Using high-level construal and perceptions of changeability to promote self-change over self-protection motives in response to negative feedback

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Abstract

Diagnostic negative information presents people with a motivational dilemma. Although negative feedback can provide useful information with which to guide future self-improvement efforts, it also presents short-term affective costs. We propose that construal level, jointly with the perceived changeability of the feedback domain, determines whether people choose to accept or dismiss such information. Whereas low-level construal promotes short-term self-protection motivation (promoting dismissal), high-level construal promotes long-term self-change motivation (promoting acceptance) – to the extent that change is perceived as possible. Four studies support this hypothesis and examine underlying cognitive and motivational mechanisms. The present work may provide an integrative theoretical framework for understanding when people will be open to and accept negative diagnostic information, and has important practical implications for promoting self-change efforts.

Keywords: construal level theory, perceived changeability, defensive information processing, self-threat, self-change, health communication

People are regularly confronted with diagnostic negative information about their knowledge, skills, and behavior – feedback that provides an accurate yet painful assessment of their weaknesses and deficiencies. Research suggests that people often feel threatened by negative diagnostic information and, when exposed to it, respond by defensively dismissing the feedback. Although the defensive dismissal of negative information may support positive feelings and high self-esteem, it may also lead people to deny serious problems, which may result in engaging in maladaptive or self-injurious behaviors (e.g., Ditto & Lopez, 1992; Dweck & Leggett, 1988; Sherman et al., 2000). The conditions that lead people to dismiss versus accept negative information is thus a major focus of research in social psychology (e.g., Dweck & Leggett, 1988; Freitas, Salovey, & Liberman, 2001; Sedikides & Hepper, 2009; Sherman et al., 2000; Trope, 1986; Trope & Neter, 1994). In this paper, we examine how people's subjective understanding or interpretation of the feedback plays a critical role in the motivational dynamics underlying people's dismissal vs. acceptance of negative diagnostic information.

The Dual-Motive Dilemma

To understand why people dismiss vs. accept negative feedback, one must understand the dynamic interplay of self-evaluative motives. Research suggests that people's self-evaluative motives can be classified into two broad categories: self-protection motives vs. self-change motives. Self-protection motives, such as self-enhancement (and self-verification, among high self-esteem individuals), promote construction, confirmation, and defense of positive beliefs about one's self (e.g., Sedikides & Strube, 1997; Tesser, 2000). By contrast, self-change motives, such as self-assessment and self-improvement, are tuned to diagnosing one's strengths and weaknesses, and using this information to better one's self (e.g., Sedikides & Hepper, 2009). Self-protection motives and self-change motives conflict when people have opportunities to

receive negative diagnostic information about themselves (e.g., Dweck & Leggett, 1988; Sedikides & Hepper, 2009; Taylor, Neter, & Wayment, 1995; Trope, 1986; Trope & Neter, 1994). Although negative feedback may be valuable in the long term by helping to diagnose areas of weakness that can be targeted for later improvement (thus activating the self-change motives), it also presents an immediate threat to positive self-views (thus activating the self-protection motives). People who sunbathe, for example, may be tempted to dismiss their risk for skin cancer because accepting this risk requires acknowledging that they have engaged in negative and risky health behavior. Dismissing this self-threatening information, however, can lead them to miss opportunities to diagnose their tanning behavior as problematic and thus improve long-term health. The manner in which people resolve this dual-motive conflict thus determines their responses to negative information. Factors that tip the relative balance of these two motives in favor of self-change over self-protection should promote greater acceptance rather than dismissal of negative information.

Construal Level Theory

Inspired by construal level theory (CLT; Liberman & Trope, 2008; Trope & Liberman, 2003; 2010), we propose that one factor that may promote self-change motivation over self-protection motivation is how people subjectively represent or construe the feedback situation. Central to CLT is the notion of psychological distance. Distant events involve the removal of an event from the direct experience of the here-and-now. People tend to lack reliable detailed specifics about psychologically distant events. To prepare and plan for distant events, people engage in high-level construal – the process of cognitive abstraction to extract the general, global, and goal-relevant features likely to be apparent across all possible manifestations of the events. As events become more proximal and detailed specifics become increasingly available

and reliable, people are able to engage in low-level construal, incorporating the idiosyncratic and secondary features that highlight event's uniqueness. In sum, low-level construal allows people to immerse into the rich nuances of the here-and-now; high-level construal allows people to transcend the present and mentally travel to other times, places, people, and possibilities.

People can engage in high- versus low-level construal in the absence of any changes in psychological distance (e.g., Freitas, Gollwitzer, & Trope, 2004; Fujita, Trope, Liberman, & Levin-Sagi, 2006; see also Vallacher & Wegner, 1987). In other words, people can use high-level construal to represent the immediate here-and-now. By engaging in high-level construal of the present, people can psychologically remove themselves from the immediate demands of the present, allowing them to recognize the more global implications of their decisions and behavior. Supporting this assertion, research suggests that rather than be swayed by salient local cues, people are more likely to behave in a goal- or value-consistent manner when engaged in high-level rather than low-level construal (Eyal, Sagristano, Trope, & Liberman, 2009; Fujita et al., 2006; Giacomantonio, Dreu, Shalvi, Sligte, & Leder, 2010; Torelli & Kaikati, 2009; Trope & Liberman, 2000). For example, female undergraduates, a population generally concerned about weight-loss, are more likely to ignore the allure of a chocolate bar and instead exhibit goal-consistent preferences to eat an apple when engaged in high-level rather than low-level construal (Fujita & Han, 2009).

The enhanced consideration of long-term and global (rather than more short-term and local) concerns when engaged in high-level (rather than low-level construal) has important implications for understanding people's reactions when they are exposed to negative self-relevant information. As noted earlier, diagnostic negative feedback presents a dual-motive dilemma. Although negative feedback identifies areas of weakness to which one can direct

effort to improve upon over time (activating self-change motivation), it also presents short-term affective costs (activating self-protection motivation). Whereas high-level construal should promote acceptance of negative feedback in service of self-change, low-level construal should promote dismissal of this feedback in service of self-protection.

Initial evidence supporting our theoretical assertions comes from research by examining the role of construal levels on self-relevant information search (Freitas, Salovey & Liberman, 2001). In a series of studies, Freitas and colleagues (2001) measured construal level as an individual difference (using the Behavioral Identification Form, Vallacher & Wegner, 1989), or experimentally manipulated high-level versus low-level construal by leading participants to expect self-relevant feedback in the distant versus near future, respectively. They showed that high-level, relative to low-level, construal was associated with increased interest in upward social comparison and stronger interest in receiving negative feedback. Therefore, when deciding whether to avoid vs. expose one's self to negative information, high-level construal appears to promote self-change over self-protection motivations.

The present research advances this Freitas et al. (2001) work in two ways. First, we examine what people do when they can no longer avoid negative information, but instead are directly confronted with it. Research suggests that people generally dismiss, and even derogate, negative self-relevant feedback when it is presented to them (e.g., Ditto & Lopez, 1992; Jemmott, Ditto, & Croyle, 1986; Kunda, 1987; Liberman & Chaiken, 1992; Morris & Swann, 1996; Weinstein & Klein, 1995; for reviews, see Kunda, 1990; Tesser, 2000). We instead propose that high-level construal, relative to low-level construal, will promote long-term self-change motivations over short-term self-protection motivations, and should therefore reduce defensive dismissal and instead promote feedback acceptance of this negative information.[1]

Second, we explore more thoroughly the cognitive and motivational mechanisms by which construal levels impact people's responses to negative feedback. Freitas et al. (2001) demonstrated that high-level construal, relative to low-level construal, reduced people's sensitivity to the costs and inconveniences associated with seeking diagnostic feedback. In the present research, we explore boundary conditions and mediating variables for the effect of construal level on the balance between self-evaluative motives. From a cognitive perspective, we examine how construal level changes people's interpretation of the feedback. To the extent that high-level construal, relative to low-level construal, promotes self-change over self-protection motives, then people should interpret and understand negative information as helpful feedback rather than threatening information.

We examine the motivational mechanisms in two ways. First, we examine the role of motivational relevance as a critical boundary condition. If indeed changes in construal level influence information processing by the dual-motive dynamics that we propose, then the effect of construal should be evident only under conditions of high motivational relevance. When feedback is self-relevant, the dual-motive conflict between self-change and self-protection is most acute. It is under these conditions in which factors (like construal level) that tip the dual-motive balance one way or another is likely to have their greatest effect. When the dual-conflict is less acute, i.e., when feedback is not self-relevant, tipping factors should have less dramatic (if any) impact. That is, because neither self-change nor self-protective motivations are activated by non-relevant feedback, there is no dual-motive balance to tip in the first place. Thus, examining the self-relevance of negative feedback as a boundary condition is critical for illustrating the motivational mechanisms that we propose.

As a further examination of motivational mechanism, we examine the perceived changeability of the feedback domain as a second critical boundary condition. If indeed people's openness to negative information is motivated by a desire for self-change as we suggest, then this openness should be evident only to the degree that people believe such change is possible. When one's standing in a particular domain is unchangeable, no positive change or improvement is possible. Supporting this assertion, research indeed suggests that domains need to be perceived as inherently changeable (vs. unchangeable) for people to be open to negative feedback (e.g., Dweck & Leggett, 1988; Green, Pinter, & Sedikides, 2005; Johnson & Fujita, 2012; Melnyk & Shepperd, in press; Taylor et al., 1995; Trope, Gervey, & Bolger, 2003). If high-level construal, relative to low-level construal, promotes self-change over self-protection motives in the manner that we propose, then the effect of high-level construal should be evident to the degree that change is believed to be possible. When no such change is possible, there should be no effect of construal level. Manipulating perceptions of changeability as a boundary condition thus provides a critical test of the dual-motive dynamics that we propose.

