the moderating effects of self- and response efficacy information

First, to determine if the manipulations of fear, response efficacy information, and self-efficacy information had the intended effects in the synthesized studies, we conducted meta-analytic manipulation checks on the available data. We report the fixed-effects and mixed-effects models for the manipulation checks in the Appendix

Downloaded from https://academic.oup.com/joc/article/72/2/241/6509143 by University of Pennsylvania Libraries user on 15 June 2022

(Online Table A2). The available data for each manipulation check were small, meaning most studies do not report this type of information.

Second, to examine the effects of efficacy information as moderators meta-analytically, we used Wilson's meta-analysis METAREG macro to estimate a mixed-effects (ML) meta-regression model. We entered efficacy information type, the interaction between efficacy information types, and message domain as predictors and the calculated *d* value as the outcome. Efficacy information was coded so that fear appeals absent of efficacy information served as the comparison groups. In our sample, there were no studies that combined positive and negative efficacy information (e.g., positive self-efficacy with negative response efficacy). Thus, we were left with two interaction terms: an interaction between positive self-efficacy and positive response efficacy, and an interaction between negative self-efficacy and negative response efficacy.

The results are presented in Table 2. As shown, there was a moderating effect for positive response efficacy information such that fear appeals with positive response efficacy information resulted in more positive intentions and behaviors than did fear appeals with no efficacy information. None of the other efficacy information indicator variables were significant, implying that positive response efficacy was the only condition that significantly increased fear appeal impact on intentions and behavior.[5]

Subgroup analysis: Comparing fear appeals that manipulated the presence of efficacy information

The main meta-analysis allowed us to determine how response efficacy, self-efficacy, and the combination of efficacy information (some manipulated, some inferred by coders) influence the effect of fear appeals when compared to low and no fear appeals. We decided to conduct a subgroup analysis to examine whether the impact of efficacy information is due to effects in the fear messages or effects in the comparison conditions. Thus, we recoded available data so that *d* represented differences in intentions and behaviors in fear appeals as a result of efficacy information (efficacy information present versus efficacy information absent), as opposed to differences in intentions and behaviors as a result of fear appeals versus comparison messages.

Inclusion criteria

We only included studies that systematically varied both the fear or threat manipulation and the presence of efficacy information. Therefore, the inclusion criteria remained the same with one key difference: Instead of only having to provide enough information about the fear appeal for coding presence or absence of efficacy information, studies had to employ a factorial design or randomized control trial in which fear and efficacy information (either self-efficacy, response efficacy, or both) were varied within the study. As expected, a much smaller number of studies met

Downloaded from https://academic.oup.com/joc/article/72/2/241/6509143 by University of Pennsylvania Libraries user on 15 June 2022

our criteria for this subgroup analysis; out of the 84 manuscripts included in the main meta-analysis, 15 met our inclusion criteria for the subgroup analysis. These 15 manuscripts provided a total of 19 independent group comparisons (k) and 2,166 participants (N). Because we were interested in the effect of efficacy information in fear appeals, we only used the high fear conditions in this analysis. Thus, d is the effect of positive efficacy information versus negative or no efficacy information on intentions and behaviors in fear appeals (see Appendix, Online Table A3).

Calculating outcome variables

Our outcome variable calculation followed a similar procedure as the main meta-analysis, but the effect sizes were different. Specifically, the effect sizes compared high efficacy fear appeals (treatment group) to low efficacy fear appeals (comparison group) on one or both of the outcome variables (intentions and behaviors). For each independent comparison group, we again calculated one effect size for intentions and/or behaviors by computing the standardized mean difference (d) between the treatment and comparison groups. Again, in all cases, a positive effect size indicates that the efficacy treatment was more effective than the negative or no efficacy comparison, whereas a negative effect size indicates that the efficacy treatment was less effective than the negative or no efficacy comparison.

