

Psychological Science

<http://pss.sagepub.com/>

Calibrating the Response to Health Warnings : Limiting Both Overreaction and Underreaction With Self-Affirmation

Dale W. Griffin and Peter R. Harris

Psychological Science published online 11 April 2011

DOI: 10.1177/0956797611405678

The online version of this article can be found at:

<http://pss.sagepub.com/content/early/2011/04/10/0956797611405678>

Published by:



<http://www.sagepublications.com>

On behalf of:



[Association for Psychological Science](http://www.sagepublications.com)

Additional services and information for *Psychological Science* can be found at:

Email Alerts: <http://pss.sagepub.com/cgi/alerts>

Subscriptions: <http://pss.sagepub.com/subscriptions>

Reprints: <http://www.sagepub.com/journalsReprints.nav>

Permissions: <http://www.sagepub.com/journalsPermissions.nav>

Calibrating the Response to Health Warnings: Limiting Both Overreaction and Underreaction With Self-Affirmation

Dale W. Griffin¹ and Peter R. Harris²

¹Sauder School of Business, University of British Columbia, and ²Department of Psychology, University of Sheffield

Psychological Science
 XX(X) 1–7
 © The Author(s) 2011
 Reprints and permission:
sagepub.com/journalsPermissions.nav
 DOI: 10.1177/0956797611405678
<http://pss.sagepub.com>


Abstract

Self-affirmation, reflecting on one's defining personal values, increases acceptance of threatening information, but does it do so at the cost of inducing undue alarm in people at low risk of harm? We contrast an *alarm model*, wherein self-affirmation simply increases response to threat, with a *calibration model*, wherein self-affirmation increases sensitivity to the self-relevance of health-risk information. Female seafood consumers ($N = 165$) completed a values self-affirmation or control task before reading a U.S. Food and Drug Administration brochure on mercury in seafood. Findings support the calibration model: Among frequent seafood consumers, self-affirmation generally increased concern (reports of depth of thought, personal message relevance, perceived risk, and negative affect) for those high in defensiveness and reduced it for those low in defensiveness. Among infrequent consumers of seafood, self-affirmation typically reduced concern. Thus, self-affirmation increased the sensitivity with which women at different levels of risk, and at different levels of defensiveness, responded cognitively and affectively to the materials.

Keywords

self-affirmation, defensiveness, optimistic denial, risk, health-risk information

Received 6/24/10; Revision accepted 11/2/10

A successful health-warning message leads to a well-calibrated level of concern: Individuals at high risk respond strongly, whereas those at low risk do not. One type of miscalibration results when fear-arousing appeals cause undue worry and overly zealous precaution taking. For example, a recent court ruling (California Court of Appeal for the First Appellate District) that health warnings about the presence of mercury in canned tuna should not be posted in supermarkets was based on the judge's belief that such warnings would lead to unfounded fear and depress healthy seafood consumption by consumers outside the target audience of pregnant women (Hightower, 2009, pp. 230–231). Another type of miscalibration results when individuals at high risk respond defensively, denying the personal relevance of the message to limit their immediate emotional response. For example, committed smokers rarely increase their level of concern in response to antismoking warnings and may even show an increased motivation to smoke (Wolburg, 2006). An ideal warning message will avoid both Type I errors (i.e., individuals not at risk responding unnecessarily) and Type II errors (i.e., individuals at risk not responding).

We begin with the assumption that every individual has an appropriate, or optimal, level of concern about a given risk

message according to that individual's risk factors, such as his or her level of product consumption or biological predisposition. This assumption is graphically represented in Figure 1: The graphs illustrate that individuals who regularly engage in a risky behavior, such as the consumption of a risk-relevant product, should experience higher levels of concern (Fig. 1a) than individuals who rarely engage in the risky behavior (Fig. 1b). In this model, the deviation of an individual's experienced level of concern from his or her optimal level of concern is controlled primarily by the combination of that individual's tendency to deny threat (defensiveness) and level of consumption of the risk-related product.

As illustrated in Figure 1a, defensive individuals with high levels of consumption tend to underrespond (i.e., to be less concerned than optimal) when faced with a fear-arousing communication. This is consistent with the definition of defensiveness as "optimistic denial"—that is, "the use of mildly self-serving distortions to reduce a sense of threat"

Corresponding Author:

Dale W. Griffin, Sauder School of Business, University of British Columbia, 2053 Main Mall, Vancouver, British Columbia, Canada V6T 1Z2
 E-mail: dale.griffin@sauder.ubc.ca