Thus the present work not only extends the insights from work by Freitas et al. (2001) from information avoidance to information acceptance, but also aims to provide deeper illumination into the cognitive and motivational mechanisms through a systematic exploration of critical boundary conditions and mediating variables. To this end, we conducted four experiments that demonstrate that high-level construal relative to low-level construal enhances acceptance of diagnostic negative information (Studies 1-4), and examine how feedback is interpreted as a mediating mechanism (Study 4). Highlighting the motivational basis for our theoretical model, we predict these effects should be evident primarily among those to whom the negative feedback is self-relevant vs. not relevant. To demonstrate that this construal-dependent

acceptance of negative feedback is motivated by self-change over self-protection concerns, we manipulate the perceived changeability of the feedback domain (Studies 2-4). We predict that the effect of construal on acceptance of negative feedback should be evident to the extent that the feedback domain is perceived to be changeable rather than unchangeable. Finally, we show that such changes in information processing can have important behavioral consequences, as revealed by people's subsequent information search (Studies 2 and 3).

Study 1

Overview

Study 1 was designed to test if people's acceptance of diagnostic negative feedback differed according to their construal level. Tanners and non-tanners were induced to high-level vs. low-level construal, and then read a health message highlighting the negative consequences of sun and UV light exposure. They then indicated to what extent the message motivated them to change their sun exposure behavior as a measure of acceptance of negative feedback (Ditto & Lopez, 1992). We predicted that among the tanners in our sample, high-level construal relative to low-level construal would be more likely to assimilate the negative feedback, thereby reporting greater motivation to change their behavior.

Method

Participants. Eighty five Caucasian undergraduate students (47 female, 38 male) participated in a study on health communication for partial course credit at the beginning the fall quarter at The Ohio State University. Participants ranged in age from 18 to 29 (M = 18.88, SD = 1.66).

Materials and Procedure. Participants completed all materials on a computer running MediaLab (Jarvis, 2006). They first completed measures designed to assess the motivational

relevance of a health message about skin cancer. Specifically, participants reported whether they had tanned in a tanning bed (yes/no). We identified 30 participants who reported tanning in a tanning bed, for whom our health message would represent motivationally relevant information.

Participants next completed a construal level manipulation, adapting procedures and materials developed by Fujita and colleagues (2006). Participants were presented with 20 objects (e.g., soda). Those in the high-level construal condition were asked to provide a superordinate category to which each object belonged (e.g. a drink), whereas those in the low-level construal condition were asked to provide a specific example of each object (e.g. Coke). Previous research has shown similar procedures reliably induce high-level vs. low-level construal of subsequent unrelated tasks (Fujita et al., 2006).

Next, participants read a short message about the dangers of skin cancer and tanning (see Appendix A). After reading the message, they completed several items assessing their acceptance of the negative information, adapted from Ditto and Lopez (1992). Specifically, we asked participants "how motivated are you to reduce your risk for skin cancer," "how motivated are you to buy sunblock," "how motivated are you to check your skin for skin cancer," and "how motivated are you to receive additional information about the dangers of skin cancer and tanning?" (1 = not at all, 7 = extremely). These acceptance items were averaged to form a single index (α=.82). Those who assimilated and accepted the negative feedback should have higher scores on this index (Ditto & Lopez, 1992). Participants then completed several demographic items and were debriefed and dismissed.

Results & Discussion

We analyzed participants' acceptance of the negative feedback as a function of construal level (high-level vs. low-level) and relevance (tanners vs. non-tanners) using a 2 x 2 between

subjects ANOVA. As predicted, construal level moderated the effect of tanning history on participants' assimilation of the health message, $F(1, 81) = 5.11$, $p = .03$, $\eta = .06$. As depicted in Figure 1, tanners engaged in high-level construal ($M = 4.82$, $SD = 0.98$) were more motivated to reduce their risk of skin cancer than those engaged in low-level construal ($M = 4.00$, $SD = 1.11$), $F(1, 28) = 4.58$, $p = .04$, $\eta = .14$. Changes in construal level produced no effect among non-tanners, $F(1, 53) = 1.84$, $p = .18$, $\eta = .03$. Furthermore, whereas high-level construal motivated tanners more than non-tanners to reduce their risk ($M = 3.62$, $SD = 1.43$), $F(1, 44) = 8.46$, $p = .006$, $\eta = .16$, low-level construal did not, $F(1, 37) = 0.12$, $p = .74$, $\eta = .03$.

These findings suggest that changes in construal level can enhance acceptance of negative diagnostic information. Specifically, tanners engaged in high-level relative to low-level construal appeared to assimilate the negative health information to a greater degree, expressing stronger desires to engage in behavioral self-change. Thus, Study 1 demonstrates that changes in construal can impact how people process negative information and enhance acceptance of such feedback. That such findings were specific to tanners, moreover, highlights that this change in information processing is motivated in nature.

To provide more stringent evidence that the results of Study 1 reflect the operation of self-change motivation, in Study 2, we manipulated the perceived changeability of the feedback domain. As noted earlier, self-relevant feedback is instrumental for self-change only to the extent that the target domain of the feedback is changeable. If no change is possible, this feedback is less useful and no longer worth bearing the negative affective costs (e.g., Dweck & Leggett, 1988; Green, Pinter, & Sedikides, 2005; Taylor et al., 1995; Trope, Gervey, & Bolger, 2003). If indeed high-level construal motivates long-term self-change efforts over more short-term self-protection, then people should show greater acceptance of self-relevant information

specifically about changeable, and not unchangeable, domains. Not finding this pattern of moderation by changeability would be difficult to explain from our theoretical perspective; thus, the design of Study 2 provides a critical test of dual-motive model that we propose.

Study 1 also relied on self-report methodology to document acceptance of negative diagnostic information. Rather than rely on self-report, in Study 2, we assessed acceptance of negative feedback behaviorally by observing participants' information search behavior following exposure to negative feedback. People who defensively dismiss the initial negative feedback might be expected to avoid exposing themselves to further threatening information – specifically, additional information that is consistent in content and tone with the initial negative message. By contrast, people who have accepted the initial negative feedback should be motivated to seek out this feedback-consistent information with which to learn more about how to address their weaknesses. We thus predicted that following exposure to negative feedback, high-level construal, relative to low-level construal, would promote information search for feedback-consistent rather than feedback-inconsistent information (reflecting self-change rather self-protection motives). We further predicted that this effect of construal would be most apparent when the negative feedback addressed a changeable rather than unchangeable domain, demonstrating the operation of self-change motivations.

Study 2

Method

Participants. One hundred thirty-three Caucasian undergraduate students (58 female, 72 male, 1 unreported) participated in a study on health communication for partial course credit at The Ohio State University. Participants ranged in age from 18 to 53 (M = 19.18, SD = 3.20).

Materials and Procedure. Participants completed all materials on a computer running MediaLab (Jarvis, 2006). As in Study 1, participants first completed measures designed to assess the motivational relevance of a health message about skin cancer. Relatively fewer participants (N = 28) in Study 2 reported a history of tanning behavior as compared to the other studies that we report in this paper. Therefore, we used a family history of skin cancer (N = 48) as our operationalization of relevance, reasoning that the message would be more motivationally relevant to those with rather than without a family history.[2]

Participants then completed a construal level manipulation adapted from Freitas et al. (2004). Participants in the high-level construal condition were asked to list reasons why they should improve and maintain their health whereas participants in the low-level construal condition were asked to list the means by which they could improve and maintain their health. Previous research has shown these procedures reliably induce high-level vs. low-level construal of subsequent tasks (e.g., Freitas et al., 2004; Fujita et al., 2006).

We then randomly assigned participants to read one of two versions of the health message about skin cancer. Half of the participants (high changeability condition) read a message that suggested that their risk for skin cancer was the result of alterable behaviors (i.e., tanning, applying sunblock, avoiding the sun). By contrast, the other half of the participants (low changeability condition) read a message that suggested that their risk was the result of unalterable characteristics (i.e., ethnicity, gender, family history, genetics). Information that one's risk of skin cancer is based on alterable rather than unalterable characteristics should promote perceptions that one's risk of skin cancer is more changeable (e.g., Dweck & Leggett, 1988; Howell & Shepperd, 2012; Melnyk & Shepperd, in press).

