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Threat Appeals: The Fear-Persuasion Relationship is Linear *and* Curvilinear

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Abstract

Drive theory (Hovland, Janis, & Kelley, 1953) may be seen as the first scientific theory of health and risk communication. But, its prediction of a curvilinear association between fear and persuasion is generally held to be incorrect. A close rereading of Hovland et al. reveals that within- and between-persons processes were conflated. Using a message that advocated obtaining a screening for colonoscopy, this study ($N = 259$) tested both forms of the inverted-U hypothesis. In the between-persons data, analyses revealed a linear effect that was consistent with earlier investigations. But, the data showed an inverted-U relationship in within-persons data. Hence, the relationship between fear and persuasion is linear or curvilinear depending on the level of analysis.

Keywords

Threat appeals; fear appeals; fear; emotion; persuasion; colonoscopy; cancer

Regarding the relationship between body mass and life span, two facts are well established (Millar & Zammuto, 1983). For one, (on average) species that have a larger body mass have longer life expectancies than species of smaller body mass. Elephants live longer than horses and horses live longer than sparrows. But, within species, the relationship is reversed. Heavier elephants show a shorter lifespan than leaner elephants. The pattern repeats within the species equus and passeridae. Obviously, these two facts are not in conflict because they apply to different domains. One describes a between-species association, which is positive, while the other defines a within-species relationship, which is negative.

It seems likely that a similar situation exists with regard to threat appeals. Of the many studies on this message form, the vast majority (a) used a between-subjects design and (b) concluded that there is a positive, linear association between fear/threat and persuasion. The possibility that a different functional form may appear in within-subjects designs is severely understudied. But, theory and some evidence point toward the likelihood that fear and persuasion are curvilinearly related when fear is assessed at multiple times during message processing (Hovland et al., 1953; Shen & Dillard, 2014). The overarching purpose of this

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research was to test for both forms of association. To contextualize the investigation, we first present a description of threat appeals.

Threat Appeals: Constructs and Terminology

Typically, threat appeals consist of two major parts (Mongeau, 2013; Rogers, 1983). The hazard component is comprised of two minor parts that describe (a) the undesirable consequences of an external threat (*severity*), and (b) the likelihood that the individual will experience these consequences (*susceptibility*). The action component is composed of (a) instructions for an effective response to an external threat (*response efficacy*), and (b) material concerning an individual's ability to execute that response (*self-efficacy*). The two major components – hazard and action -- are typically presented in a problem-solution format, such that individuals are first presented with a danger, and then exposed to a means of addressing that danger (Beck & Frankel, 1981; Witte, 1992). Neither theory nor tradition offers advice on how to order the minor parts within their corresponding major parts.

All of the constructs just described are features of messages. Of course, it is expected that these message features will engender parallel perceptions in the audience (Rogers, 1983). Consequently, one standard for assessing whether a message qualifies as a threat appeal is to examine the extent to which message perceptions in different conditions (e.g., high threat vs. low threat) differ from one another. A high threat message would be one in which the means on all four judgments are above their scale midpoints. For most threat appeal research, the question is whether or not such messages are persuasive.

In line with theories of threat appeals (Hovland et al., 1953; Rogers, 1983; Witte, 1992), it is expected that judgments of severity and susceptibility will provoke a particular emotion (i.e., fear). As with general theories of emotion, cognitive appraisals are thought to be causal antecedents of emotions (e.g., Lazarus, 1991). To maintain clarity among these concepts we use *threat* to refer to message features and their corresponding appraisals, and *fear* to mean the emotional response that follows from perceived threat. This distinction is critically important to what follows.

Theoretical conceptions of the nature of fear have changed a good deal over the years. In contemporary appraisal theories of emotion, fear is a goal-incongruent affect that is experienced as negative (Lazarus, 1991) and indexed in the English language by words such as afraid, scared and frightened. Like other discrete emotions, fear is best conceived as activity across multiple systems -- cognitive, experiential, motivational, expressive, and physiological -- that is coordinated in the service of addressing a consequential person-environment relationship. Fear is aroused when some stimulus in the environment is judged as dangerous. It is also associated with the tendency to perform protective actions. Although fear involves these multiple systems, self-report may be the best single indicator because it captures subjective experience, which is a summary of the cross-system activity (Moors, 2009; Rogers, 1983).

The Drive Model(s)

Hovland et al. (1953) proposed “that as emotional tension increases from zero to some moderate level, acceptance tends to increase, but as emotional tension mounts to higher levels, acceptance tends to decrease” (pp. 83–84). Thus, when fear is measured after message exposure, recipients may be classified as low, medium, or high in terms of fear. Those in the medium group will exhibit the highest degree of message acceptance, while persons in the low and high groups will show relatively less persuasion. We call this DM.v1 to represent version 1 of the Drive Model. It consists of only two variables: fear intensity and persuasion. Their relationship is represented visually by the black bar in Figure 1.

