Have no fear : how individuals differing in uncertainty avoidance, anxiety, and chance belief process health risk messages

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Abstract

In a sample of Belgian and Irish participants, we examine the impact of individual differences in uncertainty avoidance, anxiety, and chance belief on the processing of health risk messages. We test a model based on the extended parallel processing model (EPPM) using multigroup comparisons in structural equation modeling (SEM). Groups differing in chance belief process health risk messages in a similar way. Perceived efficacy determines message outcomes more strongly for low-anxiety and low-uncertainty-avoidance groups. Perceived threat has a stronger impact on fear for high-anxiety individuals, while it has a stronger impact on message acceptance for low-anxiety individuals. Health campaigns often use fear appeals to persuade the audience to take on a desired action. Fear appeals are “persuasive messages designed to scare people by describing the terrible things that will happen to them if they do not do what the message recommends” (Witte 1992, p. 329). After nearly six decades of academic research, however, the evidence on how fear appeals work is still mixed (Morales, Wu, and Fitzsimons 2012; Peters, Ruiter, and Kok 2013). To contribute to this debate, the main purpose of this article is to examine how differences in responses to a health-related fear appeal can be explained by audience characteristics.
Health campaigns often use fear appeals to persuade the audience to take on a desired action. Fear appeals are “persuasive messages designed to scare people by describing the terrible things that will happen to them if they do not do what the message recommends” (Witte 1992, p. 329). After nearly six decades of academic research, however, the evidence on how fear appeals work is still mixed (Morales, Wu, and Fitzsimons 2012; Peters, Ruiter, and Kok 2013). To contribute to this debate, the main purpose of this article is to examine how differences in responses to a health-related fear appeal can be explained by audience characteristics.

One of the predominant theories in the fear appeal literature is the extended parallel processing model (EPPM), which identifies three central constructs in the processing of fear appeals: perceived threat, perceived efficacy, and evoked fear (Witte 1992). Health risk messages, like other fear appeals, will generally consist of two parts: a threat message, plus a recommendation: what to do to avoid (the consequences of) the threat. The idea is that threat will evoke fear, which will motivate recipients of the message to follow the recommendation (Witte 1992). One of the relationships that is still unclear, though, is whether perceived threat relates to message responses directly or indirectly through evoked fear (Popova 2012). Moreover, the relative importance of threat and fear versus perceived efficacy for message outcomes is also unclear. To increase the effectiveness of health risk messages, organizations would benefit from knowing how both the threat (directly or through fear) and the recommendation influence recipients’ processing of the message and behavioral intentions so that they could better design their messages. The model in the present study tests the effect of perceived efficacy and direct and indirect effects (through evoked fear) of perceived threat on message outcomes.

Recently, there has been a growing awareness that, to make health communication as effective as possible, researchers and practitioners should consider the cultural and personal values of the target audience (Gallopel-Morvan et al. 2011; Hastall and Knobloch-Westerwick 2013). To date, however, only a limited number of studies have addressed the role of cultural and individual difference variables in explaining the effects of fear appeals (Ruiter et al. 2004). Previous research has focused on the target of the threat (individual or group) and whether responses were influenced by collectivism (Jansen, Van Baal, and Bouwmans 2006; Lee and Park 2012; Murray-Johnson et al. 2001). The present study investigates the influence of uncertainty avoidance, anxiety in general life, and chance belief locus of control. Uncertainty avoidance is the extent to which members of a culture feel threatened by uncertain or unknown situations (Hofstede 2001). As fear has been described as a state of maximum uncertainty (Morales, Wu, and Fitzsimons 2012), uncertainty avoidance is a prime candidate for investigation in relation to fear appeal processing (Reardon et al. 2006; Vincent and Dubinsky 2005). We also selected two individual traits that are conceptually related to uncertainty avoidance (Hofstede 2001). Anxiety in general life measures the fear and stress that people feel in everyday life (Maheswaran and Meyers-Levy 1990). Chance belief is a dimension of health locus of control and indicates to what degree individuals attributes their health to external environmental circumstances (Wallston, Wallston, and DeVellis 1978). By testing the relative importance of perceived threat, perceived efficacy, and fear among groups differing in these characteristics, we obtain a more nuanced view of how individuals process fear appeals and what determines their effectiveness.

Based on the EPPM, we distinguish between two message outcomes. The first is message acceptance, which represents the intention to adopt the recommended behavior (Popova 2012). At the same time, fear appeals can also elicit reactance, meaning individuals may tend to minimize the message and perceive its intent as manipulative (Witte 1994). Most prior research focuses solely on acceptance (De Pelsmacker, Cauberghe, and Dens 2011; Ruiter, Kok, et al. 2001). Empirical evidence, however, suggests defensive and health-conducive reactions can sometimes co-occur (Croyle, Sun, and Louie 1993; van ‘t Riet and Ruiter 2013). Therefore, we examine message acceptance and message reactance as separate outcomes to achieve a more comprehensive view of how individuals process fear appeals.
A better understanding of how individuals with different characteristics process fear appeals can help health professionals, public policy officials, and advertisers increase the effectiveness of health risk messages for diverse target groups. In addition, this study contributes to the academic understanding of how fear appeals work by examining the relationship between perceived threat and fear, studying both message acceptance and reactance, and testing three relevant moderators of fear appeal processing.