Results

As shown in Online Table A3, the fear appeal literature has a clear trend: Studies rarely report manipulating self-efficacy information independent of response efficacy information. In our database, only one study (Wurtele & Maddux, 1987), varied self-efficacy and response efficacy information independent of each other and assessed behavioral intention or behavior as an outcome variable. Therefore, we could not compare messages that varied the level or presence of self-efficacy information alone. In our sample, most independent group comparisons varied the presence or level of self- and response efficacy information together. That is, for example, a participant was exposed either to a message that included both positive self- and response efficacy information or to a message that did not contain any self- and response efficacy information.

To compare the effects of fear appeals with *positive* efficacy information to fear appeals with *negative or absent* efficacy information, we ran a mixed-effects meta-ANOVA using Wilson's METAF macro with type of efficacy information (0 = both self- and response efficacy, 1 = response efficacy) as the predictor and calculated d as the outcome (see Table 3 for results). Overall, the nonsignificant meta-ANOVA suggests that fear appeals that included only response efficacy information did not differ from those that included both self- and response efficacy information. Thus, this analysis supports our initial finding that self-efficacy information does not add to a fear appeal above and beyond response efficacy information.

Downloaded from https://academic.oup.com/joc/article/72/2/241/6509143 by University of Pennsylvania Libraries user on 15 June 2022

Table 3 Mean Effects, Weighted Mixed-Effects Meta-ANOVA Results for the Subgroup Analysis ($k = 19$, $N = 2{,}166$)

			Mixed-effects		
			$d = 0.79$		
			$Q_{between} = 0.05(1)$, $p = .82$		
Efficacy Group	*k*	*n*	*d*	*SE*	95% CI
Response	6	340	0.73*	.28	[0.18, 1.28]
Both	13	1826	0.81*	.19	[0.44, 1.18]

Notes: d = standardized mean effect size, calculated from weighted (inverse variance weights) ANOVA; CI = the 95% confidence interval for d. Response = fear appeals that manipulated the presence of response efficacy information; both = fear appeals that manipulated the presence of both self- and response efficacy information. $Q_{between}$ is analogous to the between-subjects result in traditional ANOVA.
*Results are significant if the 95% CI does not cross zero.

Discussion

Our goal was to explore the effects of self- and response efficacy information and better understand their role in fear appeal success. Our meta-analysis adds to the literature in several ways. First, we gathered a large number of published and unpublished manuscripts, which resulted in a larger number of independent group comparisons ($k = 158$) than prior research. Second, we examined both the independent and combined effects of self- and response efficacy information in fear appeals. Prior meta-analyses have taken different approaches, including investigating only one type of efficacy information (e.g., de Hoog et al., 2007) or treating the presence of one or both types of efficacy information as equivalent (e.g., Tannenbaum et al., 2015). Third, we coded efficacy information as positive, negative, or absent, whereas prior meta-analytic work has coded only for presence versus absence of efficacy information (e.g., Tannenbaum et al., 2015; Witte & Allen, 2000).

Based on our meta-analytic sample, the difference between fear appeals and no fear appeals was larger when the messages included positive response efficacy information. This result is similar to prior meta-analytic work that also found positive associations between fear appeals with response efficacy information and attitudes and intentions (e.g., de Hoog et al., 2007; Witte & Allen, 2000). Interestingly, there was no moderating effect for any other type or combination of efficacy information, including fear appeals that contained both positive response and positive self-efficacy information (Table 2). This latter finding—that fear appeals with both self- and response efficacy information were not significantly different from fear appeals without any efficacy information—is surprising. Major fear appeals theories such as PMT and the EPPM have argued that the most persuasive fear appeals are ones that

Downloaded from https://academic.oup.com/joc/article/72/2/241/6509143 by University of Pennsylvania Libraries user on 15 June 2022

include both types of efficacy information. Although our findings may need to be established in new contexts, we did not find both types of efficacy information to be necessary.

Similarly, based on theory, we expected fear appeals with negative self- and response efficacy information to result in negative (or at least significantly lower) behavioral outcomes when compared to no fear appeals. Telling someone a recommended action is difficult to perform and not effective should *discourage* intentions and behaviors. Yet, this combination was also nonsignificant (but in the expected negative direction). One potential explanation for this result is that, in comparison to positive and absent efficacy information, fewer studies have included negative efficacy information, likely because attempting to decrease perceived efficacy is considered unethical (Popova, 2012).