Hovland et al. (1953) also offer succinct advice on what makes an appeal persuasive: “1) factors which make for successful arousal of emotional tension, and 2) factors which make for successful rehearsal and reinforcement of the communicator’s reassuring recommendations” (p. 66). In other words, the message must first cause an individual to experience an onset of fear, which is then followed by an offset of fear via “reassuring recommendations.” The theory contends that the onset portion of the curve indicates drive activation. The offset represents the extent to which the message reduces the drive and is, thereby, reinforcing. Regardless of how much faith one has in reinforcement as the underlying mechanism of persuasion, the drive model is clear in its prediction: A threat appeal will be effective to the extent that it produces a fear response that rises as the severity and susceptibility of the threat is explained, then falls as the efficacy of the response action is addressed. From this perspective, the functional form of the relationship between fear and persuasion is best described as an inverted-U curve. This describes an over-time process that takes place within individuals. We call this DM.v2 and present it graphically in Figure 2. It is different from the DM.v1 in that it describes intra-individual relationships, not inter-individual associations. In addition, it is made up of three variables: fear intensity, time, and persuasion. It predicts that when fear and time combine to form an inverted-U, then that pattern will be persuasive. If the threat appeal first increases and then successfully decreases fear, individuals tend to accept the recommendation advocated by the message. By implication, other patterns will not produce the same effect.

Even though both versions of the drive model predict curvilinear effects, they are distinguishable because the curves are constructed of different variables. Just as the relationship between body mass and life expectancy can reverse when assessed between versus within species, so might the association between fear and persuasion be different at different levels of analysis.

Current Empirical Knowledge

The typical threat appeal investigation is an experiment that exposes participants to a high versus low threat message, then gathers data on perceptions of the message, fear, and some form of message acceptance. Following the logic of DM.v1, many studies have tested for linear and curvilinear effects of threat intensity on attitude, intention, or behavior. Beginning with Boster and Mongeau (1984), several meta-analyses provide useful summaries of the threat appeals literature. They generally agree on two points: The functional form of the

threat-persuasion relationship is (a) linear, (b) not curvilinear (Mongeau, 1998; Sutton, 1982; Witte & Allen, 2000; cf., Tannenbaum, Hepler, Zimmerman, Saul, Jacobs, Wilson, & Albarracin, 2015).

One notable feature of the meta-analyses is their treatment of message condition as the independent variable. Using our terminology, their analyses were conducted such that a message feature – threat intensity – predicted message acceptance. Frequently, however, writers have not been precise in describing this relationship. As one illustration, Witte and Allen (2000) asserted that their meta-analysis “... suggests that the stronger the fear aroused by the fear appeal, the more persuasive it is” (p. 601). This statement seems to refer to the association between emotion and opinion change. But, the evidence following it indicates otherwise: “For example, the fear manipulation-attitude correlation was .21 in Boster and Mongeau,⁸ .20 in Mongeau,⁹ and .14 in this study” (p. 601). Because threat is not the same variable as fear, the papers provide no direct test of the notion that fear is curvilinearly related to persuasion. Still, that fact has proven no impediment to concluding that fear and persuasion are linearly, not curvilinearly, related. Part of the problem is linguistic slippage: *Fear appeal* was often used to mean different things: (a) a message with certain properties, (b) a message intended to produce perceived threat and/or fear, and (c) a message that actually produced fear. Conclusions were drawn about the operation of fear, when, in reality, only threat had been assessed. We use the amalgam term *threat/fear* to describe the assumption that threat and fear have an identity relationship.

The gray bar in Figure 1 summarizes the results of the meta-analyses that report a linear threat/fear-persuasion relationship. As with the primary studies that comprised their input, the X axis displays the threat conditions or, given the assumption of isomorphism, the fear scores that were measured once after message exposure. There is variation on that axis because people were assigned to different conditions, they experienced more threat, and were more frightened than people in other conditions. The Y axis, labeled persuasion, refers to attitudes, intentions, and behaviors. There is variation on that axis because some people were more persuaded than others. The meta-analyses generally concluded that their data showed evidence of a linear relationship, but no indication of a curvilinear relationship. Yet, there is an important limitation to that conclusion: Because the variation in the independent and dependent variables is between-persons, the data provide only a test of DM.v1. This holds whether the predictor is threat (the condition) or fear (the experience). It is impossible to draw any conclusions about DM.v2 because the primary studies on which the meta-analyses are based did not measure either perceived threat or experienced fear during message processing. Consequently, we know a good deal about the threat/fear-persuasion relationship in between-persons data and almost nothing about it in within-persons data.