THEORETICAL FRAMEWORK AND HYPOTHESES

Conceptual Framework

The conceptual model we test in this article is presented in Figure 1. The model is based on the EPPM, which identifies three central constructs in the processing of fear appeals: perceived threat, perceived efficacy, and evoked fear (Witte 1992). Perceived threat relates to the perception or cognition that a threat exists. It consists of two components: perceived severity, or an individual's beliefs about the seriousness of the threat (e.g., “AIDS leads to death”), and perceived susceptibility, an individual's beliefs about his or her chances of experiencing the threat (e.g., “I'm at risk for AIDS because I share needles while using intravenous drugs”) (Witte 1992). Perceived efficacy refers to cognitions about efficacy and also consists of two dimensions. Perceived response efficacy is an individual's beliefs as to whether a response effectively prevents the threat (e.g., “I believe condoms prevent HIV contraction”), while perceived self-efficacy refers to an individual's belief in his or her ability to perform the recommended response (e.g., “I can easily use condoms to prevent HIV contraction”) (Witte 1992). Fear is a negatively valenced emotional reaction (e.g., “I am scared”) and is elicited by a threat that is perceived to be significant and personally relevant (Witte 1994). In other words, the EPPM considers perceived threat (but not efficacy) as an antecedent to fear (Witte 1994). Ruiter, Abraham, and Kok (2001) indicated that one reason for inconsistency in the results of the EPPM could be a lack of clarity concerning the relationship between threat and fear. Because threat manipulations prompt fear, it is difficult to ascertain whether threat perception or the emotion of fear is responsible for the observed effects on message processing. That is why, in the present study, both processes are modeled: we anticipate that perceived threat has a direct effect on message outcomes, as well as an indirect effect through evoked fear. Perceived efficacy, on the other hand, is directly related to message outcomes.

FIG. 1. Conceptual model.
We distinguish between two message outcomes. The first is message acceptance, which represents the intention to adopt the recommended behavior (Witte 1994). For example, Cauberghe and colleagues (2009) showed that, in response to an antispeeding fear appeal, viewers’ perceived threat, perceived efficacy, and evoked fear independently influenced their attitude toward speeding and intention not to speed. In fact, most prior empirical fear appeal research has focused solely on message acceptance (e.g., De Pelsmacker, Cauberghe, and Dens 2011; Ruiter, Kok, et al. 2001).

At the same time, people often develop counterarguments to fear appeals in an attempt to resist the message. The degree to which individuals minimize the message and perceive its intent as manipulative is labeled as message reactance (Witte 1994). For example, Earl and Albarracín (2007) found that fear-inducing arguments about HIV actually decreased knowledge about HIV and AIDS and condom use.

The EPPM indicates that, conceptually, message acceptance and message reactance are two inversely related outcomes (i.e., a higher degree of reactance in response to a message would simultaneously imply a lower degree of acceptance, and vice versa) (Witte and Allen 2000). Papers that focus solely on acceptance also implicitly assume this. However, other empirical studies have found that message acceptance and reactance are two separate mechanisms that can take place concurrently (Croyle, Sun, and Louie 1993; van ‘t Riet and Ruiter 2013). For instance, Croyle, Sun, and Louie (1993) found that abnormal cholesterol test results lead to message minimization for borderline-high subjects (reactance), but this group was at the same time more likely to seek information and plan modification to their lifestyle (acceptance). Therefore, we examine message acceptance and message reactance as separate outcomes.

First, in line with most other fear appeal studies, we hypothesize that an increase in perceived efficacy increases the likelihood of adaptive behavior and decreases the likelihood of reacting to the message recommendation (Cauberghe et al. 2009; Witte and Allen 2000).

**H1a:** There is a positive relationship between perceived efficacy and message acceptance.

**H1b:** There is a negative relationship between perceived efficacy and message reactance.

Second, prior studies show that a higher level of perceived threat leads to higher levels of fear (Witte 1994).

**H2:** There is a positive relationship between perceived threat and evoked fear.
In previous literature, there is contradicting evidence on the effects of perceived threat and evoked fear on either message acceptance or reactance (Albarracín et al. 2005; Witte 1994; Witte and Allen 2000). Witte and Allen (2000) found that fear and threat have a positive effect on message acceptance. However, other studies indicate a negative effect of fear and threat on message acceptance (Albarracín et al. 2005; Earl and Albarracín 2007; Peters, Ruiter, and Kok 2013). Therefore, we do not formulate an explicit hypothesis on the main effects of perceived threat and evoked fear. Importantly, we expect that the nature and the relative importance of the effects of fear, threat, and efficacy on message outcomes depend on cultural and personal characteristics.

As mentioned, a number of authors have already argued that health communication is more effective when it is adapted to the target audience (Hastall and Knobloch-Westerwick 2013). In the present study, we focus on uncertainty avoidance and two related individual differences: anxiety in general life and chance belief. Uncertainty avoidance reflects both a chronic level of fear and control belief in a person or society (Hofstede 2001). Hofstede (2001) argues that high uncertainty-avoidant individuals are expected to feel more anxiety throughout their lives than low uncertainty-avoidant individuals. High uncertainty-avoidant individuals also feel more powerless toward external forces (Hofstede 2001), including in the domain of health. As such, uncertainty avoidance and chance belief are positively related. Anxiety and chance belief are also associated (Burker, Phillips, and Giza 2012). In the following sections, we develop hypotheses on how these variables influence the processing of fear appeals.