Although not significant, the negative self-efficacy information main effect was in the expected negative direction. The effect of negative response efficacy information on behavioral outcomes, however, was nonsignificant and in the *positive* direction. Overall, there was a small number of fear appeals with negative response efficacy information ($k = 17$) compared to our full sample, thus we cautiously note this pattern in the data. We need more research on negative response efficacy and negative self-efficacy information before any conclusions can be drawn.

Our analysis of only studies that experimentally varied the presence of efficacy information in fear appeals (i.e., the subgroup analysis) supported the main results. Specifically, fear appeals that included response efficacy only or both self- and response efficacy information produced higher intentions and behaviors than fear appeals with negative efficacy information or without efficacy information (Table 3). That is, the lack of difference between fear appeals with both types of efficacy information and fear appeals with only response efficacy information suggest that self-efficacy had little added value over and above response efficacy.

Theoretical implications, unanswered questions, and calls for future research

Based on our results, there are several unanswered theoretical questions and avenues for future research. First, although positive response efficacy information clearly matters, we did not find evidence that fear appeals with *both* positive self- and response efficacy information increase fear appeal effectiveness when compared to low and no fear appeals. However, our meta-analysis was limited by the design of fear appeal studies as they have accumulated in the literature. Most critically, we were not able to examine the effect of including self-efficacy information alone because few studies manipulate this type of information systematically and independent of response efficacy information. In fact, only one manuscript out of the 84 that met our criteria manipulated self-efficacy information in this way (see Wurtele & Maddux, 1987). A likely reason for this practice is that popular fear appeal theories argue that *both* high self- and response efficacy are necessary to promote adaptive responses (e.g., Rogers, 1983; Witte & Allen, 2000), but it could also be that

Downloaded from https://academic.oup.com/joc/article/72/2/241/6509143 by University of Pennsylvania Libraries user on 15 June 2022

researchers have found self-efficacy messages to have no impact. Future research should experimentally manipulate the presence of self-efficacy information independent of response efficacy information in fear appeals, and report null effects if present, to further explore their independent and combined effects.

Second, although none of the other efficacy information types or interactions were significant in the meta-regression, additional theorizing and research on efficacy information types are necessary. The *d*s calculated from weighted analysis of covariance were mostly positive, even when the fear appeal included negative efficacy information. One explanation for this trend is methodological; intentional or not, researchers may use more persuasive messages as the fear appeal treatment and less persuasive messages as the low or no fear appeal comparisons. Thus, other message features in the fear appeals may partially explain the positive behavioral outcomes. Another explanation is theoretical; the presence of any efficacy information, positive or negative, encourages recipients to think about and evaluate their own perceived efficacy. In this case, the relation between efficacy information and perceived efficacy is not the causal one described in the EPPM.

Third and relatedly, the association between receiving efficacy information and perceiving efficacy requires additional attention. Most theories argue that fear appeals should include efficacy information (e.g., Rogers, 1983; Witte & Allen, 2000). However, at least according to the EPPM, individuals rely on prior beliefs and experiences to determine their perceived efficacy if the fear appeal is absent efficacy information (Witte & Allen, 2000). Thus, the individual roles of provided efficacy information and perceived efficacy are an important, and likely a context-specific, part of the puzzle. For example, although our manipulation checks (Online Table A2) and prior meta-analyses (e.g., Witte & Allen, 2000) found that the presence of efficacy information is associated with increased perceived efficacy, there is likely a threshold to the effect. Perceived efficacy may not increase in response to a fear appeal with efficacy information when perceived efficacy is already high, even if those individuals ultimately have higher intentions and behaviors. Relatedly, one explanation for our findings could be that the self-efficacy information manipulations were not as strong or effective as the response efficacy manipulations. Future research should explore variations in the strength of the efficacy information contained in a message, their influence of perceived efficacy, and the role of each in fear appeal effectiveness.