After reading the initial health message, participants were then offered the opportunity to read several additional messages about sun exposure that could bolster versus repudiate the initial health message they had just read, supporting self-change motivation versus self-protection motivation, respectively. Specifically, participants were told that although they were not required to, they could read several additional articles relevant to skin cancer. They were then presented with a list of article titles from which to choose. Half of the articles were titled to reference topics that were consistent in message and tone to the health message that they had just read ("Sun damage causes premature aging of the skin," "Sunscreen prevents skin damage from UV rays," "Tanning beds are more dangerous than natural sun exposure," "Spray tans can give the look of a tan without the dangerous UV exposure"). The other half were titled to reference topics that were inconsistent in message and tone to the health message that they had just read ("Vitamin D from sun exposure may be beneficial," "Sunscreens do not prevent damage from UV rays," "Tanning beds offer greater benefits than tanning in the sun," and "Spray tans can be dangerous to your health"). In a pilot study, we recruited 30 additional participants from the same population and asked them to rate the articles on a 7-point scales to confirm that these articles indeed were perceived by participants as consistent versus inconsistent with the initial health message (1 = very inconsistent; 7 = very consistent). They also rated the valence of each article (1 = very negative, 7 = very positive), and how useful each would be for change (1 = not at all useful, 7 = very useful). As predicted, the four feedback-consistent articles (M = 4.79, SD = 0.87) were perceived to be more consistent with the initial health message than the four feedback-inconsistent articles (M = 3.42, SD = 1.00), $F(1, 29) = 40.54$, $p < .001$. Furthermore, the feedback consistent information was perceived as more negative (M = 3.45, SD = 0.80) and more useful for changing one's behavior (M = 3.92, SD = 1.06) than the feedback inconsistent

information (M = 4.16, SD = 0.92 and M = 3.56, SD = 1.32, respectively), $F(1, 29) = 13.44$, p = .001 and $F(1, 29) = 4.90$, p = .03, respectively. These pilot data support our assumptions that reading additional feedback-consistent articles would be perceived as having affective costs yet instrumental in promoting long-term change.

In the present study, when participants selected an article from the list of eight article titles, they were then presented with the actual article on the computer screen. Participants could return to the original list of articles, or choose to stop reading articles, at any time. All of the articles were comparable in length (136-150 words). We recorded the amount of time participants spent reading the feedback-consistent versus inconsistent articles as a behavioral measure of participants' acceptance of the initial health message. After reading as much or as little information as they desired, participants completed a few remaining questions, provided demographic information, were debriefed and thanked.

Results & Discussion

The amount of time participants spent reading the feedback-consistent versus inconsistent articles were summed, respectively. Although we verified that there were no outliers in these data (all log transformed reading times fell within 3SD of the mean), to adjust for skew, we log-transformed all of the reading times for all analyses. We report raw reading times in minutes, however, for ease of interpretation. We also counted the number of each respective article participants choose to read. Although these latter data produced similar results to the reading time analyses we report below, they did not reach conventional levels of statistical significance. This may be due in part to the non-normal, generally bi-modal distribution of the variable. To analyze the log-transformed reading times, we conducted a 2 (construal level: low-level vs. high-level) x 2 (changeability: low vs. high) x 2 (family history) x 2 (article type: feedback-consistent

vs. feedback-inconsistent) mixed-model ANOVA with article type as a within-subjects variable. Results indicated that there was a four-way interaction of construal level, family history of skin cancer, changeability and article type, $F(1, 117) = 3.38$, $p = .07$, $\eta = .03$ (see Figure 2).

To interpret this interaction, we examined the data as a function of article type. Construal level, changeability, and family history appeared to have little influence on the amount of time spent reading feedback-inconsistent articles, $F(1, 116) = 1.62$, $p = .21$, $\eta = .01$. These variables did, however, influence the amount of time spent on feedback-consistent articles, $F(1, 116) = 3.82$, $p = .05$, $\eta = .03$. Family history and construal level jointly influenced participants' reading of feedback-consistent messages when skin cancer risk was portrayed as changeable, $F(1, 54) = 6.77$, $p = .01$, $\eta = .11$, but not when it was portrayed as unchangeable, $F(1, 61) = 0.02$, $p = .90$, $\eta = .00$. When skin cancer risk was portrayed as changeable, as predicted, those engaged in high-level ($M = 4.90$, $SD = 1.58$) relative to low-level construal ($M = 0.15$, $SD = 1.29$) spent more time reading feedback-consistent articles when they had a family history of skin cancer, $F(1, 17) = 4.79$, $p = .04$, $\eta = .22$. No such impact of construal level was evident among those with no family history, $F(1, 36) = 2.26$, $p = .14$, $\eta = .06$. Examining the same interactive effect of construal level and family history under conditions of high changeability as a function of construal level (rather than family history) revealed that when engaged in high-level construal, those with a family history of skin cancer spent more time ($M = 4.90$, $SD = 1.58$) reading feedback-consistent messages than those without a family history of skin cancer ($M = 0.07$, $SD = 0.53$), $F(1, 28) = 11.31$, $p = .002$, $\eta = .29$. When engaged in low-level construal, by contrast, family history had no impact on post-feedback information search, $F(1, 25) = 0.49$, $p = .49$, $\eta = .02$.

The results from Study 2 are important for two reasons. First, these studies replicated Study 1 using a behavioral measure, demonstrating that when exposed to negative feedback, high-level construal can promote receptivity, as revealed by post-feedback information search behavior. Following exposure to negative feedback, those engaged in high-level construal sought out information that supported and elaborated upon this feedback (vs. information that undermined and repudiated it). Second, these results further illuminated the motivational basis for people's acceptance vs. dismissal of negative feedback as a function of construal levels. Specifically, after reading negative self-relevant (vs. irrelevant) feedback, participants engaged in high-level construal, rather than low-level construal, sought out feedback-consistent information only to the extent that the feedback addressed a domain that was perceived as changeable, rather than unchangeable. These results suggest that people's acceptance of negative feedback and subsequent information search was indeed motivated by self-change concerns. After exposure to negative information, people sought additional (negative) information only when it was perceived as instrumental in promoting self-change. Thus, this study highlights the impact that construal level can have in affecting the relative balance between contrasting self-change and self-protection motives when exposed to negative feedback, with high-level construal promoting self-change under conditions of high changeability.

That high-level construal can enhance people's acceptance of negative diagnostic feedback has important implications for a number of real-world problems. We conducted Study 3 as a proof-of-concept field study to explore the potential of developing an intervention that manipulates construal level and perceived changeability to enhance acceptance of negative health risk information. We predicted that high-level construal should increase openness to

health-risk information and motivate health-change behavior, but only when one's level of risk is believed to be changeable rather than unchangeable.

Study 3

Method

Participants. One hundred seventeen Caucasian patients from two offices of a local dermatology practice were recruited as they waited for their appointments in the waiting areas. To minimize disruption to the dermatology practice, participants were instructed to stop the experiment if their name was called for their appointment, which resulted in missing data for 14 of the participants. Of the participants who provided demographic information, 81 were female. Participants ranged in age from 18 to 80 years old (M = 47.25, SD = 15.95). Additionally, we excluded 5 participants who did not follow directions. Therefore, the final N of this study was 98 participants.

Materials and Procedure. Pilot studies revealed that very few participants were willing to admit engaging in tanning behavior while completing a survey in a dermatology office, presumably due to social desirability and self-presentational concerns. Thus, we did not ask participants about tanning behavior history, but instead queried their family history of skin cancer as our proxy for motivational relevance, as in Study 2. Forty-nine participants reported a family history of skin cancer. They then completed the same category vs. exemplar construal level manipulation as in Study 1 (e.g., Fujita et al., 2006). Participants then read a short message about the dangers of skin cancer and tanning (see Appendix B). Participants were randomly assigned to read one of two versions of the health message: one that suggested that their risk for skin cancer was the result of alterable behaviors (i.e., tanning, applying sunblock, avoiding the

sun) vs. one that suggested that their risk was the result of unalterable characteristics (i.e., ethnicity, gender, family history, genetics).

Participants were then given an opportunity to receive several brochures that provided additional information about skin cancer (e.g., how to use sunscreen effectively, detecting skin cancer, risk factors for skin cancer) published by the Center for Disease Control and the American Academy of Dermatologists. Participants read a list of titles for several brochures (i.e., "How to use sunscreen effectively," "Information for skiers/snowboarders," "Detecting skin cancer: Knowing what to look for on your skin," "Checking your skin for skin cancer," "Risk factors for skin cancer," "Play it safe in the sun: A guide for parents") and indicated which if any they would like to receive. These preferences for additional feedback-consistent information served as the assessment of receptivity to negative feedback. When all study materials had been completed, the experimenter gave participants any of the brochures they requested in addition to a list of websites for all of the brochures, and carefully debriefed them.

Results & Discussion

We regressed construal level, changeability, and relevancy with their respective interactions on whether or not participants took any of the offered brochures using logistic regression. We also conducted analyses on the number of brochures participants took using linear regression, which paralleled the results we subsequently report, although not at conventional levels of significance. This may be due in part to the non-normal distribution of the variable. All predictor variables were effects-coded (low = -1, high = 1). Because office location did not significantly alter the results, we have dropped it from the following analyses for simplicity.

As hypothesized, the combined influence of construal level, changeability and relevance predicted information search, β = .93, *SE* = .26, $p < .001$ (see Figure 3). We first examined this finding as a function of changeability. Unexpectedly, when skin cancer risk was portrayed as unchangeable, construal level and changeability jointly influenced post-feedback information search, β = -.88, *SE* = .33, $p = .008$. Those engaged in high-level (75.00%) relative to low-level (21.10%) construal were more likely to seek additional information about unchangeable risks when they had no family history of skin cancer, β = 1.21, *SE* = .50, $p = .01$. This was not true of those with a family history, β = -.54, *SE* = .44, $p = .22$. More critically, as predicted, when one's risk cancer was portrayed as changeable, relevance moderated the effect of construal level on post-exposure information search, β = .99, *SE* = .39, $p = .01$. As expected, although there were no significant differences in information search behavior of those in engaged in high-level (11.10%) relative to low-level (41.70%) construal among those with no family history, β = -.87, *SE* = .61, $p = .15$, those engaged in high-level (72.20%) relative to low-level (22.20%) construal were more likely to seek additional information about changeable risks when they had a family history of skin cancer, β = 1.10, *SE* = .48, $p = .02$.