Predictions Regarding the Form of the Fear-Persuasion Relationship

DM.v1 predicts a curvilinear association between fear and persuasion in between-subjects data (i.e., Hovland et al. 1953, did distinguish between threat and fear). Yet, if we assume a close relationship between threat and fear, as many later writers did, then this prediction fails (Boster & Mongeau, 1984; Sutton, 1982; Tannenbaum, 2015; Witte & Allen, 2000). As noted, this conclusion is based in part on the assumption that threat and fear are effectively

isomorphic. A stronger test of the original DM.v1 hypothesis could be achieved by directly examining the relationship between fear and persuasion. That is, self-reports of fear can be treated as the independent variable, rather than threat condition. Given past results, we should anticipate that when threat/fear and persuasion are studied across persons the functional form will be linear. This expectation is more accurately characterized as a prediction rather than a proper hypothesis due to its grounding in data rather than theory. That said, we anticipated that:

H1: The between-persons association between fear and persuasion is (a) positive and linear, not (b) curvilinear.

DM.v2 asserts the existence of a curvilinear relationship when fear is measured at multiple times during message processing. There are a handful of recent studies that have tested for this association and they uniformly support the DM.v2 prediction (Dillard, Li, Mieczkowski, Yang, & Shen, 2016; Mieczkowski, Dillard, & Shen, 2016; Shen & Coles, 2015; Shen & Dillard, 2014). Thus, we expected that:

H2: Change in fear during message processing is positively associated with persuasion when that change approximates an inverted-U curve.

Context and Advocacy: Screening for Colorectal Cancer

Colorectal cancer was chosen as the context for the study, in part, because of the frequency and severity of the disease. Worldwide, colorectal cancers are the third most common type of cancer (Ferlay, Bray, Pisani, & Parkin, 2004). The National Cancer Institute estimates that over 50,000 people in the U.S. will die from colorectal cancer in 2014 (National Cancer Institute, n.d.-a). Hence, this is a consequential issue.

Another reason to consider colorectal cancer is its preventability. In a study of the United States and Europe, the survival rate was 66% during the period 2000–2002 (Verdecchia et al., 2007). Likelihood of survival is increased by early detection (Ransohoff, 2009) and screening is recommended for persons 50 years of age and older (Centers for Disease Control and Prevention, n.d.). Several different methods of screening are available including fecal occult blood test and sigmoidoscopy. However, colonoscopy is considered the most effective of the available options because it enables inspection of the entire length of the colon. Following these recommendations, we designed a message that advocated obtaining a colonoscopy for persons age 50 and older. To ensure that prior screening behavior did not influence intention, we sampled persons aged 39–49 who had not previously had any sort of screening for colorectal cancer.

Method

Participants

Participants were a geographically diverse group of U.S. residents recruited by Qualtrics via a national paid opt-in online survey panel that consisted of roughly equal numbers of males and females. Individuals were eliminated before they took the survey if they were outside

the age range of 39–49, had been diagnosed with colorectal cancer prior to the survey, or had previously been screened for colorectal cancer.

In the final sample ($N = 259$), 46% of participants were male and 54% were female, ranging in age from 39 to 49 years old ($M = 43.8$, $SD = 3.1$). Eighty percent of the participants identified as white, 9% as black or African American, 7% as Asian or Pacific Islander, 5% as Hispanic, 2% as Native American or American Indian, and 2% as other without specifying their ethnicity. Because the subsamples for non-white ethnicities were so small, subsequent analyses utilized a binary variable (white vs. non-white).

Statistical Power

Given that the different forms of the fear-persuasion association were to be modeled as the effect of one variable on another, we estimated power for a bivariate relationship. Assuming $N = 250$ and $\alpha = .05$ (two-tailed) our study possessed power of .35, .89, and $>.99$ for small ($r = .10$), medium ($r = .30$), and large ($r = .50$) effects respectively. The corresponding values for one-tailed tests were .47, .94, and $>.99$. Hence, the study was well-powered to detect medium or larger effects, but less likely find small effects.

Procedure

Data were gathered online. In the first portion of the research, participants responded to a series of demographic questions. They then reported on their baseline level of fear (t_0) and read the message. The message was divided into four components and respondents gave an estimate of their fear level following each component (i.e., fear at t_1 to t_4). After completing the message they provided their judgments of message effectiveness and behavioral intention. Their overall, post-message level of fear (t_5) in response to the message was measured at the end of the questionnaire. On average, participants took 17 minutes to read the message and complete the survey.

Message

The message was presented in PowerPoint slides composed of text and images. It consisted of four components: susceptibility, severity, response efficacy, and self-efficacy (see Table 1 for more detail). The entire message is available at https://www.dropbox.com/s/npbefqo5vimpip6/Dillard%2C%20Li%2C%20%26%20Huang_HC_Message.docx?dl=0.