Additional factors could also play a role. For example, Nabi, Roskos-Ewoldsen, and Carpentier (2008) argued subjective knowledge is an important factor to consider when designing fear appeals. They found that men with high levels of subjective knowledge were more persuaded by an efficacy-only message when compared to a strong or weak fear appeal. However, this same result was not found for women with high levels of subjective knowledge, who had similar reactions to the fear and efficacy-only messages. Importantly, in Nabi and colleagues' (2008) study, all the messages contained efficacy information. Thus, future research should continue to

Downloaded from https://academic.oup.com/joc/article/72/2/241/6509143 by University of Pennsylvania Libraries user on 15 June 2022

explore how individual factors (e.g., subjective knowledge) influence responses to fear appeals.

A notable, consistent meta-analytic finding is that the relation between fear and persuasive outcomes is linear (Boster & Mongeau, 1984; Tannenbaum et al., 2015; Witte & Allen, 2000; see also Meczkowski, Dillard, & Shen, 2016). Thus, the variations in fear are often not considered beyond a simple grouping (i.e., high fear vs. low fear) or manipulation check to ensure those exposed to a high fear message experienced more fear than those exposed to a low or no fear message. However, recent research has shown that this finding is a result of employing between-subjects designs (both experimentally and meta-analytically) instead of within-subjects designs. This line of research demonstrates that within-subjects, the relation between fear and persuasive outcomes is curvilinear (Meczkowski et al., 2016; Shen, 2017). Like prior work, we could not meta-analytically test the within-subjects effects of fear on persuasive outcomes because too few studies have taken this approach or provided this information. Thus, we echo calls for additional research that uses a within-subjects design to further investigate the linear versus curvilinear model with an added call to examine the role of efficacy information in these models. In any case, though, this aspect does not compromise our interpretation of between-subjects effects.

Finally, and perhaps unsurprisingly, most messages in our sample were about health-related topics (e.g., smoking, alcohol use, dental hygiene; Table 2). However, fear appeals are a common persuasive message strategy and are used across a variety of domains from politics (e.g., if you do not vote for me, bad things will happen to you and this country) to close relationships (e.g., if you do not agree to attend couples therapy with me, I want a divorce) to finance (e.g., if you do not start saving for retirement now, you will not have enough money in the future). Although our sample did include nonhealth topics (e.g., environment, online security, education), more research with other topics is needed to understand the utility of fear appeals and explanatory power of fear appeal theories.

Final note

Overall, our results provide additional evidence of the importance of efficacy information in fear appeals. However, they do not support the need to include both positive self-efficacy and positive response efficacy information as predicted by theories like the EPPM (Witte, 1992; Witte & Allen, 2000) or PMT (Rogers, 1975, 1983). Instead, one type of efficacy information may be sufficient. In our sample, only positive response efficacy information moderated the effect of fear appeals on behavioral outcomes when compared to low or no fear appeals. Although these results should be replicated in the future, we can provide at least one clear and simple strategy for fear appeal design: Always include positive response efficacy information.

Downloaded from https://academic.oup.com/joc/article/72/2/241/6509143 by University of Pennsylvania Libraries user on 15 June 2022

Supporting information

Additional Supporting Information may be found in the online version of this article.

Please note: Oxford University Press is not responsible for the content or functionality of any supplementary materials supplied by the authors. Any queries (other than missing material) should be directed to the corresponding author for the article.

Notes

1. Statistics originally reported as correlations and converted to Cohen's *d* by the authors.
2. For example, Tannenbaum et al. (2015) included studies that reported attitude, behavioral intention, and/or behavior as an outcome variable.
3. Data from this project are available via the Open Science Framework at https:// osf. io/ h9fyd/ ?view_ only= ef9590790eaf4930849fc51a22355f06
4. The influential case diagnostics are available from the first author.
5. We also conducted the meta-analysis using the metafor package in R and obtained similar results.

Acknowledgments

The authors wish to thank Kenneth M. Sanchez for assisting with an earlier version of the manuscript, including the construction of Table 2 and checking references.