We next examined these data as a function of relevance. Unexpectedly, among those with no family history of skin cancer, construal level and changeability jointly influenced post-feedback information search, β = -1.04, *SE* = .39, $p = .008$. Those engaged in high-level (75%) relative to low-level construal (21.10%) were more likely to seek additional information when risk was portrayed as unchangeable, β = 1.21, *SE* = .50, $p = .02$; no differences emerged when risk was portrayed as changeable, β = -0.87, *SE* = .61, $p = .15$. On the other hand, among those with a family history of skin cancer, construal level and changeability jointly influenced information search in the opposite direction, β = .83, *SE* = .33, $p = .01$. As predicted, those

engaged in high-level (72.20%) relative to low-level construal (22.20%) were more likely to seek additional information when risk was portrayed as changeable, β = 1.10, *SE* = .48, *p* = .02, but not when risk was portrayed as unchangeable, β = -0.55, *SE* = .44, *p* = .22.

In summary, results from Study 3 suggest that high-level construal, as compared to low-level construal, motivated those at risk for skin cancer to seek out additional information after they read a health message that suggested that such risk was changeable rather than unchangeable. We therefore replicated the results from Study 2 in a field setting and were able to enhance acceptance of negative feedback under those conditions that support self-change motivation (i.e., when the information is relevant and the information can be used to achieve change). One surprising result, however, was the effect of high-level construal on the post-feedback information search among participants for whom skin cancer was low in relevance, particularly when that risk was portrayed as relatively unchangeable. Our theoretical approach offers no specific predictions about people's reactions when negative feedback is low in relevance. Perhaps when participants perceived their risk to be low (not relevant) and stable over time (low in changeability), high-level construal motivated a desire to bolster and confirm that very low likelihood of future disease. Without additional data, however, these observations are merely speculative. We might add too that we did not replicate this finding in any of the other datasets we report, so it is unclear how robust this particular result is.

Study 4

Overview

By manipulating perceived changeability of the feedback domain, Studies 2 and 3 bolstered our assertion that high-level, relative to low-level construal, promotes acceptance of negative diagnostic feedback by enhancing self-change over self-defensive motivation. In Study 4, we go beyond documenting motivational mechanisms and explore further concurrent cognitive

mechanisms. Specifically, we have proposed that by linking negative feedback to self-change rather than self-defensive motivations, high-level (relative to low-level) construal promotes interpretations of negative information as instrumental and valuable feedback (rather than an affectively painful threat). That is, what the message means to participants may fundamentally shift from something harmful to something helpful as a function of high-level (relative to low-level) construal. Study 4 was designed to assess people's interpretation of the negative feedback. Participants were induced to engage in high-level or low-level construal prior to reading a persuasive health message about skin cancer. As before, this message depicted their risk as relatively changeable versus unchangeable. All participants then indicated their motivation to seek additional feedback-consistent information as an indicator of feedback acceptance. Critically, we also assessed their interpretation of the feedback. Replicating Studies 2 and 3, we hypothesized that high-level, relative to low-level, construal would promote greater acceptance of the negative feedback, particularly when the feedback domain was perceived as changeable rather than unchangeable. Importantly, reflecting the relative weighting of self-change over self-protective motivations by those engaged in high-level (relative to low-level) construal, we also predicted that people would be more likely to interpret the negative information as instrumental and valuable feedback rather than as an affectively painful threat under these same conditions. We further predicted that this change in the interpretation of the feedback would mediate the effect of our manipulations on acceptance of this feedback.

Method

Participants. Three hundred thirty-one Caucasian participants (175 female, 156 male, 2 chose not to respond) were paid to participate in a study on health communication on Amazon's Mechanical Turk service. Participants ranged in age from 18 to 73 (M = 34.50, SD = 13.18), and

all resided in the United States. We excluded four participants who failed to follow instructions, leaving a final *N* of 327.

Materials and Procedure. Participants completed all materials online. Unlike previous studies, participants completed the relevance measures at the end of the study rather than the beginning. Thus, participants first completed the same construal level manipulation as in Study 2. Participants then read a persuasive message depicting the risk of skin cancer and tanning. Because this study was conducted a couple of years after the previous studies, we updated the statistics in the message to reflect the newest information provided by the Skin Cancer Foundation (See Appendix C). Half of participants were randomly to a high changeability condition which stated that "Just one indoor tanning session increases users' chances of developing melanoma by 20% and each additional session during the same year boosts the risk by almost another 2%. If you go tanning only 5 times throughout the year, your risk for skin cancer is 30% higher than if you choose not to tan. Therefore, your risk for skin cancer is something you can control. If you choose to wear protective clothing, apply sunblock regularly, and avoid UV radiation, you will be able to reduce your risk you already have due to UV exposure." Participants in the low changeability condition read, "Just one blistering sunburn in childhood or adolescence more than doubles a person's chances of developing melanoma later in life! Even if you had sunburns as a child that didn't blister, it only takes five sunburns over a lifetime doubles one's chances of developing melanoma. Therefore, your risk for skin cancer is something you can't control. If you choose to wear protective clothing, apply sunblock regularly, and avoid UV radiation, you won't be able to reduce the risk you already have due to your childhood sun exposure."

After reading the message, as an assessment to their acceptance vs. dismissal of the negative feedback, participants responded to several questions assessing their motivation to get additional information (i.e., "How motivated are you to seek out additional information about reducing your risk for skin cancer," "How motivated are you to receive additional information about reducing your risk for skin cancer," and "How motivated are you to schedule an appointment with a dermatologist;" 1 = not at all, 7 = extremely; $\alpha = .89$). Participants then answered several items assessing their interpretation of the information as useful feedback or painful threat on a seven-point Likert scale (1 = Strongly disagree, 7 = Strongly agree). Because we were concerned that direct questions regarding interpretation of the feedback may activate reactance or social desirability in responding, we focused on the attributions about the author's intentions as indirect measure of participants' interpretation of the information. These items included "The author of this message was trying to help me understand my risk for skin cancer so I could change it;" "The author wanted to make me feel ashamed of my behavior" ($\alpha = .89$; see Appendix D). Responses were coded such that higher values represented construing the author's intentions as helpful and lower numbers represented construing the author's intentions as threatening or hurtful. These items showed acceptable reliability ($\alpha = .88$) and were thus combined to form a single index.

Results & Discussion

Feedback-Consistent Information Search Motivation. We measured participants' motivation to get additional feedback-consistent information as an assessment of participants' acceptance of negative feedback. We analyzed these data as a function of construal level (high-level vs. low-level construal), relevance (tanners vs. non-tanners), and changeability (high vs. low). Engaging in high-level construal ($M = 4.12$, $SD = 1.58$) generally increased motivation to

get additional information relative to low-level construal (M = 3.75, SD = 1.72), $F(1, 319)$ = 6.11, p = .01, η = .02. There was also a non-significant tendency for non-tanners (M = 3.98, SD = 1.65) to be more motivated to get additional information than tanners (M = 3.69, SD = 1.65), $F(1, 319)$ = 2.76, p = .10, η = .01. As predicted, and consistent with Studies 2 and 3, we found that these general patterns were qualified by an interaction between construal level, changeability and relevance, $F(1, 319)$ = 4.02, p = .05, η = .01 (see Figure 4).

We first examined these data as a function of changeability. When one's risk was portrayed as unchangeable, non-tanners (M = 4.30, SD = 1.61) were generally more motivated than tanners to seek additional information (M = 3.56, SD = 1.69), $F(1, 159)$ = 5.57, p = .02, η = .03, with no other significant effects emerging (ps > .52). When one's risk was portrayed as changeable, by contrast, high-level construal (M = 3.95, SD = 1.55) generally increased motivation to get additional information relative to low-level construal (M = 3.51, SD = 1.74), $F(1, 160)$ = 7.81, p = .006, η = .05, but this was qualified by relevance, $F(1, 160)$ = 5.54, p = .02, η = .03. As we predicted, although construal level had no effect on non-tanners, $F(1, 132)$ = 0.27, p = .61, η = .00, tanners engaged in high-level (M = 4.54, SD = 1.59) relative to low-level construal (M = 2.81, SD = 1.49) were more motivated to seek additional information after receiving feedback about their ostensibly changeable skin cancer risk, $F(1, 28)$ = 8.96, p = .006, η = .24.

We next examined these data as a function of relevance. Non-tanners were generally more motivated to get additional information when skin cancer risk was portrayed as unchangeable (M = 4.30, SD = 1.61) relative to changeable (M = 3.68, SD = 1.65), $F(1, 260)$ = 9.25, p = .003, η = .03; no other significant effects emerged (ps > .23). Tanners, on the other hand, were generally more motivated to get additional information when engaged in high-level

(*M* = 4.08, *SD* = 1.62) rather than low-level construal (*M* = 3.21, *SD* = 1.73), *F*(1, 59) = 4.63, *p* = .036, η = .07. As predicted, however, this was qualified by changeability, *F*(1, 59) = 3.96, *p* = .05, η = .06. Conceptually replicating Studies 2 and 3, tanners engaged in high-level (*M* = 4.54, *SD* = 1.59) relative to low-level construal (*M* = 2.81, *SD* = 1.49) were more motivated to seek additional information, but only when they believed their risk to be changeable, *F*(1, 28) = 8.96, *p* = .006, η = .24, and not when they believed it to be unchangeable, *F*(1, 31) = 0.01, *p* = .91, η < .01.