Measures

Fear.—To minimize respondent fatigue, only two items drawn from previous research - *fearful* and *afraid* – were used to assess participants' fear response (Meczowski et al., 2016). A score for each participant was obtained using the average of these items at each time of measurement. The response scale was anchored at 0 = *none of this feeling* and 4 = *a great deal of this feeling*. The measure was repeated at six separate times in the survey. The item stems were (t_0) *Please mark the response that best represents how you feel right now* and (t_1 to t_4) *How did Part I / II / III / IV of the message make you feel?* Following the message (t_5) participants were asked *Overall, how did the message make you feel?* The first five measures provided data for the within-person analyses, whereas the post-message t_5 measure mimicked earlier between-person designs. Descriptive statistics for this and other

measures are given in Table 2. Because one reviewer expressed concerns about the validity of the question wording, we conducted a test to evaluate that potential problem (see Appendix).

Perceived threat.—Six 7-point Likert items ranging from 1 = *strongly disagree* to 7 = *strongly agree* were used to assess perceptions of severity and susceptibility of colon cancer. Both scales used three items to measure severity (e.g., “*I believe colorectal cancer is severe*”) and susceptibility (e.g., “*There’s a chance that I could contract colorectal cancer*”). Perceived threat and subsequent measures were taken after participants had read the entire threat appeal. These and subsequent items were administered after the message.

Perceived efficacy.—Three items (e.g., “*I am confident in my ability to get screened for colorectal cancer*”) were used to assess self-efficacy and another three to measure response efficacy (e.g., “*Getting a colonoscopy is a good way to protect myself against colorectal cancer*”).

Behavioral Intention.—Intention to comply with the advocacy was measured by a single item that asked participants to evaluate the likelihood that they would *Get screened for colorectal cancer*. The 11-point response scale ranged from 1 = 0% to 11 = 100% with anchors at 10-unit intervals.

Plan for Analysis

After inspecting the distributional characteristics of individual items, we tested the measurement model using confirmatory factor analysis. The between-subject analyses were carried out via regression analysis. For the within-subjects data, we used latent basis modeling to represent the fear response data (Little, 2013). After fitting the curve, we added behavioral intention to the model to test the effect of the curve on persuasion.

Results

Measurement Model

A second-order confirmatory factor analysis was conducted using AMOS 22.0. It included the message judgment measures, fear at t_0 , t_1 , t_2 , t_3 , and t_4 , and behavioral intention. A second order latent fear term was created, with fear at t_0 through t_4 being first-order factors. On the advice of Kline (2011, p. 307), the error terms of adjacent first-order fear variables were allowed to correlate. Only the second-order fear term was allowed to correlate with other latent terms. The measurement model produced fit statistics as follows: $\chi^2(207) = 392.27$, $p < .001$, $\chi^2/df = 1.90$, TLI = .96, RMSEA = .059 (90% CI = .050 – .068), PCLOSE = .051. Following the standards of fit suggested by Hu and Bentler (1998, 1999), we concluded that model fit was satisfactory. For the most part, standardized factor loadings were high: fear (.83-.98), severity (.71-.85), susceptibility (.70-.91), response efficacy (.83-.95), and self-efficacy (.85-.89).

Input Matrix

For the SEM analyses, we created an input matrix of partial covariances that controlled for age, sex, and ethnicity (white vs. non-white) (Table 2). These same variables were controlled for in the regression analyses.

Message Judgments

Inspection of the means on the message judgment measures confirmed that the message was perceived as high on all four components: severity ($M = 6.22$), susceptibility ($M = 5.18$), response efficacy ($M = 6.28$), and self-efficacy ($M = 5.59$). All of these mean values differed from the scale midpoint at $p < .01$ or better. Overall, these results established that the message was perceived as intended and that it could be appropriately termed a threat appeal.

H1: The Fear-Persuasion Relationship in Between-Subjects Data

H1 predicted (a) a linear effect of t_5 fear on intention and (b) no effect on intention for the curvilinear component of t_5 fear. Regression analysis was used to assess these possibilities simultaneously. To create the curvilinear component, t_5 fear was mean-centered, then squared. Next, the mean-centered main effect term and corresponding quadratic term were forced into a regression equation that predicted intention to obtain a colonoscopy. Table 3 displays the results. Given that the linear term for fear was positive and significant, H1a was supported. Because the quadratic term was nonsignificant, H1b received no support. Given high statistical power, we conclude that there was a good chance that our study may have missed a small effect, but that we can be confident in rejecting the possibility of medium or large effect.