References

Bailey, T. M. (2009). *ForestPlot tool - Download v504* [MS Excel workbook]. Retrieved from http:// psych. cf. ac. uk/ home2/ mat/

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: Freeman.

Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to meta-analysis*. Wiley. https://doi.org/10.1002/9780470743386.

Boster, F. J., & Mongeau, P. (1984). Fear-arousing persuasive messages. *Annals of the International Communication Association*, *8*(1), 330–375. https://doi.org/10.1080/23808985.1984.11678581

Chinn, S. (2000). A simple method for converting an odds ratio to effect size for use in meta-analysis. *Statistics in Medicine*, *19*(22), 3127–3131.

Clifford, S. (2009, August 31). Doubts about scare tactics on drivers who text. *The New York Times*. Retrieved from https:// www. nytimes. com/ 2009/ 09/ 01/ technology/ 01dis tracted. html.

de Hoog, N., Stroebe, W., & de Wit, J. B. F. (2007). The impact of vulnerability to and severity of a health risk on processing and acceptance of fear-arousing communications: A meta-analysis. *Review of General Psychology*, *11*(3), 258–285. https://doi.org/10.1037/1089-2680.11.3.258

Dillard, J. P., Plotnick, C. A., Godbold, L. C., Freimuth, V. S., & Edgar, T. (1996). The multiple affective outcomes of AIDS PSAs: Fear appeals do more than scare people. *Communication Research*, *23*(1), 44–72. https://doi.org/10.1177/009365096023001002

Downloaded from https://academic.oup.com/joc/article/72/2/241/6509143 by University of Pennsylvania Libraries user on 15 June 2022

Earl, A., & Albarracín, D. (2007). Nature, decay, and spiraling of the effects of fear-inducing arguments and hiv counseling and testing: A meta-analysis of the short- and long-term outcomes of HIV-prevention interventions. *Health Psychology*, *26*(4), 496–506. https://doi.org/10.1037/0278-6133.26.4.496

Fishbein, M., & Ajzen, I. (2010). *Predicting and changing behavior: The reasoned action approach*. New York, NY: Psychology Press. https://doi.org/10.4324/9780203838020.

Fisher, J. D., & Fisher, W. A. (1992). Changing AIDS-risk behavior. *Psychological Bulletin*, *111*(3), 455–474. https://doi.org/10.1037/0033-2909.111.3.455

Fisher, W. A., Fisher, J. D., & Harman, J. (2003). The arguments-motivation-behavioral skills model: A general social psychological approach to understanding and promoting health behavior. In J. Suls & K. A. Wallston (Eds.), *Social psychological foundation of health and illness* (pp. 82–106). Malden, MA: Blackwell. https://doi.org/10.1002/9780470753552.

Fisher, Z., & Tipton, E. (2015). *Robumeta: An R-package for robust variance estimation in meta-analysis* [R software package]. Retrieved from https:// arxiv. org/ abs/ 1503. 02220

Floyd, D. L., Prentice-Dunn, S., & Rogers, R. W. (2000). A meta-analysis of research on protection motivation theory. *Journal of Applied Social Psychology*, *30*(2), 407–429. https://doi.org/10.1111/j.1559-1816.2000.tb02323.x

Hastings, G., Stead, M., & Webb, J. (2004). Fear appeals in social marketing: Strategic and ethical reasons for concern. *Psychology and Marketing*, *21*(11), 961–986. https://doi.org/10.1002/mar.20043

Hedges, L. V., & Olkin, L. (1980). Vote-counting methods in research synthesis. *Psychological Bulletin*, *88*(2), 359–369. https://doi.org/10.1037/0033-2909.88.2.359

Higgins, J. P. T., Thompson, S. G., Deeks, J. J., & Altman, D. G. (2003). Measuring inconsistency in meta-analyses. *BMJ (Clinical Research ed.)*, *327*(7414), 557–560. Retrieved from https:// www. jstor. org/ stable/ 25455439

Huedo-Medina, T. B., Sánchez-Meca, J., Marín-Martínez, F., & Botella, J. (2006). Assessing heterogeneity in meta-analysis: *Q* statistic or I^2 index? *Psychological Methods*, *11*(2), 193–206. https://doi.org/10.1037/1082-989X.11.2.193

Kok, G., Peters, G.-J., Kessels, L. T. E., ten Hoor, G. A., & Ruiter, R. A. C. (2018). Ignoring theory and misinterpreting evidence: The false belief in fear appeals. *Health Psychology Review*, *12*(2), 111–125. https://doi.org/10.1080/17437199.2017.1415767

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

Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis* (Vol. *49*). Thousand Oaks, CA: Sage.