Interpretation of the Author's Intentions. We then examined participants' attributions of the authors' intentions as an indirect measure of how they interpreted the feedback. In general, those who were led to believe their skin cancer risk was changeable (*M* = 6.07, *SD* = 0.75) rather than unchangeable (*M* = 5.63, *SD* = 0.95) were more likely to interpret the author's intentions as more helpful rather than threatening, *F*(1, 319) = 17.72, *p* < .001, η = .05. However, this general pattern was moderated by construal level, *F*(1, 319) = 4.51, *p* = .03, η = .01. There were no effect of changeability among those engaged in low-level construal, *F*(1, 167) = 2.06, *p* = .15, η = .01, whereas among those engaged in high-level construal, feedback about changeable risks (*M* = 6.10, *SD* = 0.71) were perceived as more helpful than unchangeable risks (*M* = 5.55, *SD* = 0.95), *F*(1, 152) = 21.22, *p* < .001, η = .12. Critically, as predicted, construal level, relevance, and changeability interacted to influence participants' interpretation of the author's intentions, *F*(1, 319) = 4.12, *p* = .04, η = .01 (see Figure 5).

We first examined these data as a function of changeability. When one's risk was portrayed as unchangeable, there were no significant effects of construal level or relevance on interpretation of the author's intentions (all *p*s > .11). However, when one's risk was portrayed as changeable, construal level and tanning status jointly impacted participants' interpretation of

the author's intentions, $F(1, 160) = 2.83$, $p < .10$, $\eta = .02$. None of the specific focal comparisons reached conventional levels of significance, although inspection of the general pattern of results supported our predictions. Whereas construal level had little impact on non-tanners, $F(1, 132) = 0.08$, $p = .78$, $\eta = .001$, engaging in high-level relative to low-level construal promoted interpreting the author's intentions as helpful rather than threatening among tanners, $F(1, 28) = 2.51$, $p = .12$, $\eta = .08$.

We next examined the data as a function of relevance. Non-tanners generally interpreted the author's intentions as being more helpful when it was portrayed as changeable ($M = 6.08$, $SD = 0.66$) rather than unchangeable ($M = 5.68$, $SD = 0.89$), $F(1, 260) = 16.36$, $p < .001$, $\eta = .06$. No other significant effects emerged among non-tanners (ps > .65). Tanners also tended to interpret the author's intentions as more helpful when it was portrayed as changeable ($M = 6.07$, $SD = 0.75$) rather than unchangeable ($M = 5.43$, $SD = 1.14$), $F(1, 59) = 5.72$, $p = .02$, $\eta = .09$. Critically, this pattern was moderated by construal level, $F(1, 59) = 3.89$, $p = .05$, $\eta = .06$. Although specific focal comparisons were not statistically significant, the data conformed to our predictions. When risk was portrayed as changeable, tanners engaged in high-level construal ($M = 6.24$, $SD = 0.58$) were more likely to interpret the author's intentions as helpful feedback than those engaged in low-level construal ($M = 5.81$, $SD = 0.93$), $F(1, 28) = 2.51$, $p = .12$, $\eta = .08$. When risk was portrayed as unchangeable, this pattern appeared to reverse: tanners engaged in low-level construal ($M = 5.70$, $SD = 1.13$) interpreted the author's intentions as more helpful than those engaged in high-level construal ($M = 5.17$, $SD = 1.13$), $F(1, 31) = 1.84$, $p = .19$, $\eta = .06$.

Mediation. We tested whether participants' differential interpretations of the author's intentions as helpful (vs. threating) mediated the effect of construal level, relevance, and

changeability on openness to negative diagnostic information using procedures recommended by Shrout and Bolger (2002; see also Preacher & Hayes, 2004). Specifically, we tested the indirect effect of the interaction between construal level, relevance, and changeability on feedback acceptance (as assessed by motivation for additional feedback-consistent information) through interpretation of the author's intentions using bias-corrected boot-strapping procedures (N = 1000) to generate 95% confidence intervals. These analyses revealed a statistically significant indirect effect: $\beta_{\text{Indirect}} = 0.31$, *CI* [.0003, .1040] (see Figure 6). This provides some evidence that participants' differential interpretations of the author's intentions mediated the effect of construal level, relevance, and changeability on feedback acceptance. More broadly, these data are consistent with our proposal that what leads people engaged in high-level relative to low-level construal to accept negative feedback is a change in the meaning of the information. Rather than represent something painful, high-level construal may promote understanding that negative information is valuable and useful feedback.

General Discussion

In the present research, we examined the conditions that lead people to pursue self-change rather than self-protection when confronted with negative self-relevant information. Four studies showed that high-level construal increased motivation for self-change relative to low-level construal when the information was self-relevant and change was possible. Specifically, when exposed to negative feedback, participants engaged in high-level, relative to low-level, construal evidenced enhanced openness to additional negative information. We also examined the cognitive and motivational mechanisms set into motion by high-level construal.

By systematically comparing reactions of those for whom the negative feedback was self-relevant versus not relevant, we were able to examine an important boundary condition that

influences the dual-motive dynamics that we propose underlie the effect of construal on acceptance of negative feedback. Specifically, the conflict between self-protection and self-change motivations is most acute when negative feedback is motivationally relevant; any factor that favors one motivation over the other should thus exert its greatest impact when feedback is self-relevant versus irrelevant. Indeed, in all four studies, high-level, relative to low-level, construal enhanced acceptance of negative feedback only among those for whom the feedback was self-relevant (i.e., health messages about the risk of skin cancer targeted to those most at risk).

Studies 2-4 highlighted a second critical boundary condition; namely, the perceived changeability of the feedback domain (e.g., Dweck & Leggett, 1988; Johnson & Fujita, 2012; Trope et al., 2003). We reasoned that if high-level construal indeed promotes self-change motives over self-change motives, then the effect of construal should be evident only when the feedback domain was actually changeable. When no change is possible, there should be no motivational conflict between self-change and self-protection motives, and thus no balance of motivations to tip with a change in construal. As we predicted, high-level construal enhanced acceptance of negative feedback only when it was instrumental for improving one's self over time (i.e., when a self-relevant health risk was perceived as changeable). When negative feedback was not instrumental for self-change (i.e., when a self-relevant health risk was perceived as unchangeable), high-level construal had no detectable effect on feedback acceptance as compared to low-level construal. People's sensitivity to the perceived changeability of the feedback domain as a boundary condition supports the assertion that construing feedback in higher level terms reduces self-protection concerns and enhances acceptance in service of self-change when confronted with negative diagnostic information.

Finally, Study 4 provided preliminary evidence that a change in the meaning of negative information may be a critical cognitive mechanism. Findings from Study 4 suggest that high-level construal led participants to view the author's intentions as helpful rather than hurtful. Echoing the motivational dynamics described above, however, this was true only when the feedback domain was relevant and perceived as changeable. This change in interpretation of what negative feedback represents also mediated the impact of our manipulations on people's willingness to receive additional information. These data suggest then that a change in subjective meaning of what negative feedback means from painful threat to useful feedback may be a critical step by which high-level relative to low-level construal promotes the self-change process.

As noted in the Introduction, the current research extends the work of Freitas and colleagues (2001) in two important ways. First, we demonstrate that changes in construal level not only change people's willingness to seek out and expose themselves to diagnostic negative information, but also influence how they respond to such information when exposed to it. Beyond information avoidance, then, high-level and low-level construal also appear to impact people's information processing and behavioral acceptance of negative feedback. These findings thus promote our understanding of people's reactions to negative diagnostic information when such information cannot be avoided, and help to provide a more complete picture of when people engage in self-protection versus self-change.

Second, the present research highlights motivational relevance and the perceived changeability of the feedback domain as two critical moderators for the acceptance and processing of negative information. High-level construal is not a panacea for increasing assimilation of negative feedback. Indeed, as noted previously, high-level construal promotes

greater openness to negative information only to the extent that the information is perceived as motivationally relevant and instrumental in promoting self-change. Thus, the present results not only suggest the important role of construal in how people respond to negative information, but also highlight two critical boundary conditions. Future research might test whether these factors moderate the effect of construal on information exposure in the same manner as it moderates the effect of construal on negative feedback acceptance.

The present findings may also speak to research on self-affirmation. Extensive research has shown that affirming one's core values increases openness to negative self-relevant information (e.g., Epton & Harris, 2008; Harris & Napper, 2005; Klein & Harris, 2009; Sherman, Nelson, & Steele, 2000). The precise mechanisms by which this self-affirmation exerts its effect, however, are not well understood (e.g., McQueen & Klein, 2006; Sherman & Cohen, 2006). Emerging research suggests that one consequence of affirming one's values may be the construal of events in higher-level rather than lower-level terms (e.g., Schmeichel & Vohs, 2009; Wakslak & Trope, 2009). For example, Wakslak and Trope (2009) found that after completing a values-affirmation manipulation, participants were more likely to identify behaviors in terms of the superordinate end-states they achieve as opposed to subordinate means by which to perform them. Combined with these past findings, the present research may suggest that a change in construal level may be one mechanism by which self-affirmation enhances receptivity to negative feedback. Self-affirmation may promote high-level rather than low-level construal, which in turn set into motion the processes that we have attempted to document in the present research.

We might note that little work has been done in the self-affirmation literature examining the perceived changeability of the feedback domain as a potential moderator (cf., Howell &

Shepperd, 2012). We find this somewhat surprising, given the prominence of this variable in the self-motives literature (e.g., Dweck & Leggett, 1988; Sedikides & Hepper, 2009; Taylor, Neter, & Wayment, 1995; Trope, 1986; Trope & Neter, 1994). If indeed self-affirmation reduces defensiveness by promoting high-level rather than low-level construal, one might anticipate that perceived changeability of the feedback to domain to play a critical moderating role. Future research needs to address this issue.