Establishing the Shape of the Growth Curve

A valid test of the within-person curvilinear hypothesis required that several conditions be met (Meczkowski et al., 2016). For one, it was necessary that a curve be present in the data. As a first pass at assessing this criterion, we plotted the means and standard errors for fear at t_0 through t_4 (Figure 3). Both parameters were small at t_0 because most people are not normally in a state of fright. This may be understood as a floor effect. At t_2 respondents had just been exposed to both minor parts of the hazard segment of the message, that is, susceptibility and severity. Relative to t_0 , mean fear increased and, due to variation in the degree of perceived threat, so did the SD. At t_4 , participants had read both parts of the action component, which greatly decreased mean fear and correspondingly constrained the SD. The overall pattern may be viewed as evidence of the effectiveness of the manipulation. As intended, the means show an inverted-U pattern.

The next step involved fitting a structural model to the data that represented the curve. As discussed by Little (2013), the latent basis model achieves this aim with two latent variables: level and shape. For the level variable, each of the fear indicators was set at 1. This defines the model intercept as the mean of t_0 . For the shape variable, the t_0 fear indicator was set at 0 and the t_4 indicator was set at 1. These values have the effect of scaling the paths t_1 through t_3 relative to the endpoints of the curve.

Although the initial model produced poor fit statistics, subsequent analyses suggested that fit could be improved by allowing a correlation between error terms 1 and 4. Given that participants provided 10 judgments ($= 2 \text{ items} \times 5 \text{ measurements}$) on the same scales in relatively short period of time, it seemed plausible that item specific error, transient error, or a combination of the two were responsible for the correlated errors (Schmidt & Hunter, 1999). This interpretation was consistent with the observation that our previous studies, which measured fear at only three points in time, did not require correlated errors (Mieczkowski et al., 2016; Shen & Dillard, 2014). When we modeled these associations, the result fit the data reasonably well: $\chi^2(10) = 22.38$, $p = .01$, $\chi^2/df = 2.23$, TLI = .97, RMSEA = .069 (90% CI = .030/.108), and PCLOSE = .17. Figure 4 presents the unstandardized solution (it also includes a test of H2, which is discussed below). As can be seen, the pattern of weights for shape corresponds with the curve depicted in Figure 3. Jointly, these decisions and outcomes met all of the necessary conditions to test H2.

H2: The Fear-Persuasion Relationship in Within-Subjects Data

To evaluate the impact of the fear curve on persuasion (H2), we added behavioral intention to the model in Figure 4. The resulting model yielded $\chi^2(9) = 21.70$, $p = .01$, $\chi^2/df = 2.41$, TLI = .97, RMSEA = .074 (90% CI = .034/.114), and PCLOSE = .14. Because these results indicated satisfactory fit (Hu & Bentler, 1998; 1999), we proceeded to interpret the results. For testing H2, the key feature of the model was the path coefficient from shape to intention. Given a standardized coefficient of .37, $p = .008$, we concluded that H2 was supported.

Discussion

Drive Models

Because our results showed no sign of a curvilinear effect in inter-individual data, we saw no support for the original DM.v1 prediction. Rather, we found the linear association that is common to between-subjects investigations (that assume a one-to-one relationship between threat and fear). One relatively novel feature of our results is that linearity was observed in self-report indices of fear rather than threat as an experimental condition. Despite this difference, the relationship is compatible with meta-analyses of between-person studies, which also report a linear association.

The within-person results were compatible with DM.v2, the intra-individual version of Hovland et al.'s (1953) drive model that predicted a curvilinear relationship between fear over time and persuasion. The current study is not the first investigation to provide evidence consistent with DM.v2, but it is one of only a very small number to do so. This is not because many projects have tested for the overtime inverted-U and only some of them have produced data consistent with the prediction. Rather, just a few investigations have examined the relationship using an appropriate design and analytic method, all of which produced results consistent with DM.v2 (Dillard et al., 2016; Mieczkowski et al., 2016; Shen & Coles, 2015; Shen & Dillard, 2014). All available evidence indicates that the within-person curvilinear association is robust.

The fact that we were able to derive two distinct models from a single theory might be interpreted to mean that the theory is a rich source of ideas. To do so would be a mistake. DM.v1 and v2 are themselves different theories. That their conflation has gone unnoticed for such a long time has proven to be a hindrance to our understanding of threat appeals. Indeed, any theory that houses two unequivocally different models without identifying them as such fails to meet a necessary standard of conceptual precision.

Comparison with Other Theories of Threat Appeals

DM.v2 locates fear as the central explanatory mechanism for understanding the effects of threat appeals. This is a radical departure from other theories of threat appeals. For instance, cognitive theories, which focus on how individuals think rather than feel, have contributed to our understanding of threat appeals in important ways. With help from Beck and Frankel (1981), Rogers' (1983) Protection Motivation Theory (PMT) specified the four content components of threat appeals. The stage model illuminated the cognitive biases that can occur during message processing (de Hoog, Stroebe, & de Wit, 2005). Yet, from the current perspective, the role that these theories assign to fear is greatly understated. DM.v2 is different from the stage model because it includes fear whereas the stage model does not. It is different from PMT in that it accords fear a theoretically substantive role, which PMT does not.