**Uncertainty Avoidance**

First, we expect that mechanisms leading to acceptance of or reactance to a fear appeal message will be different in low and high uncertainty avoidance (UA) situations. Previous research has already extended the EPPM with UA-related concepts. For instance, based on Hammer's anxiety/uncertainty management theory, Witte (1993) found that, in cross-cultural encounters, individuals engage in either uncertainty control processes, which lead to adaptive outcomes, or anxiety control processes, which lead to maladaptive outcomes.

Low-UA individuals believe that they can influence their own lives, while high-UA individuals feel relatively powerless toward external forces (Hofstede 2001). As high-UA individuals generally tend to hold lower perceptions of self-efficacy (Sánchez-Franco, Martínez-López, and Martín-Velicia 2009), the efficacy measures mentioned in a fear appeal are less likely to have an effect on them. By contrast, low-UA individuals will focus more on what they can do to avert the threat, which makes perceived efficacy more important for this group. We also expect high-UA individuals to focus less on the threat part of a fear appeal than low-UA individuals, in an attempt to reduce or avoid the uncertainty induced by the threat. Gallopem-Morvan and colleagues (2011) speculated that French people could be more resistant toward the threat of new graphic tobacco warnings in comparison to Canada and the United States, because France scores higher on uncertainty avoidance, according to Hofstede's scores (2001). They did not, however, actually measure uncertainty avoidance on an individual level in their study.

Vincent and Dubinsky (2005) examined the influence of uncertainty avoidance on fear using the protection motivation model. They compared responses to a fear appeal for skin cancer between France and the United States, but found no significant differences between the two countries in evoked fear.

High-UA individuals tend to experience more anxiety and will likely experience more fear in response to a fear appeal than low-UA individuals (Hofstede 2001). As fear represents uncertainty, high-UA individuals are also more motivated to avoid such a state. Consequently, the level of fear they experience in response to a fear appeal will more strongly determine their response to the message. We thus expect that fear will have a relatively stronger impact on message outcomes for high-UA
individuals, whereas perceived efficacy and threat should have a relatively stronger impact for low-UA individuals.

**H3:** The effect of perceived efficacy on (a) message acceptance and (b) message reactance is stronger for low-uncertainty avoidance individuals than for high-uncertainty avoidance individuals.

**H4:** The effect of perceived threat on (a) message acceptance and (b) message reactance is stronger for low-uncertainty avoidance individuals than for high-uncertainty avoidance individuals.

**H5:** The effect of evoked fear on (a) message acceptance and (b) message reactance is stronger for high-uncertainty avoidance individuals than for low-uncertainty avoidance individuals.

### Anxiety in General Life

The way in which people process fear appeals has also been proposed to be affected by their general level of anxiety (Witte and Allen 2000). A lack of empirical clarity remains in the fear appeal literature on the type of fear appeal that is most effective for audiences that are already “scared” (Muthusamy, Levine, and Weber 2009). Witte and Morrison (2000) found that anxiety influences how one perceives both threat and efficacy, but that this does not influence message outcomes. Based on a meta-analysis, Witte and Allen (2000) concluded that anxiety does not influence individuals’ message acceptance in response to fear appeals. A more recent study indicated that low-anxiety individuals more easily accept a strong fear appeal message than high-anxiety persons, as the latter will be led by fear (Muthusamy, Levine, and Weber 2009).

People who are more anxious by nature tend to see themselves as being less able to perform recommended responses that will effectively avert a threat (Witte and Morrison 2000). Thus, high-anxiety individuals will be more driven by fear and will focus less on cognitive perceptions of efficacy and threat. On the contrary, low-anxiety individuals will focus on the perceptions of efficacy and threat rather than on the evoked fear. Thus, following a similar logic we used in the development of the hypotheses about uncertainty avoidance, we expect the following:

**H6:** The effect of perceived efficacy on (a) message acceptance and (b) message reactance is stronger for low-anxiety individuals than for high-anxiety individuals.

**H7:** The effect of perceived threat on (a) message acceptance and (b) message reactance is stronger for low-anxiety individuals than for high-anxiety individuals.

**H8:** The effect of evoked fear on (a) message acceptance and (b) message reactance is stronger for high-anxiety individuals than for low-anxiety individuals.

### Health Locus of Control

Health locus of control indicates individuals’ beliefs on what influences health and whether they attribute their health to their own actions (i.e., internal locus of control) or to external factors, namely environmental circumstances (i.e., chance belief locus of control) or powerful external agents such as doctors or family members (i.e., powerful other locus of control) (Wallston, Wallston, and DeVellis 1978).

There is a lot of research on health locus of control and health behavior (e.g., Grotz et al. 2011), although not in relation to the processing of fear appeal messages. For instance, Grotz and colleagues (2011) indicated that, compared to low-chance-belief individuals, high-chance-belief individuals conduct less systematic health information seeking. Similarly to what we expect for UA and anxiety in general life, we expect that high-chance-belief individuals will be driven more by evoked fear than by perceived efficacy and threat, whereas low-chance-belief individuals will focus more on perceived efficacy and threat than on evoked fear.
**H9:** The effect of perceived efficacy on (a) message acceptance and (b) message reactance is stronger for low-chance-belief individuals than for high-chance-belief individuals.

**H10:** The effect of perceived threat on (a) message acceptance and (b) message reactance is stronger for low-chance-belief individuals than for high-chance-belief individuals.

**H11:** The effect of evoked fear on (a) message acceptance and (b) message reactance is stronger for high-chance-belief individuals than for low-chance-belief individuals.