More broadly, the present work may provide an integrative theoretical framework for understanding when people will be open to and accept negative diagnostic information. Beyond self-affirmation, any factor that promotes high-level over low-level construal should enhance openness to negative feedback. As noted earlier, research on CLT highlights psychological distance as a critical determinant of construal level. Distancing diagnostic negative information in time, space, social distance, and hypotheticality should have analogous results to those presented in this paper. Thus, CLT predicts that people will advise their friends (who are socially distant relative to one's self) to accept negative feedback whereas they might dismiss the same feedback for themselves (e.g., Weinstein, 1983; Weinstein & Lachendro, 1982). Similarly, they should be more open to negative information when it is presented as hypothetical than real.

Research has also highlighted numerous factors beyond self-affirmation and psychological distance that appear to impact construal level. For example, research suggests that positive versus negative mood promotes high-level versus low-level construal, respectively (e.g., Gasper & Clore, 2002). Intriguingly, positive moods have also been shown to enhance openness to self-threatening information (e.g., Raghunathan & Trope, 2002; Trope & Neter, 1994). Our theoretical perspective would suggest a change in construal level may be one possible mechanism for this latter finding (for similar argument, see Trope, Igou, & Burke, 2006). A

number of other factors have been also been shown to promote high-level versus low-level construal, respectively, such as 3rd versus 1st person visual perspective (Libby, Shaeffer, & Eibach, 2009), cognitive disfluency versus fluency (Alter & Oppenheimer, 2008), abstract versus concrete language (Semin & Fiedler, 1988), and even high versus low ceilings (Meyers-Levy & Zhu, 2007). Each of these might be expected to enhance openness to negative diagnostic information. Thus, the present theoretical perspective may be able to integrate past findings under a single integrative framework, and be used to generate novel research hypotheses.

In addition to theoretical contributions, this work has important pragmatic implications for anyone interested in reducing the defensive responses that serve as barriers to self-change. The present research focused on responses to health communications, an important domain in which defensive dismissal of negative information has significant health and financial costs. We might expect similar findings, however, for any domain for which the dynamic between self-change and self-protection motivations is relevant. Although Study 3 represents an important first step in extending this work from the lab to the field, more still needs to be done. Future research, for example, might seek to develop more ecologically valid interventions that effectively promote high-level over low-level construal of settings that may provide the diagnostic negative information necessary for self-change. Furthermore, beyond post-feedback information search, future research might investigate other behavioral efforts at self-change. It remains to be demonstrated, for example, whether high-level, relative to low-level, construal of health messages actually promotes preventative health behaviors and promote better health. The present research suggests that helping people to take a psychological “step back” and to “view the forest instead of the individual trees” may indeed help to promote such self-change efforts by reducing interference from self-protection concerns.

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Footnotes:

[1]Agrawal & Wan (2009) have argued that processing of self-relevant health risk messages depletes self-regulatory resources (e.g., Muraven & Baumeister, 2000). They have shown that processing self-relevant health messages in one domain (e.g., hepatitis C) reduces processing of subsequent health messages in a different domain (e.g., dental hygiene). Interposing a manipulation of high-level (vs. low-level) construal between the two health messages, however, reduced the deleterious effects of regulatory resource depletion and enhanced processing of the second message. Although this is consistent with our claim that high-level construal may enhance processing of negative self-relevant information, a direct link to the present work is made difficult due to the manipulation of regulatory resource depletion in Agrawal & Wan's (2009) work. They found no positive effect of high-level construal in the absence of regulatory resource depletion, which represents the critical context that we examine in the present studies. We suspect that the perceived changeability of the feedback domain may explain why we find an effect of construal level under conditions in which they did not.

[2]We measured whether participants had a family history of skin cancer in the other studies as well. In Studies 1 and 4, although the pattern of results is generally similar when analyzing the data using family history as an operationalization for relevance, the effects were not statistically significant. We might note that tanning behavior is a more proximal and direct risk factor for skin cancer, and therefore may capture the conceptual essence of motivational relevance to a greater extent than family history. We might also add that using tanning behavior, despite the low *N*, rather than family history in Study 2 as our operationalization of relevance led to the same predicted pattern of results, although not at the standards of traditional statistical significance. This is probably due in large part to a lack of statistical power brought about by the

low *N*. We did not assess tanning behavior in Study 3, for the reasons noted in the Method section.

Appendix A

Skin cancer is the most commonly diagnosed cancer in the United States. There are more than a million cases of skin cancer diagnosed each year. There are three distinct types of skin cancer. Melanoma is the most serious form of skin cancer that claims as many as 8,650 lives per year. Approximately 69,000 cases were diagnosed in 2009 alone.

Skin cancer occurs when the body is exposed to ultraviolet light, typically from BOTH the sun or a tanning bed. Both UVA and UVB rays can damage your skin. A suntan is produced because your skin tries to block harmful ultraviolet light. A suntan is actually indicating that your skin is being damaged. It is important to remember that any exposure to harmful UV rays, whether by the sun or by a tanning bed, significantly increases your risk of skin cancer. This can occur even in the winter months because UV damage accumulates over time.

There are many risk factors associated with skin cancer. Factors that are known to increase skin cancer risk include tanning behaviors, not wearing protective clothing, and failure to use and apply sunblock products. Individuals who tan and do not put on adequate protection are at a higher risk for skin cancer. This means that people who tan are more likely to be diagnosed with and die from skin cancer.

Appendix B

High Changeability Message

Skin cancer is the most commonly diagnosed cancer in the United States. There are more than a million cases of skin cancer diagnosed each year. There are three distinct types of skin cancer. Melanoma is the most serious form of skin cancer that claims as many as 8,650 lives per year. Approximately 69,000 cases were diagnosed in 2009 alone.

Skin cancer occurs when the body is exposed to ultraviolet light, typically from BOTH the sun or a tanning bed. Both UVA and UVB rays can damage your skin. A suntan is produced because your skin tries to block harmful ultraviolet light. A suntan is actually indicating that your skin is being damaged. It is important to remember that any exposure to harmful UV rays, whether by the sun or by a tanning bed, significantly increases your risk of skin cancer.

There are many risk factors associated with skin cancer. Factors that are known to increase skin cancer risk include tanning behaviors, not wearing protective clothing, and failure to use and apply sunblock products. Individuals who tan and do not put on adequate protection are at a higher risk for skin cancer. This means that people who tan are more likely to be diagnosed with and die from skin cancer.

Low Changeability Message

Skin cancer is the most commonly diagnosed cancer in the United States. There are more than a million cases of skin cancer diagnosed each year. There are three distinct types of skin cancer. Melanoma is the most serious form of skin cancer that claims as many as 8,650 lives per year. Approximately 69,000 cases were diagnosed in 2009 alone.

Skin cancer occurs when the body is exposed to ultraviolet light, typically from BOTH the sun or a tanning bed. Both UVA and UVB rays can damage your skin. A suntan is produced because your skin tries to block harmful ultraviolet light. A suntan is actually indicating that your skin is being damaged. It is important to remember that any exposure to harmful UV rays, whether by the sun or by a tanning bed, significantly increases your risk of skin cancer.

There are many risk factors associated with skin cancer. Factors that are known to increase skin cancer risk include genetics, family history of skin cancer, age, and race. Individuals who have light skin color or family history are at a higher risk for skin cancer. This means that people who are light-skinned are much more likely to be diagnosed with and die from skin cancer.

Appendix C

High Changeability Message

Skin cancer is the most common form of cancer in the United States. There are more than 3.5 million cases of skin cancer diagnosed each year. In fact, each year there are more new cases of skin cancer than lung, breast, prostate, and colon cancer ***combined!*** One in five Americans will develop skin cancer in the course of their lifetime. The American Cancer Society estimates that there will be more than 9,000 deaths in the US in 2013.

About 86% of melanoma skin cancers are due to exposure to ultraviolet (UV) radiation from the sun alone. Tanning beds are a unique form of UV radiation that dramatically increase your risk for skin cancer. This UV light causes people to develop darker skin, or tans, because your skin tries to block the harmful ultraviolet light. Therefore, each time you get a suntan, your skin is being damaged. It is important to remember that any exposure to harmful UV rays, whether by the sun or by a tanning bed, significantly increases your risk of skin cancer. This can occur even in the winter months because UV damage accumulates over time.

There are many risk factors associated with skin cancer. Just one indoor tanning session increases users' chances of developing melanoma by 20% and each additional session during the same year boosts the risk by almost another 2%. If you go tanning only 5 times throughout the year, your risk for skin cancer is 30% higher than if you choose not to tan. Therefore, your risk for skin cancer is something you can control. If you choose to wear protective clothing, apply sunblock regularly, and avoid UV radiation, you will be able to reduce your risk you already have due to UV exposure.

Low Changeability Message

Skin cancer is the most common form of cancer in the United States. There are more than 3.5 million cases of skin cancer diagnosed each year. In fact, each year there are more new cases of skin cancer than lung, breast, prostate, and colon cancer ***combined!*** One in five Americans will develop skin cancer in the course of their lifetime. The American Cancer Society estimates that there will be more than 9,000 deaths in the US in 2013.