A different position with respect to fear can be seen in the Parallel Response Model (Leventhal, 1970) and its descendant, the Extended Parallel Processing Model (EPPM) (Witte, 1992). Both propose that fear directly instigates defense mechanisms whose function is to down-regulate the experience of fear (Witte, 1992, Proposition 7). It is expected that these defense mechanisms also produce counter-persuasive effects. By contrast, DM.v2 suggests that the fear curve is persuasive. Only fear that is left unresolved by the message -- *residual fear* -- is implicated in the production of defensive reactions. Thus, DM.v2 and the post-drive theories differ on the role of fear as a cause of defensive reactions.

Third, the EPPM, and its predecessor the PMT, contend that when perceived efficacy is high, fear exists in a reciprocal relationship with perceived threat: Perceived threat amplifies fear and fear amplifies perceived threat. This might be true, but such a claim suggests the need to study two dynamic processes. One is overall message processing, which occurs at the rate of message presentation. The other is a much faster subprocess that cycles during message processing. Neither PMT nor EPPM specify the rate of change, when or how the cycling stops, or a method for studying multiple, simultaneous processes that take place at different speeds. In contrast, DM.v2 proposes only a single process that unfolds at the rate of message consumption. Thus, DM.v2 is notably different from EPPM and PMT. The future may require that complexities are introduced into the model. But, in light of the fact that it has taken over 60 years to test the dynamic version of drive theory, it may be prudent to limit our attention to a single process for the time being.

Implications for Message Design

Our between-subjects data showed only a linear relationship between fear and persuasion. If we ignore the ambiguity of equating threat intensity with emotional intensity (i.e., threat/

fear), then our result is identical to the findings of most previous meta-analyses (Boster & Mongeau, 1984; Sutton, 1982; Witte & Allen, 2000). Thus, on the basis of all available between-subjects data (and the one assumption), we should conclude that more threat/fear produces more persuasion. Even though Tannenbaum et al. (2015) suggest that there are diminishing returns from moderate to high levels of threat, we see no evidence that high threat causes a downturn in persuasion. Because there is no price to be paid for creating too much fear (within the constraints of ethics and reality), there is one implication for message design: Practitioners should endeavor to create messages that provoke the highest level of fear possible.¹

DM.v2 implies that to be successful, practitioners must take on a second task. Messages should not only evoke fear, but also reduce it by providing behavioral options that align with the message advocacy. This recommendation may sound familiar because it is exactly what Hovland et al. (1953, p. 64) advised. It is, however, clearly distinct from the guidance offered by the meta-analytic results.

Interpreting the Past: Planning for the Future

Given two distinct ways of studying the fear-persuasion relationship (between vs. within) and two distinct conclusions regarding the form of that association (linear vs. curvilinear), it is reasonable to wonder whether one approach should be preferred over the other. The answer is not straightforward. It might appear that the dynamic approach is superior given the idea that emotions are dynamic entities is definitional. And, the difference between the dynamic and static approaches is akin to the difference between a video and a snapshot, one of which is “obviously” better than the other. Yet, people find utility in snapshots despite the availability of video. We suggest that the two approaches are more or less serviceable depending on the aims and constraints of the research. The within-persons design should be favored for studying basic theoretical questions concerning message processing. Such questions match the speed at which individual messages are consumed.

Between-person designs possess different virtues and limitations. One ambiguity concerns the meaning of a post-message measure of fear (Mongeau, 2013). Does the post-message measure capture some part of the dynamic experience and, if so, which part? One recent investigation assessed fear prior to the message, after the hazard component, and after the action component, then used those three indices to predict the traditional post-message measure of fear (Dillard et al., 2016). Results showed that post-message fear was roughly the average of the peak (i.e., post-threat) and end (i.e., post-action) measures. This means that the post-message measure is a poor means of assessing the dynamic aspects of the fear response. It does not mean that the post-message approach is useless. Indeed, every message has an ending point, after which recipients must form some gist interpretation of their dynamic emotional experience. Between-persons designs with post-message measures of fear are useful for capturing that moment at which message processing segues into message

¹One reviewer took exception to this conclusion, noting that Witte and Allen (2000) assert that both threat and efficacy components must be strong for the message to be effective. We agree that they made this claim. But, as Mongeau (2013) explains, their conclusion does not follow from their results, which showed only main effects for threat and efficacy. And, in any case, our focus is on fear the emotion, not threat and efficacy as precursors of the emotion.

effects. This summary interpretation is what individuals take away from the message. It provides the basis for subsequent opinion and action.