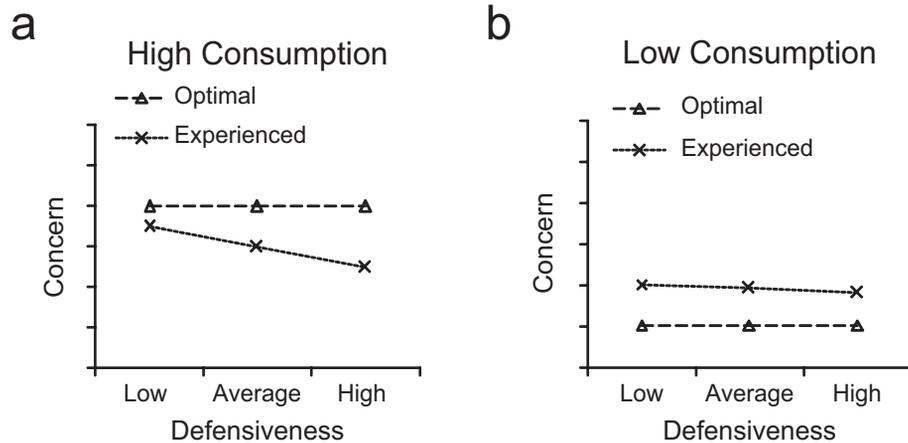


Fig. 1. Hypothesized relationships among the personal relevance of a health-risk message (operationalized as level of tuna consumption), defensiveness, and concern about risk. At high levels of consumption (a), defensive individuals tend to underrespond. At low levels of consumption (b), most individuals tend to overrespond.

(Thompson & Schlehofer, 2008, p. 1077). Figure 1b illustrates that infrequent consumers faced with a salient fear-arousing communication tend to overrespond (i.e., to be more concerned than optimal). This overresponse is consistent with the large literature illustrating how the availability and affect heuristics lead to the overestimation of small but vivid risks (summarized in Slovic, Finucane, Peters, & MacGregor, 2002; Slovic, Fischhoff, & Lichtenstein, 1982). According to recent perspectives, both the overresponse to small risks, caused by the affect heuristic, and the underresponse to larger risks, caused by defensiveness, are triggered by affective cues (Slovic et al., 2002; Thompson & Schlehofer, 2008; Wiebe & Korbel, 2003).

How might responses to risk become better calibrated? According to self-affirmation theory (Steele, 1988), considering important personal values bolsters the perceived integrity of the self and thereby reduces the motivation to avoid threats to the self. This leads to a more open-minded response, reducing defensive responding and associated errors. For example, self-affirmation has been shown to increase sensitivity to argument strength in persuasive messages (Correll, Spencer, & Zanna, 2002) and to increase general message acceptance, perceived personal relevance, reported negative affect, and intention to change behavior in response to messages about threatening health risks (Harris & Epton, 2009).

However, any manipulation that reduces underresponse (a Type II error) is vulnerable to increasing overresponse (a Type I error). This raises the question of whether self-affirmation increases responsiveness to health messages without regard to a recipient's risk factors. Does open-mindedness entail a heightened responsiveness to any potentially fear-evoking information, regardless of relevance (the *alarm* model), or does it entail a nuanced appraisal of the personal relevance of the evidence (the *calibration* model)? Little is known about how self-affirmation affects responding under conditions of low personal relevance (Briñol & Petty, 2009; Harris & Epton, 2009). Moreover, prior studies have not directly measured the effects of defensiveness.

In the study reported here, we examined the effects of self-affirmation at both high and low levels of personal relevance and for individuals high and low in defensiveness. We expected that if self-affirmation improves the calibration of threat appraisal, its effect would be specific, operating most strongly on the most defensive individuals, rather than simply elevating the overall level of responsiveness. We examined the effect of self-affirmation on responses to an actual government health warning about the risk of mercury in seafood (specifically, tuna); in particular, we examined whether self-affirmation operated to nonselectively amplify alarm responses to this health warning or to selectively improve the calibration of those responses, amplifying or reducing alarm depending on the respondent's level of defensiveness and personal relevance (i.e., level of tuna consumption).

The contrasting predictions of the alarm and calibration models are presented in Figures 2 and 3, respectively. Figure 2 illustrates the pattern of responses expected if self-affirmation encourages nonselective acceptance of risk-related information. Such open-minded acceptance implies that all individuals, regardless of their level of consumption or defensiveness, will show increased concern relative to those who are not self-affirmed. Hence, underresponse will be reduced or eliminated among defensive individuals with high consumption levels, but at the cost of increased overresponse among low-consumption individuals (a Type 1 error).

Figure 3, in contrast, illustrates the pattern of responses implied by the calibration model, according to which self-affirmation encourages a critical, nuanced analysis of risk-related information that is sensitive to the actual risk status of the individual. Given that highly defensive frequent consumers should be the most underresponsive, because of their habitual avoidance of the negative affect triggered by self-threats, self-affirmation should increase concern most among these individuals, according to this model. For people predisposed to overresponding, because of the biasing effects of the affect heuristic (e.g., infrequent consumers), the calibration model predicts that self-affirmation will decrease concern.