**METHOD**

**Country Selection**

Because one of the aims of the present study is to test the effects of UA on the processing of fear appeals, we collected data in Ireland and Belgium to ensure sufficient variation in UA. According to Hofstede, Belgium (both Flanders and Wallonia) scores 94/100 on the Uncertainty Avoidance Index, whereas Ireland scores 35/100 (Hofstede 2001). In the GLOBE study, UA is measured on a seven-point scale, with Ireland scoring a moderate 4.02 out of 7 (House et al. 2004), while data for Belgium were not collected. In general, we expect Belgium to score higher on UA than Ireland.

**Pretest and Stimulus Development**

The study is based on a 2 (threat: low, high) × 2 (efficacy: low, high) between-subjects experiment. We conducted a pretest (n = 30, 43% men, M_age = 30.00 years) in the Dutch-speaking part of Belgium to test the manipulations. A nonexisting health issue was chosen, namely the threat of the PSZ mosquito. Previous research has found that responses to negative uncertainty are stronger in case of unfamiliar issues and that strong fear appeals may lose their strength for familiar issues (De Pelsmacker, Cauberghe, and Dens 2011).

The pretest was conducted to ensure adequate manipulations of threat and efficacy. The perceived threat and perceived efficacy measures are the same as in the main experiment and can be found in the following section. To manipulate threat, we tested four informative messages and 10 visuals (which were combined to form the final advertisement). The two copies (M_Low = 3.52, M_High = 4.67, t (29) = 4.09, p < .001) and visuals (M_Low = 3.58, M_High = 5.97, t (29) = 6.76, p < .001) that differed most in perceived threat were selected. The threat in the message copy was manipulated by varying both the severity of the threat (“infection can lead to physical disorder and inflammations” versus “persistent infections, with the chance of amputation”) and susceptibility (“only a few victims have been diagnosed” versus “a whopping 10,000 people”). The “low threat” visual showed a mouth with a few minor inflammations, whereas the “high threat” visual showed the back of a man which contained major inflammations (see appendix for stimulus examples).

We tested five different recommendations with a substantial spread in efficacy. The two recommendations differing most in terms of perceived efficacy were selected (M_Low = 2.88, M_High = 4.39, t (29) = 6.44, p < .001). Perceived efficacy has two dimensions. Perceived response efficacy is an individual’s beliefs as to whether a response effectively prevents the threat (Witte 1992). Response efficacy thus refers to the likelihood of being able to avoid the threat by following the recommendation. Perceived self-efficacy refers to an individual's belief in his or her ability to perform the recommended response (Witte 1992). The latter thus refers to self-control abilities to prevent the threat. Our manipulation was constructed to include both dimensions. The “low efficacy” recommendation reads: “By getting at least 10 hours of sleep a night, you are less likely to be contaminated.” The “high efficacy” recommendation reads: “Drink at least half a liter of water per day
to fully protect your body.” The “low efficacy” condition reflects lower self-efficacy than the “high efficacy” condition: You have lower control over sleeping 10 hours a night than over drinking half a liter of water a day. The conditions also reflect a different response efficacy: drinking half a liter of water provides full protection, while sleeping 10 hours a day only increases the likelihood of protection. The illness caused by the PSZ mosquito in the health campaign does not exist. Consequently, in principle, drinking water is not more related to the illness than having a good night’s sleep. Both are rather general recommendations that can be good for a number of health reasons. Both recommendations were found to be equally credible ($M_{\text{Low}} = 3.07$, $M_{\text{High}} = 2.97$, $t(29) = 0.04$, $p = .703$). This indicates that a possible confound of difference in credibility can be ruled out.

To increase realism, the message also included a picture of a doctor and the logo of the World Health Organization, which were constant across conditions. The stimuli were in Dutch in Belgium and in English in Ireland. The advertising copy was translated and back-translated to ensure meaning equivalence.

**Data Collection**

For the main study, a professional market research agency collected data in the Dutch-speaking part of Belgium ($n = 207$) and in Ireland ($n = 208$). The English version of the questionnaire was translated and back-translated into Dutch by two native speakers for measurement equivalence. The samples in the two countries were not significantly different in terms of gender (Belgium: 52% male, Ireland: 45% male, chi-square (1) = 2.02, $p = .155$) and age ($M_{\text{Belgium}} = 43.79$ years, $M_{\text{Ireland}} = 43.75$ years, $t(413) = .04$, $p = .970$).

**Measures**

The measures and their reliabilities are listed in Table 1. First, the respondents were asked to report their age and gender. Second, chance belief and anxiety in general life were measured. Next, the participants were randomly exposed to one of the four advertisements. After participants had viewed the advertisement, their responses were surveyed and the results used to measure the different components of the model. Similar to Hastall and Knobloch-Westerwick (2013), perceived threat was measured by three items that indicate the severity of the threat. Perceived efficacy was measured by means of a combination of response and self-efficacy items. Message acceptance was measured as the intention to adopt the recommend behavior. Message reactance was measured by the degree to which persons derogated or minimized the message and the degree to which they perceived manipulation from the message. Evoked fear was measured by means of six items. Finally, participants indicated their UA based on the GLOBE study scale.

**TABLE 1 Measures**
The Cronbach's alpha of chance belief and GLOBE's UA scales are below 0.70, which indicates a weak internal consistency of both scales. By deleting one item in the chance belief scale, Cronbach's alpha increases to 0.72, which is acceptable (Santos 1999). Regarding the GLOBE UA scale, after the deletion of three items, we obtain a Cronbach's alpha of .71. After these modifications, the Cronbach's alphas of all constructs exceed .70 (Table 1). In subsequent analyses, we use summated scales for all constructs (mean scores across the items of each construct).