McShane, B. B., Böckenholt, U., & Hansen, K. T. (2016). Adjusting for publication bias in meta-analysis: An evaluation of selection methods and some cautionary notes. *Perspectives on Psychological Science* , *11*(5), 730–749. https://doi.org/10.1177%2F1745691616662243

Meczkowski, E. J., Dillard, J. P., & Shen, L. (2016). Threat appeals and persuasion: Seeking and finding the elusive curvilinear effect. *Communication Monographs*, *83*(3), 373–395. 10.1080/03637751.2016.1158412

Nabi, R. L., Roskos-Ewoldsen, D., & Carpentier, F. D. (2008). Subjective knowledge and fear appeal effectiveness: Implications for message design. *Health Communication*, *23*(2), 191–201. https://doi.org/10.1080/10410230701808327

Downloaded from https://academic.oup.com/joc/article/72/2/241/6509143 by University of Pennsylvania Libraries user on 15 June 2022

O'Keefe, D. J. (2013). The relative persuasiveness of different message types does not vary as a funciton of the persuasive outcome assessed: Evidence from 29 meta-analyses of 2,062 effect sizes for 13 message variations. *Communication Yearbook*, *37*(1), 221–249.

*Ordoñana, J. R., González-Javier, F., Espín-López, L., & Gómez-Amor, J. (2009). Self-report and psychophysiological responses to fear appeals. *Human Communication Research*, *35* (2), 195–220. https://doi.org/10.1111/j.1468-2958.2009.01344.x

Peters, G.-J. Y., Ruiter, R. A. C., & Kok, G. (2013). Threatening communication: A critical re-analysis and a revised meta-analytic test of fear appeal theory. *Health Psychology Review*, *7*(Suppl 1), S8–S31. https://doi.org/10.1080/17437199.2012.703527

Peters, J. L., Sutton, A. J., Jones, D. R., Abrams, K. R., & Rushton, L. (2008). Contour-enhanced meta-analysis funnel plots help distinguish publication bias from other cases of asymmetry. *Journal of Clinical Epidemiology*, *61*(10), 991–996. Retrieved from https:// doi- org. proxy2. library. illinois. edu/ 10. 1016/ j. jclinepi. 2007. 11. 010

Popova, L. (2012). The extended parallel process model: Illuminating gaps in research. *Health Education & Behavior*, *39*(4), 455–473. https://doi.org/10.1177%2F1090198111418108

Rogers, R. W. (1975). A protection motivation theory of fear appeals and attitude change. *The Journal of Psychology*, *91*(1), 93–114. https://doi.org/10.1080/00223980.1975.9915803

Rogers, R. W. (1983). Cognitive and physiological processes in fear-based attitude change: A revised theory of protection motivation. In J. Cacioppo & R. Petty (Eds.), *Social psychophysiology: A sourcebook* (pp. 153–176). New York, NY: Guilford.

*Roskos-Ewoldsen, D. R., Yu, H. J., & Rhodes, N. (2004). Fear appeal messages affect accessibility of attitudes toward the threat and adaptive behaviors. *Communication Monographs*, *71*(1), 49–69. https://doi.org/10.1080/0363452042000228559

Rothenberg, R. (1990, February 16). Talking too tough on life's risks? *The New York Times*. Retrieved from https:// www. nytimes. com/ 1990/ 02/ 16/ business/ talking- too- tough- on- life- s- risks. html.