Still, there is no reason to believe that persuasive outcomes remain stationary after message exposure. Individuals may be exposed to countervailing messages. Even in the absence of counter-persuasion, attitudes may oscillate as the psychological system moves toward equilibrium (Fink & Cai, 2013). To examine the processes that occur subsequent to message processing, researchers will need to use longitudinal designs that assess individuals' post-message reactions in units of seconds, minutes, days, or weeks depending on the research question.

Strengths and Limitations

One positive feature of the current project was an age-appropriate national sample that controlled for sex and ethnicity. Thus, we can generalize across some social categories, whereas the age selection criteria ensured that the message was delivered to the relevant audience (i.e., those for whom a colonoscopy would soon be appropriate). Because the sample included only individuals who had not previously had a colonoscopy, we can have some confidence that prior behavior did not inflate our estimates of the message effect. However, previous exposure to the topic via media and interpersonal channels may have contributed to individuals' intention to obtain a screening in ways that we did not assess. A strength of the investigation was its real-world topic and arguments drawn from genuinely expert health sources. A corresponding limitation derives from the fact that we utilized only one message. Finally, we made no effort to study defensive reactions, which may have caused us to underestimate the true impact of the inverted-U.

Conclusions

The major contributions of this study are (a) the identification of two distinct versions of drive theory and (b) the demonstration that the functional form of the fear-persuasion relationship is linear for one version of the theory and curvilinear for the other. Both points underscore the need for development of a theory of threat appeals that explicitly embraces the dynamic properties of the central mediating variable—fear—and moves us beyond the conceptual constraints of contemporary between-subjects frameworks.

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Appendix: Does Question Wording Alter the Fear Response Data?

One reviewer expressed concern about the wording of the emotion items. On his/her view, the query "How did Part I/II/III/IV of the message make you feel?" is unlikely to produce valid data because it asks about fear in response to specific stimulus rather than respondents' experience of fear generally. By this logic, the efficacy information in the message will be judged as less fear inducing than severity information in the message, but those judgments

may or may not correspond with how the recipient is actually feeling. If someone in a state of terror were asked how M&Ms make them feel, they would report low fear despite their overall condition. From this perspective, what is needed is a question that asks about feelings alone and does not instruct respondents to focus on a cause. This perspective is literalist because it assumes that respondents will interpret the sentence meaning of the question without regard to context.

A contrasting position can be developed from work on language pragmatics. According to Grice (1975), when individuals interact they rely on context to formulate a cooperative questions and answers. Cooperation means providing a response that is truthful, relevant, and not overly detailed or too superficial. And, context is created by circumstances combined with previous interaction. From this perspective, asking “How do you feel at the moment?” is functionally equivalent to asking “How did Part I/II/III/IV make you feel?” because context informs the hearer of the speaker’s meaning (i.e., the researcher’s meaning). To see this more clearly, it helps to adopt the viewpoint of the research participant. First, participants are aware, via experimental instructions, that the research is intended to evaluate the message and that their task is to provide meaningful descriptions of their reactions to it. When they are asked “How do you feel?” *prior* to the message, the question is asking about their current emotional state. They use contextual information to infer that the speaker/research does not mean how they felt yesterday or might feel tomorrow. If they are asked the non-specific question “How do you feel?” *after* reading Part I of the message, the researcher must be asking about what has transpired since that question was last asked. The researcher cannot sensibly be asking anything else. Unless the researcher is deranged, or violating the cooperative principle for other reason, the only plausible inference is that s/he is seeking information about the effect of the message. Hence, the pragmatic meaning of “How do you feel?” is equivalent to “How did Part I make you feel?” In short, the literalist position predicts differences as a function of wording, whereas the pragmatics position anticipates no differences.

Sample

A sample of participants aged 39 to 49 who had never been checked for colorectal cancer was recruited from a Qualtrics panel. After removing respondents who provided straight-line responses, 51 participants were retained, with 27 in the original-wording condition ($M_{\text{age}} = 44$; 56% females; 85% white) and 24 in the changed-wording condition ($M_{\text{age}} = 45$; 63% females; 75% white).

Procedures and Measures

Apart from question wording, the procedures were identical to those in the main study. Participants in the *original wording* condition were asked *How did Part I / II / III / IV of the message make you feel?* Participants in the *changed wording* condition were asked *How do you feel at the moment?* In both conditions, the pre-message question was *Please mark the response that best represents how you feel right now.*

Statistical Power

We estimated power for an independent sample t-test in R. With $n_1 = 27$, $n_2 = 24$, and $\alpha = .05$ (two-tailed), our study possessed power of .11, .42, and .80 for Cohen's (1987) definitions of small ($d = .20$), medium ($d = .50$), and large ($d = .80$) effects respectively. Hence, the study was able to detect large effects with confidence.