### Manipulation Checks and Correlations

First, we checked the manipulations of threat and efficacy levels. In Ireland, both the threat ($M_{\text{low}} = 4.24, M_{\text{high}} = 4.96, t(206) = 4.03, p < .001$) and the efficacy manipulation ($M_{\text{low}} = 3.19, M_{\text{high}} = 4.52, t(407) = 9.83, p < .001$) are successful. For the Belgian sample, the manipulations are also successful: perceived threat ($M_{\text{low}} = 4.29, M_{\text{high}} = 4.91, t(205) = 3.99, p < .001$) and perceived efficacy ($M_{\text{low}} = 3.19, M_{\text{high}} = 4.38, t(408) = 10.04, p < .001$).

In comparison with Ireland, Belgium scores significantly higher on UA ($M_{\text{Belgium}} = 4.26, M_{\text{Ireland}} = 3.99, t(413) = 2.36, p = .019$), anxiety in general life ($M_{\text{Belgium}} = 4.02, M_{\text{Ireland}} = 3.74, t(413) = 2.81, p < .001$), and chance belief ($M_{\text{Belgium}} = 4.11, M_{\text{Ireland}} = 3.61, t(409) = 3.91, p < .001$). Similar to Murray-Johnson and colleagues (2001), we test the hypotheses using individual scores on the measured characteristics, pooling the data from both countries.

We calculated the correlations between the moderating variables, based on the pooled Irish–Belgian sample. UA is positively correlated with anxiety in general life ($r = 0.23, p < .010$) as well as chance belief ($r = 0.21, p < .010$). The correlation between anxiety in general life and chance belief is also positive and significant ($r = 0.15, p < .010$). The moderators investigated in the present are thus related, as expected, but also sufficiently different to warrant an examination of each of them separately. The correlation between message acceptance and message reactance is $-0.19$ ($p < .010$), indicating that the two outcomes are substantially different.

### EVALUATION OF THE MEASUREMENT MODEL

We collected the data based on the $2 \times 2$ design explained previously. This design was used to generate substantial variation in perceived threat, efficacy and fear scores and in acceptance and reactance scores, which is a common approach of fear researchers (Witte and Allen 2000). In the subsequent analyses, we use participants’ reported levels of perceived threat, efficacy, and fear. The
data are analyzed using structural equation modeling in which the scores on these constructs were used across experimental conditions.

The model presented in Figure 1 is used as a baseline model. As mentioned, two similar models are tested, with message acceptance and message reactance as outcome variables.

The general acceptance model has a good fit (CFI = .97, TLI = .96, RMSEA = .06). The composite reliability (CR) range from 0.90 to 0.93, which is above the threshold of 0.70 (Hair et al. 2006). The averaged variance extracted (AVE) range from 0.61 to 0.79 and the maximum shared variance (MSV) and average shared variance (ASV) are smaller than the AVE for all constructs, confirming convergent and discriminant validity (Hair et al. 2006). For the reactance model, the goodness-of-fit indices indicate satisfactory fit (CFI = .95, TLI = .95, RMSEA = .07). The CRs are between 0.84 and 0.92. All latent variables exceed the recommend value of .50 for AVE, except the reactance variable (AVE = 0.45). The final itemization of a measure is a tradeoff between consistency, reliability, AVE, and content validity, because excluding items may undermine content validity (Ping 2004). Because the EPPM scales are well established and the CRs are above .80, we have chosen not to delete any items in the reactance measure. Discriminant validity is confirmed, as all MSVs and ASVs are smaller than AVE.

After confirming reliability, convergent validity, and discriminant validity, measurement invariance of the models is tested (Byrne 2004). We describe the results for the UA acceptance model here. First, a well-fitting baseline measurement model is developed for each UA group. Second, the invariance of the measurement model is tested across groups. The two-group, unconstrained model reveals a good fit to the data (CFI = .96, TLI = .96, RMSEA = .05). Next, constraints on the factor loadings are imposed across the two samples. For this model, there is complete factor loading invariance (chi-square difference (15) = 20.93, p = .139). The measurement invariance test procedure is the same for all multigroup analyses, with similar results. Modification indices information is used to improve the original models. All models have an acceptable goodness of fit (all CFI ≥ 0.93, all TLI ≥ 0.92, and all RMSEA ≤ 0.06) (details can be obtained from the authors).

In the next step, we test the multigroup model, based on the measurement structure adapted in the previous stage. The acceptance models are fully invariant between both groups in the three multigroup comparisons. The reactance models are partially invariant, with the majority of the factor loadings invariant across groups. This demonstrates an acceptable similarity of the constructs across groups, which allows meaningful cross-group comparisons of structural paths. Thus, these measurement models are used in the following section to test structural invariance and thus test the hypotheses using the Amos Graphics maximum likelihood method.

**HYPOTHESES TESTING**

**High Versus Low Uncertainty Avoidance**

Based on the individual scores on UA, we categorize people into low versus high UA individuals. We form these two groups based on a median split of the pooled Belgian–Irish samples. The mean is 4.13 and the median is 4.00. The cases with the median value are assigned to the lowest group. A total of 239 individuals are categorized as low UA (M = 3.39) and 176 as high UA (M = 5.13). This difference is significant (t(413) = −24.93, p < .001). The two groups do not differ significantly in gender and age (age: M_{Low UA} = 43.11, M_{High UA} = 44.66, t(413) = −1.24, p = .215; gender: men_{Low UA}: 51%, men_{High UA}: 46%, chi-square (1) = 0.86, p = .372).