Ruiter, R. A. C., Kessels, L. T. E., Peters, G.-J. Y., & Kok, G. (2014). Sixty years of fear appeal research: Current state of the evidence. *International Journal of Psychology*, *49*(2), 63–70. https://doi.org/10.1002/ijop.12042

Sheeran, P., Harris, P. R., & Epton, T. (2014). Does heightening risk appraisals change people's intentions and behavior? A meta-analysis of experimental studies. *Psychological bulletin*, *140*(2), 511–543. Retrieved from https:// doi. apa. org/ doi/ 10. 1037/ a0033065

Shen, L. (2017). Putting the fear back again (and within individuals): Revisiting the role of fear in persuasion. *Health Communication*, *32*(11), 1331–1341. https://doi.org/10.1080/10410236.2016.1220043

*Smalec, J. L., & Klingle, R. S. (2000). Bulimia interventions via interpersonal influence: The role of threat and efficacy in persuading bulimics to seek help. *Journal of Behavioral Medicine*, *23*(1), 37–57. https://doi.org/10.1023/a:1005468220077

*Smerecnik, C. M. R., & Ruiter, R. A. C. (2010). Fear appeals in HIV prevention: The role of anticipated regret. *Psychology, Health & Medicine*, *15*(5), 550–559. https://doi.org/10.1080/13548506.2010.498888

Sutton, S. R. (1982). Fear-arousing communications: A critical examination of theory and research. In J. R. Eiser (Ed.), *Social psychology and behavioral medicine* (pp. 303–337). Wiley.

Tannenbaum, M. B., Hepler, J., Zimmerman, R. S., Saul, L., Jacobs, S., Wilson, K., & Albarracín, D. (2015). Appealing to fear: A meta-analysis of fear appeal effectiveness and theories. *Psychological Bulletin*, *141*(6), 1178–1204. https://doi.org/10.1037/a0039729

Downloaded from https://academic.oup.com/joc/article/72/2/241/6509143 by University of Pennsylvania Libraries user on 15 June 2022

*van Bavel, R., Rodríguez-Priego, N., Vila, J., & Briggs, P. (2019). Using protection motivation theory in the design of nudges to improve online security behavior. *International Journal of Human-Computer Studies*, *123*, 29–39. https://doi.org/10.1016/j.ijhcs.2018.11.003

Vevea, J. L., & Coburn, K. (n.d.). *The Vevea and Hedges weight-function model for publication bias* [Shiny app]. Retrieved from https:// vevealab. shinyapps. io/ WeightFunctionModel/

Vevea, J. L., & Hedges, L. V. (1995). A general linear model for estimating effect size in the presence of publication bias. *Psychometrika*, *60*(3), 419–435. https://doi.org/10.1007/BF02294384

Vevea, J. L., & Woods, C. M. (2005). Publication bias in research synthesis: Sensitivity analysis using a priori weight functions. *Psychological Methods*, *10*(4), 428–443. https://doi.org/10.1037/1082-989X.10.4.428

Viechtbauer, W. (2010). Conducting meta-analyses in R with the metafor package. *Journal of Statistical Software*, *36*(3), 1–48. https://doi.org/10.18637/jss.v036.i03

Wilson, D. B. (2010). *Meta-analysis macros for SAS, SPSS, and Stata* [SPSS software macro]. Retrieved from http:// mason. gmu. edu/ ~dwilsonb/ ma. html

Witte, K. (1992). Putting the fear back into fear appeals: The extended parallel process model. *Communication Monographs*, *59*(4), 329–349. https://doi.org/10.1080/03637759209376276

Witte, K., & Allen, M. (2000). A meta-analysis of fear appeals: Implications for effective public health campaigns. *Health Education & Behavior*, *27*(5), 591–615. https://doi.org/10.1177/109019810002700506

*Wurtele, S. K., & Maddux, J. E. (1987). Relative contributions of protection motivation theory components in predicting exercise intentions and behavior. *Health Psychology*, *6*(5), 453–466. https://doi.org/10.1037/0278-6133.6.5.453

Downloaded from https://academic.oup.com/joc/article/72/2/241/6509143 by University of Pennsylvania Libraries user on 15 June 2022