About 86% of melanoma skin cancers are due to exposure to ultraviolet (UV) radiation from the sun alone. Tanning beds are a unique form of UV radiation that dramatically increase your risk for skin cancer. This UV light causes people to develop darker skin, or tans, because your skin tries to block the harmful ultraviolet light. Therefore, each time you get a suntan, your skin is being damaged. It is important to remember that any exposure to harmful UV rays, whether by the sun or by a tanning bed, significantly increases your risk of skin cancer. This can occur even in the winter months because UV damage accumulates over time.

There are many risk factors associated with skin cancer. Just one blistering sunburn in childhood or adolescence more than doubles a person's chances of developing melanoma later in life! Even if you had sunburns as a child that didn't blister, it only takes five sunburns over a lifetime doubles one's chances of developing melanoma. Therefore, your risk for skin cancer is

something you can't control. If you choose to wear protective clothing, apply sunblock regularly, and avoid UV radiation, you won't be able to reduce the risk you already have due to your childhood sun exposure.

Appendix D

Motivation to Get Additional Information Items:
Please use the following scale to answer each question.

1	2	3	4	5	6	7
Not at all						Extremely

1. How motivated are you to seek out additional information about reducing your risk for skin cancer?
2. How motivated are you to receive additional information about reducing your risk for skin cancer?
3. How motivated are you to schedule an appointment with a dermatologist?

Construal of the Message Items:
Please use the following scale to indicate your agreement/disagreement with each statement.

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree Nor Disagree	Somewhat Agree	Agree	Strongly Agree

1. The author wanted to make me look foolish with this message.*
2. The author wanted to make me feel ashamed of my behavior.*
3. The author wanted to make me feel embarrassed after reading this message.*
4. The author wanted to make me feel uncomfortable when reading this message.*
5. The author wrote this information to make me recognize a problem so that I could fix it.
6. The author was trying to help me improve my health.
7. The author wanted to make me realize I am at risk for skin cancer so that I can be careful about my behavior and reduce my risk.
8. The author of this message was trying to help me understand my risk for skin cancer so I could change it.
9. The author wanted to educate me about skin cancer with this message.
10. The author wanted to enlighten me about my risk for skin cancer with this message.
11. The author wanted to impart knowledge about my risk for skin cancer with this message.
12. The author wanted to explain my risk for skin cancer with this message.

Items with a * indicate reverse-scored items.

Figure Captions

Figure 1. Motivation to reduce risk as a function of construal level and relevance (Study 1). Error bars indicate standard error of the mean.

Figure 2. Post-feedback information search as a function of construal level, relevance, changeability and article type (Study 2). Error bars indicate standard error of the mean.

Figure 3. Post-feedback information search as a function of construal level, relevance, and changeability (Study 3).

*Figure 4.*Post feedback information search motivation as a function of construal level, changeability and relevance (Study 4). Error bars indicate standard error of the mean.

Figure 5. Construal of the negative feedback as helpful as a function of construal level, relevance, and changeability (Study 4). Error bars indicate standard error of the mean.

Figure 6. Construal of the negative feedback as helpful as a mediator of the interactive effect of construal level, changeability, and relevance on post-feedback information search motivation (Study 4). The figure shows the standardized regression coefficients, which were estimated using methods by Shrout & Bolger (2002). For the path between the three-way interaction and motivation to reduce risk, the coefficient in parenthesis shows the result when the mediator was not included in the model, and the other coefficient shows the result when the mediator was included in the model. Asterisks indicate coefficients that were significantly different from zero (* $p < .05$, † $p < .10$).

Figure 1.

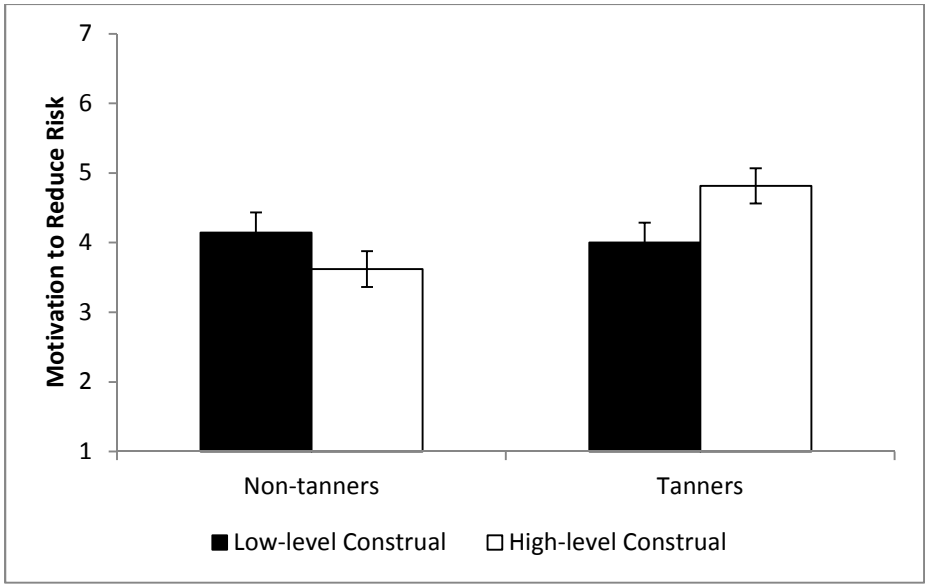
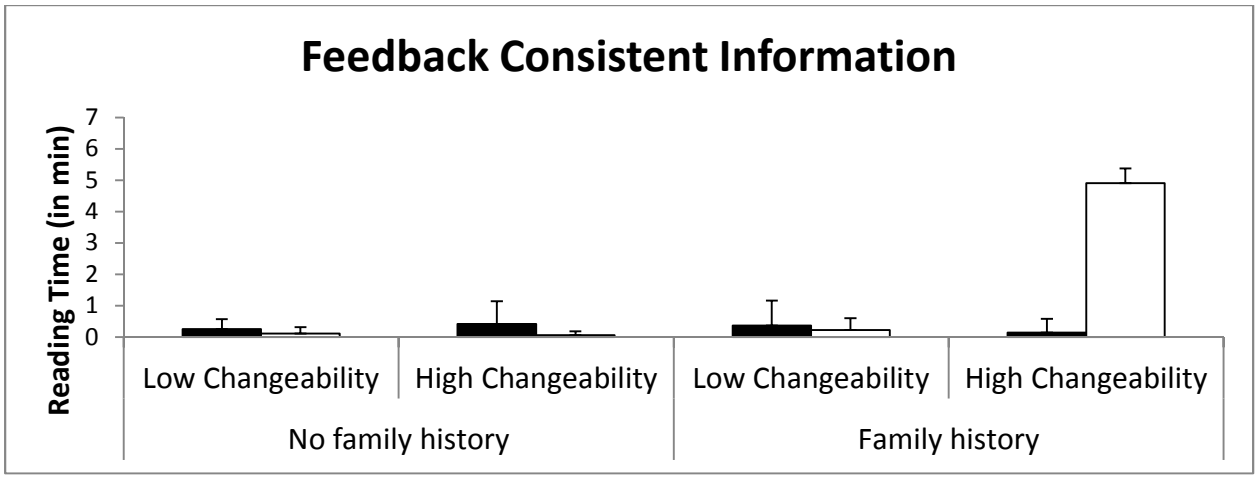


Figure 2.



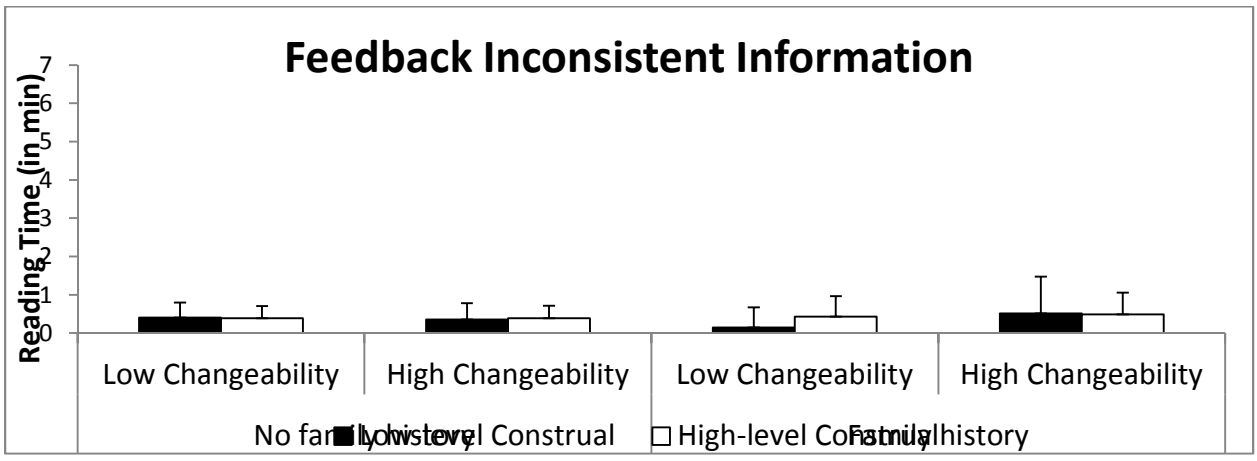
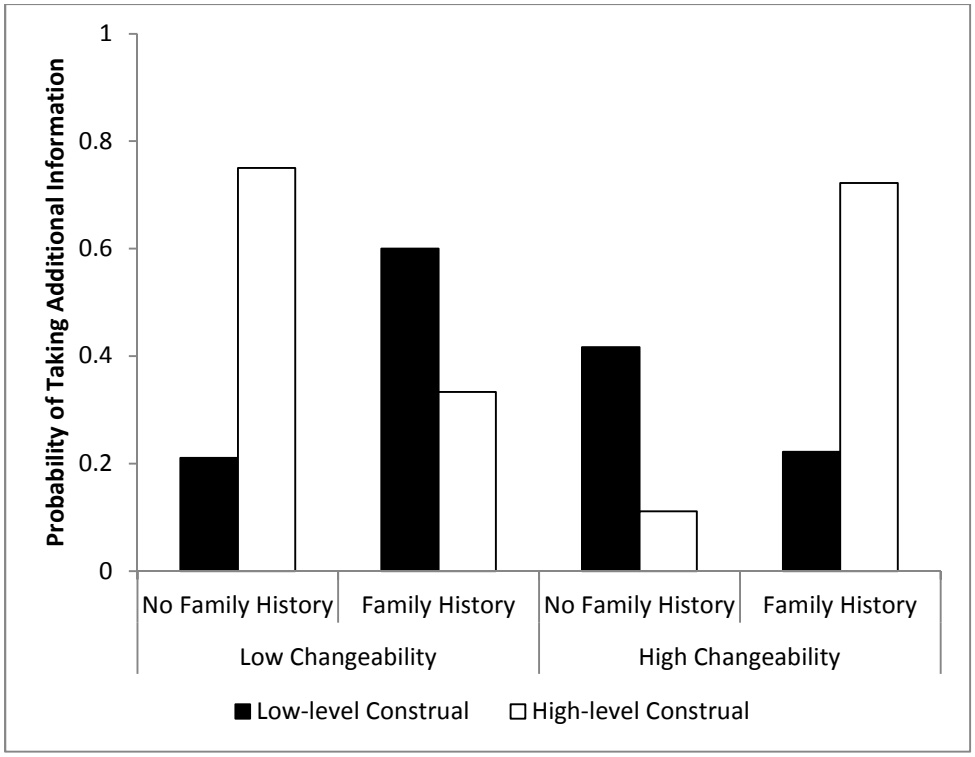