**Acceptance.** The unconstrained structural model shows a good fit (CFI = .96, TLI = .96, RMSEA = .05). More perceived efficacy leads to higher acceptance of the message in both samples, confirming
hypothesis 1a (Table 2). Higher perceived threat leads to more fear, confirming hypothesis 2. More evoked fear and a stronger perceived threat leads to less message acceptance. Hypothesis 3a is confirmed because the relationship between perceived efficacy and message acceptance is significantly stronger for low-UA individuals. Contrary to expectations, there are no significant differences between the two groups for the effects of fear and perceived threat on message acceptance, leading to the rejection of hypotheses 4a and 5a.

**TABLE 2 Structural Paths: Message Acceptance**

<table>
<thead>
<tr>
<th>Perceived threat → Fear</th>
<th>Fear → Acceptance</th>
<th>Perceived threat → Acceptance</th>
<th>Perceived efficacy → Acceptance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low uncertainty avoidance</td>
<td>Std. effect (p)</td>
<td>.268 (&lt;.001)</td>
<td>-.137 (0.005)</td>
</tr>
<tr>
<td>High uncertainty avoidance</td>
<td>Std. effect (p)</td>
<td>.138 (0.089)</td>
<td>-.048 (0.470)</td>
</tr>
<tr>
<td>Low vs. high uncertainty avoidance</td>
<td>Critical ratio</td>
<td>-1.97</td>
<td>1.22</td>
</tr>
<tr>
<td>Low anxiety</td>
<td>Std. effect (p)</td>
<td>.123 (0.101)</td>
<td>-.031 (0.536)</td>
</tr>
<tr>
<td>High anxiety</td>
<td>Std. effect (p)</td>
<td>.338 (&lt;.001)</td>
<td>-.157 (0.012)</td>
</tr>
<tr>
<td>Low vs. high anxiety</td>
<td>Critical ratio</td>
<td>1.90</td>
<td>-1.56</td>
</tr>
<tr>
<td>Low chance belief</td>
<td>Std. effect (p)</td>
<td>.185 (0.022)</td>
<td>-.100 (0.094)</td>
</tr>
<tr>
<td>High chance belief</td>
<td>Std. effect (p)</td>
<td>.285 (&lt;.001)</td>
<td>-.057 (0.291)</td>
</tr>
<tr>
<td>Low vs. high chance belief</td>
<td>Critical ratio</td>
<td>.89</td>
<td>.55</td>
</tr>
</tbody>
</table>

Note. Halalized text = critical ratio for the difference in effect between the low and high group. p-values are reported between brackets.

**Reactance.** The unconstrained structural model shows a good fit (CFI = .95, TLI = .95, RMSEA = .05). Perceived efficacy leads to less reactance to the message, although the effect is only significant in the low-UA group, partly confirming hypothesis 1b (Table 3). The structural path from perceived threat to fear shows that more threat leads to more fear, confirming hypothesis 2. Perceived efficacy more strongly influences message reactance for the low-UA sample, confirming hypothesis 3b. The critical ratios show no significant difference between the two groups for the effect of fear and perceived threat on message reactance, leading us to reject hypotheses 4b and 5b.

**TABLE 3 Structural Paths: Message Reactance**

<table>
<thead>
<tr>
<th>Perceived threat → Fear</th>
<th>Fear → Reactance</th>
<th>Perceived threat → Reactance</th>
<th>Perceived efficacy → Reactance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low uncertainty avoidance</td>
<td>Std. effect (p)</td>
<td>.271 (&lt;.001)</td>
<td>.231 (&lt;.001)</td>
</tr>
<tr>
<td>High uncertainty avoidance</td>
<td>Std. effect (p)</td>
<td>.139 (0.088)</td>
<td>.545 (&lt;.001)</td>
</tr>
<tr>
<td>Low vs. high uncertainty avoidance</td>
<td>Critical ratio</td>
<td>-1.93</td>
<td>1.54</td>
</tr>
<tr>
<td>Low anxiety</td>
<td>Std. effect (p)</td>
<td>.125 (0.096)</td>
<td>.219 (0.002)</td>
</tr>
<tr>
<td>High anxiety</td>
<td>Std. effect (p)</td>
<td>.339 (&lt;.001)</td>
<td>.398 (&lt;.001)</td>
</tr>
<tr>
<td>Low vs. high anxiety</td>
<td>Critical ratio</td>
<td>.86</td>
<td>1.16</td>
</tr>
</tbody>
</table>

Note. Halalized text = critical ratio for the difference in effect between the low and high group. p-values are reported between brackets.

**High Versus Low Anxiety in General Life**

The individuals of the pooled Irish–Belgian sample are median split based on their scores on anxiety in general life ($M = 3.88$, median = 4.00). The individuals who scored the median value are assigned to the high group. The low-anxiety group consists of 204 individuals ($M = 3.10$) and the high-anxiety group of 211 individuals ($M = 4.63$) ($t (413) = 23.91$, $p < .001$). The two groups differ in age ($M_{low}$
anxiety = 45.46, M_{High anxiety} = 42.14, t (413) = 2.70, p = .007), and gender (men_{Low anxiety} = 54%, men_{High anxiety} = 46%, chi-square (1) = 4.42, p = .035).