Results

Data were analyzed using a multivariate general linear model, which allowed us to control for the baseline fear (t_0) and the demographic variables including gender, age, and ethnicity. These are the same controls used in the main study. As Table 1 shows, the change in question wording did not lead to significant differences on any of the message-related fear responses. These results were consistent with the pragmatic position and inconsistent with the literalist position. Significance tests aside, one might wish to focus on the pattern of means. Indeed, every mean in the changed wording condition is lower than the corresponding mean in the original wording condition. If the literalist perspective is correct, the reverse pattern should hold for t_3 and t_4 . Hence, pattern too favors the pragmatic position over the literalist position.

Table 1.

Results of the multivariate general linear model

	Original Wording Mean (<i>SD</i>)	Changed Wording Mean (<i>SD</i>)	<i>F</i> (1, 44)	<i>p</i>
Fear t_1	.81 (.89)	.54 (.88)	1.10	.30
Fear t_2	1.24 (1.33)	1.02 (1.05)	.21	.65
Fear t_3	1.09 (1.28)	.52 (.65)	2.12	.15
Fear t_4	.69 (1.08)	.46 (.75)	.38	.54

Note: *F* and *p* values refer to the multivariate general linear model with wording type being independent variable, and fear t_0 , age, gender, and ethnicity of participants serving as covariates.

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Figure 1.

Linear and Curvilinear Associations between Fear Arousal and Persuasion in Between-Persons Data.

Note. The conflation of threat and fear on the X-axis is consistent with most of the meta-analyses, which have implicitly assumed a one-to-one association between the two.

Figure 2.
An Inverted-U Pattern of Within-Person Fear Response to a Threat Appeal

Figure 3.

Fear Intensity Means and Standard Errors for the Colonoscopy Message over Five Time Points.

Note. Fear was scaled such that 0 = *None of this feeling* and 4 = *A great deal of this feeling*.

Figure 4.

The Final Latent Basis Model with Intention to Screen as the Outcome Variable.

Note. Coefficients are unstandardized. Correlations among errors are not shown.

Table 1

Description of the Message

Message Component	Average Reading Time	Content
Susceptibility	79s	Text: Basic information about colorectal cancer including frequency of diagnosis and death. Imagery: Drawing of colon and rectum. Bar charts of diagnoses and deaths data.
Severity	76s	Text: Development of symptoms generally and at early, later, and final stages specifically. Imagery: Drawings of cancer development at stages 0 to IV; photograph of stage 0 polyp inside colon, malignant colorectal cancer in early stage, later stage, and autopsy of a final-stage patient.
Response Efficacy	40s	Text: Definition and description of colonoscopy including effectiveness at reducing risk of colorectal cancer. Imagery: Drawing of person undergoing the colonoscopy procedure.
Self-Efficacy	54s	Text: Story of a woman named Denise. How colonoscopy saved her life and details of the screening procedure. Imagery: An elderly man smiling at his doctor.

Table 2

Partial Correlations and Descriptive Statistics Controlling for Age, Gender, and Ethnicity

Variable	1	2	3	4	5	6	7	8	9	10	11
1.Severity	.84										
2.Susceptibility	.49***	.86									
3.Self-Efficacy	.32***	.27***	.91								
4.Response Efficacy	.64***	.42***	.45**	.90							
5.Fear0	-.08	.01	-.15*	-.16**	.94						
6.Fear1	.13*	.28***	.03	.12	.42***	.95					
7.Fear2	.20	.28***	.11	.21**	.38***	.83***	.97				
8.Fear3	.09	.18**	-.09	.04	.41***	.74***	.75***	.93			
9.Fear4	.00	.08	-.10	-.03	.51***	.56***	.58***	.77***	.95		
10.Fear5	.20**	.24***	.03	.18**	.42***	.70***	.77***	.66***	.59***	.95	
11.Intention	.35***	.38***	.54***	.50***	-.12	.20**	.26***	.08	-.03	.20**	-
<i>M</i>	6.22	5.18	6.28	5.59	0.37	0.85	1.23	0.67	0.43	0.95	8.60
<i>Range</i>	(1-7)	(1-7)	(1-7)	(1-7)	(0-4)	(0-4)	(0-4)	(0-4)	(0-4)	(0-4)	(1-11)
<i>SD</i>	0.94	1.33	1.01	1.36	0.77	1.00	1.23	0.97	0.77	1.11	2.79

Note. *N* = 259; *df* = 254.* *p* < .05.** *p* < .01.*** *p* < .001.

Cronbach's alpha values are in the diagonal.

Table 3

Predictors of Intention in Between-subjects Data

Predictors	β	R
Block 1		
Age	-.01	
Sex (female = 1)	.03	
Ethnicity (white = 1)	-.13 [*]	.13
Block 2		
t ₅ Fear	.35 ⁺	
t ₅ Fear ²	-.16	.24 ^{**}

⁺
 $p = .05$.^{*}
 $p < .05$.^{**}
 $p < .01$.