Figure 3.



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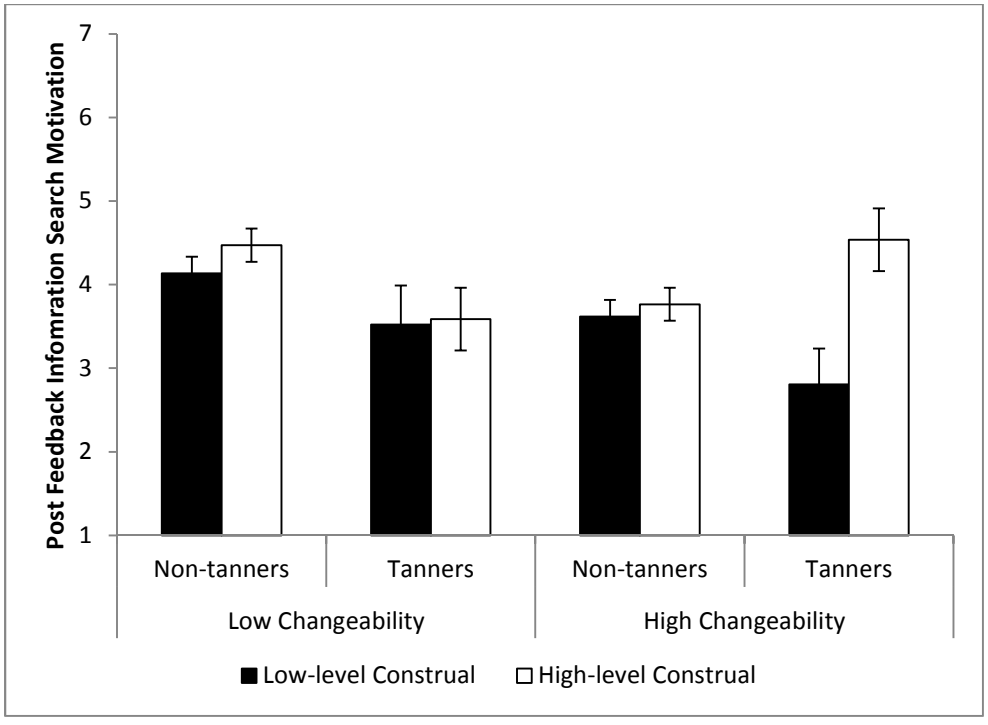


Figure 5.

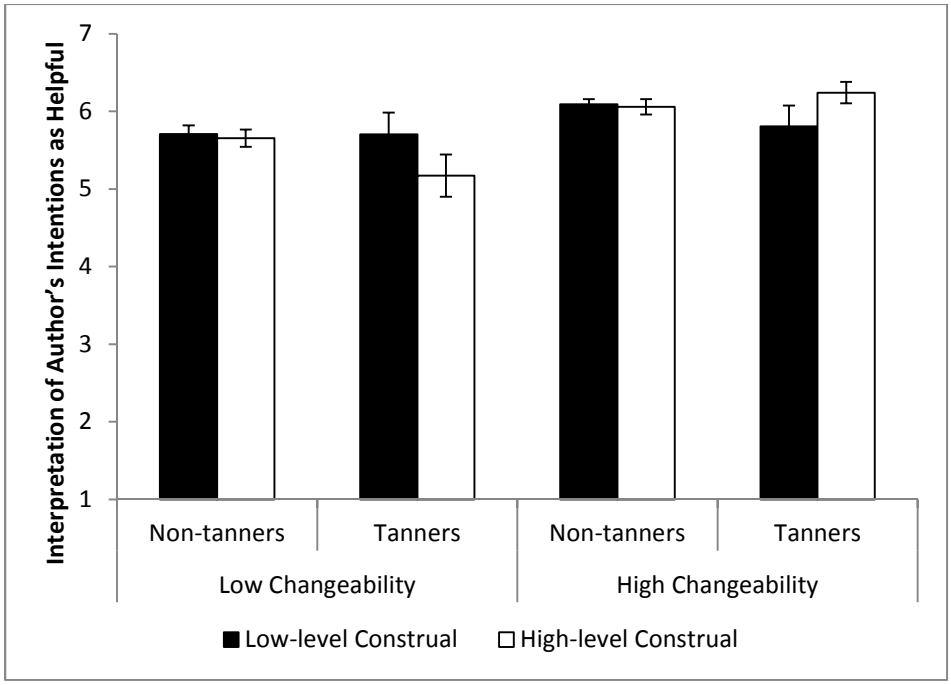
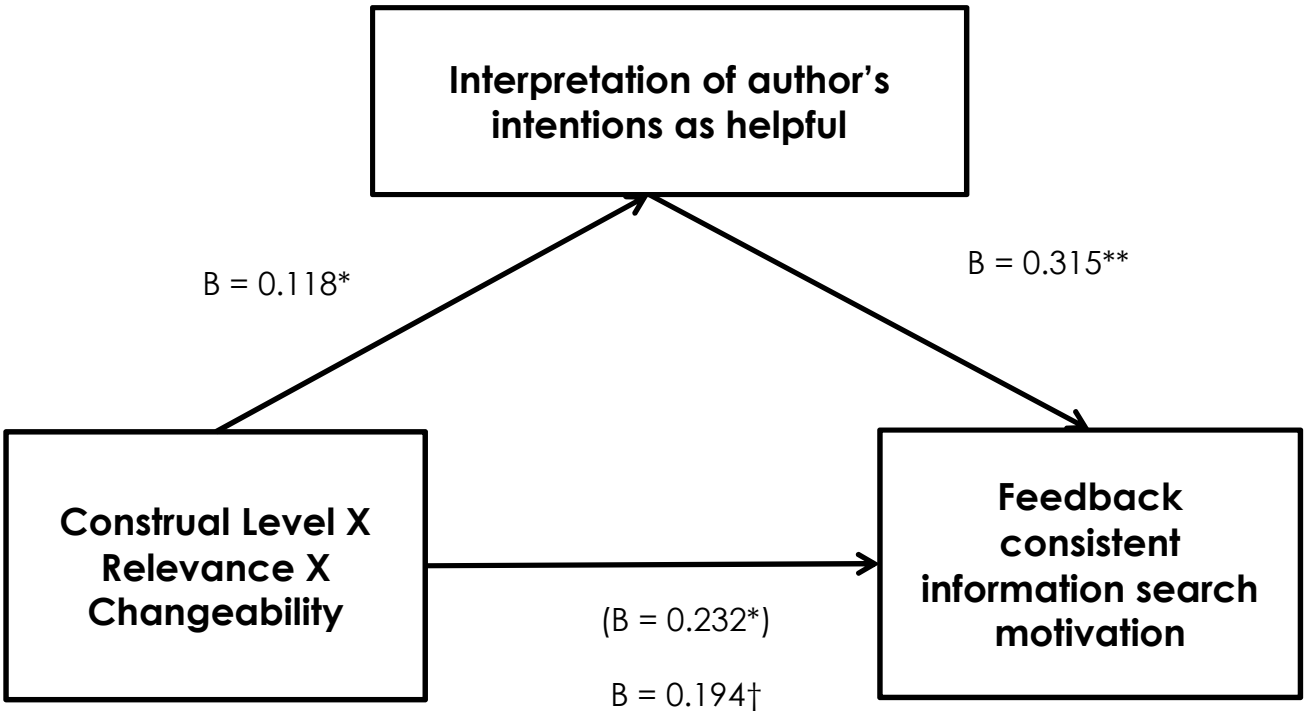


Figure 6.



Indirect Effect = 0.037, 95% CI: (0.0003, 0.1040)