Acceptance. The unconstrained structural model shows a good fit (CFI = .96, TLI = .95, RMSEA = .05). In both groups, more perceived efficacy leads to more message acceptance, in support of hypothesis 1a (Table 2). Higher perceived threat leads to more fear (supporting hypothesis 2), especially for high-anxiety individuals. Compared to high-anxiety individuals, perceived efficacy leads to higher acceptance of the message for low-anxiety individuals, confirming hypothesis 6a. Further, more perceived threat leads to less acceptance of the message for low-anxiety individuals, while this path is not significant for high-anxiety individuals, in support of hypothesis 7a. Fear leads to less acceptance of the message for high-anxiety individuals, while this path is not significant for low-anxiety individuals, although the difference is not significant, leading us to reject hypothesis 8a.

Reactance. The goodness-of-fit statistics of the unconstrained structural model indicate a good fit to the data (CFI = .94, TLI = .93, RMSEA = .05). More perceived efficacy leads to less reactance to the message in both groups, confirming hypothesis 1b (Table 3). The path from perceived threat to fear is significantly positive (confirming hypothesis 2) and significantly more important for high-anxiety individuals. For both groups, fear leads to more reactance to the message, while perceived threat leads to less reactance to the message. The effect of perceived efficacy on message reactance is stronger in the low-anxiety group than in the high-anxiety one, which is in line with hypothesis 6b. Hypotheses 7b and 8b are rejected because there are no significant differences between the groups of these relationships.

High Versus Low Chance Belief Locus of Control

The pooled sample is median split on the basis of chance belief scores ($M = 3.86$, median = 4.00) with the median scores assigned to the high group. The low-chance-belief group consists of 172 individuals ($M = 2.63$) and the high-chance-belief group of 243 individuals ($M = 4.72$) ($t (413) = −25.74, p < .001$). The two groups are different neither in age ($M_{Low chance belief} = 43.71, M_{High chance belief} = 43.81, t (413) = −0.03, p = .942$) nor in gender (men_{Low chance belief} = 51%, men_{High chance belief} = 47%, chi-square (1) = 0.39, $p = .426$).

Acceptance. The unconstrained multigroup structural model shows a good fit to the data (CFI = .97, TLI = .96, RMSEA = .05). In Table 2, we see that higher perceived efficacy leads to more acceptance of the message in both groups, confirming hypothesis 1a. More threat increases fear for both groups, confirming hypothesis 2. The critical ratios show no significant difference between the two groups, leading us to reject hypotheses 9a, 10a, and 11a.

Reactance. The goodness-of-fit statistics of the unconstrained structural model reveal a good fit to the data (CFI = .94, TLI = .93, RMSEA = .05). The higher perceived efficacy, the less the message is rejected, supporting hypothesis 1b (Table 3). Higher perceived threat leads to more fear in both groups, confirming hypothesis 2. The higher the evoked fear, the stronger the reactance to the message is in both groups. The critical ratios indicate no significant difference between the two groups, leading to the rejection of hypotheses 9b, 10b, and 11b.

DISCUSSION AND CONCLUSION

The present study investigates the effect of culture-related individual characteristics—uncertainty avoidance, anxiety in general life, and chance belief—on the processing of fear appeals in health messages. In general, more perceived threat leads to more fear. This effect is significant in almost all groups, with the exception of low-anxiety individuals and high-UA individuals. The effect of
perceived threat on evoked fear for the low-anxiety individuals is significantly different from the high-anxiety group. It appears that the emotion of fear is more difficult to evoke for low-anxiety individuals.

Although the effect of fear on message acceptance is not significantly different between groups, the effect is significant only in the low-UA and high-anxiety groups. It would seem that fear drives a response to the message, such that more evoked fear leads to less message acceptance. The effect of evoked fear on message reactance is positive and significant for all groups. More fear leads to more message reactance. These results contradict the findings of Witte and Allen (2000), who found that fear had a positive effect on message acceptance. The results do support the findings of Albarracín and colleagues (2005) and Earl and Albarracín (2007), namely that more fear evoked by messages leads to more message reactance.

The effect of perceived threat on message acceptance is significant and negative for low-UA, low-anxiety, and low- and high-chance-belief individuals. Thus, for these individuals, a higher perceived threat leads to a lower intention to adapt their behavior. This effect is significantly different from the one in high-anxiety groups. Cognition appears to be more important for low-anxiety individuals than for high-anxiety groups. The effect of perceived threat on reactance is negative and significant for all groups. This indicates that a higher perceived threat leads to a lower perception of message manipulation and a lower message minimization.

Our results also show that the indirect effect of perceived threat on message acceptance and reactance via fear is less important than the direct effect of perceived threat on these outcome variables. This result contradicts the findings of Ruiter and colleagues (2001) who indicated that fear has stronger effects on message processing than perceptions of threat.

Finally, more perceived efficacy leads to more message acceptance and less message reactance. This is the case for all groups except for high-UA individuals and high-anxiety groups in the reactance model. Research (e.g., Hofstede 2001) indicated that high-UA individuals do not believe they have an influence on their own life, which could make perceived efficacy irrelevant for them. Perceived efficacy also more strongly determines message reactance of low-anxiety than of high-anxiety individuals. These results indicate that cognition is more important for low-anxiety and low-UA individuals. Ruiter, Abraham, and Kok (2001) indicated that, compared to evoked fear and perceived threat, perceived efficacy is a more important factor and has a greater impact on behavior and intention. This is supported by our results, but more so for low-UA individuals and low-chance-belief individuals than for high-UA individuals and high-anxiety individuals.

One of the objectives of the present study was to explore moderators that could be important to take into account to adapt fear appeals to different target audiences. In that respect, chance belief seems less relevant. No differences are found between individuals low and high on chance belief. Burnett (1981) found that health locus of control did not interact with fear appeal level to influence behaviors, which is confirmed by our results.

Uncertainty avoidance has a strong impact on perceived efficacy, in that it strongly affects message outcomes for low-UA individuals. This can be attributed to the fact that a high-UA individual tends to hold lower perceptions of self-efficacy (Sánchez-Franco, Martínez-López, and Martín-Velicia 2009). Because high-UA individuals feel they have little control over their lives (Hofstede 2001), efficacy matters less than for low-UA individuals. This contradicts the findings of Vincent and Dubinsky (2005), who found no influence of uncertainty avoidance on fear. This could be explained by the fact that Vincent and Dubinsky (2005) used a cross-country comparison and did not measure uncertainty avoidance on an individual level. An important note is that the relatively low Cronbach's alpha indicates that the UA construct needs further refinement, as mentioned by Venaik and Brewer (2013). Anxiety in general life is also relevant in explaining differences in fear appeal processing. Fear appeal message processing is different between individuals differing in anxiety in general life. Low-anxiety
individuals focus more on cognitions. It is also more difficult to evoke fear with these individuals. High-anxiety individuals focus less on cognitions and are more led by fear. Witte and Allen (2000) concluded from their meta-analysis that individual differences do not appear to influence processing of health risk messages. Our results on the moderating effects of anxiety and uncertainty avoidance contradict this.

**IMPLICATIONS**

Our results indicate that practitioners should be very careful using fear appeals. When developing a health awareness campaign, perceived efficacy must be emphasized as much as possible, while fear must be minimized. Strong evoked fear and perceived threat have a negative effect on the intention to adapt behavior, whereas increased perceived efficacy has a positive effect on message acceptance. Message reactance increases when evoked fear increases, and perceived efficacy and perceived threat decrease. Because adoption of behavior is the main goal of health risk messages, generally speaking, overly threatening and scary messages should be avoided and perceived efficacy should be stressed. In view of the relatively low effectiveness of strongly threatening health risk messages, health promoters should refrain from using strong fear appeals and should consider using other messages to change behaviors. Albarracín and colleagues (2005) found that the most effective interventions were those that contained attitudinal arguments, educational information, behavioral skills arguments, and behavioral skills training. These persuasive techniques should focus more strongly on cognitions for low-anxiety and low-UA audiences.

Our results were obtained using individual measures of uncertainty avoidance, anxiety, and chance belief. Practitioners could use our results not only to improve communication to audiences differing in these characteristics but also to adapt messages on a national level or culture group level basis, provided sufficient indications exist that a country or a cultural group scores generally very high or low on one of these characteristics. Indeed, even though anxiety and chance belief are not traditionally considered cultural characteristics, studies have found variations among countries in level of anxiety (Arrindell et al. 2004) and chance belief (Wrightson and Wardle 1997). Targeting countries is perhaps more managerially relevant than targeting individuals.

**LIMITATIONS AND FURTHER RESEARCH**

There are several limitations to this study. First, only one set of stimuli was tested, related to a fictitious disease. While we checked that our manipulations were successful and controlled for the perceived credibility of the recommendations in the health messages, other potential confounds can never be fully excluded if drinking water and sleeping differ on other dimensions than response and self-efficacy. Future research should try and replicate these results with different messages for other health-related issues. Further research could also explore other message dimensions in combination with culture-related individual characteristics. For example, the effect of perceived expertise of the spokesperson on message outcomes could be examined. We used a doctor in the stimuli to increase realism and expertise. This could be more important for high power distant individuals. In addition, the mechanisms of message acceptance and message reactance, and especially their interaction, remain ambiguous and further research—to unravel the processes leading to message acceptance and message reactance—is encouraged.

The present research was conducted in two European countries. Looking at additional and different countries could corroborate our results. For instance, less-developed countries could be studied to investigate to what extent individuals from these countries need a different message approach. Less-
developed countries, by definition, are likely to differ from developed countries on demographic variables such as average income, education level, and access to health care. Future studies that include such countries should be careful to control for all these factors.

The GLOBE-based uncertainty avoidance measure used in this research proved to be problematic. Originally, the scale consists of five items. To reach a sufficiently high Cronbach's alpha, three items had to be deleted. The two remaining items that have been used to measure uncertainty avoidance in the present study ("I believe that orderliness and consistency should be stressed, even at the expense of experimentation and innovation"; "I believe that societal requirements and instructions should be spelled out in detail so citizens know what they are expected to do") still capture the construct of uncertainty avoidance. We noticed that the three items we deleted were asked in a different format than ranging from Strongly disagree to Strongly agree, which may have caused confusion for respondents. The GLOBE scales have not yet often been used in cross-cultural research. Although they provide an interesting angle to measuring uncertainty avoidance from a “value” perspective, more research is needed to refine the scale and to test to what extent the items measure different dimensions of uncertainty avoidance than, for instance, Hofstede's (2001) construct. This type of further research would offer an academic contribution in that it would allow understanding and measuring uncertainty avoidance on an individual level in a more accurate way.
APPENDIX

STIMULUS EXAMPLES

(a) Low threat, low efficacy.

(b) High threat, high efficacy.
REFERENCES