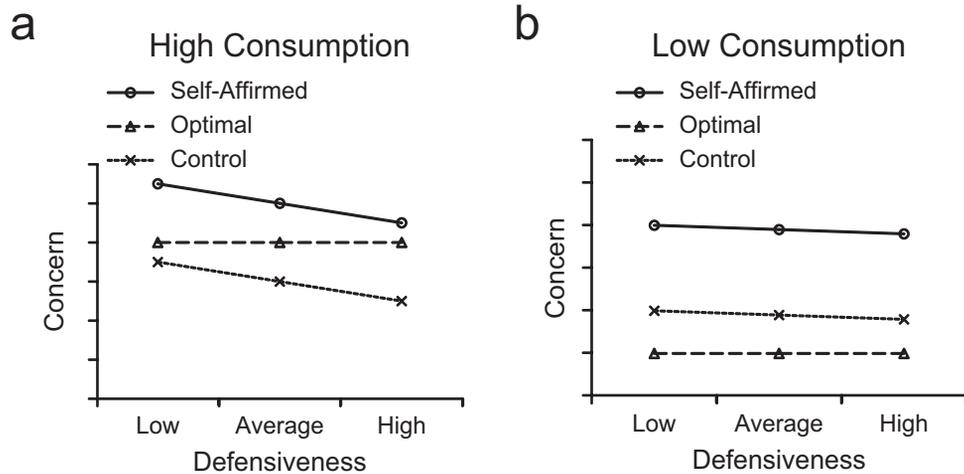


Fig. 2. The alarm model: nonselective effects of self-affirmation on concern about risk. At high levels of consumption (a), self-affirmation decreases underresponding among defensive individuals (reducing Type II error) but induces overresponding among nondefensive individuals (increasing Type I error). At low levels of consumption (b), self-affirmation exacerbates overresponding.

Finally, if overreaction and underreaction to a risk-related message are triggered by affective cues, as we hypothesize, the moderating effects of self-affirmation should be mediated by negative affect. Our goal was to test these predictions using real-world stimuli and a relevant real-world population.

Method

Female participants who were of typical childbearing age (21 to 35 years, $M = 32.1$) and who consumed selected seafood items (tuna, sushi, salmon, or shellfish) at least twice monthly ($N = 165$) were recruited for an online study from a Canadian community survey panel (ethnic origin: 58% Caucasian, 25% East Asian, 9% South Asian, 6% African, and 2% other). Participants first completed defensiveness and consumption

measures and were then randomly assigned to write a short essay describing either why their most important values were relevant to their own lives (self-affirmation condition; $n = 72$) or why their least important values might be relevant to other people’s lives (control condition; $n = 93$; Harris & Napper, 2005). Subsequently, all participants were presented with a U.S. Food and Drug Administration (2009) brochure that is available online and in physicians’ offices and clinics in the United States. The brochure reviews the amount of mercury present in a variety of fish and seafood and recommends that women limit their consumption of certain fish (including various types of tuna) prior to, during, and immediately after pregnancy. Control participants found the message modestly fear arousing ($M = 2.99$) and moderately worrying ($M = 3.86$; both ratings on a 7-point scale from 1, *not at all*, to 7, *extremely*).

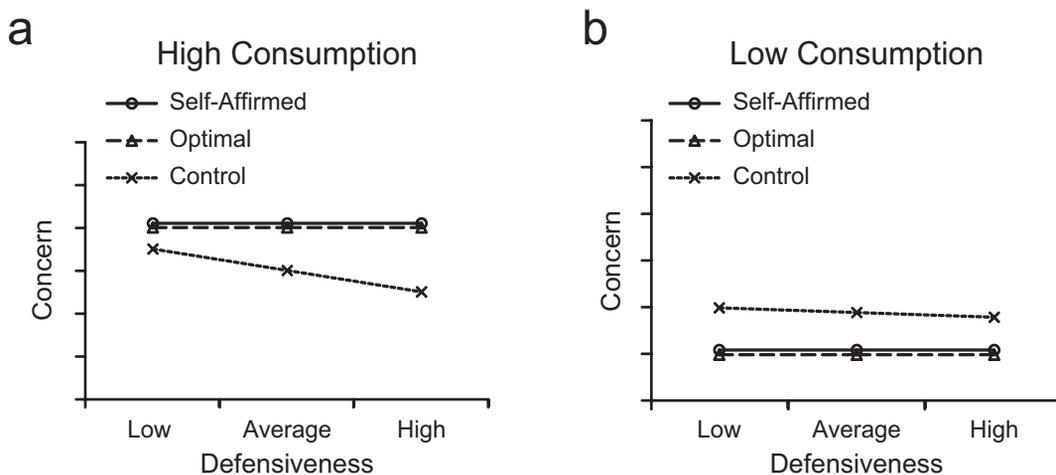


Fig. 3. The calibration model: selective effects of self-affirmation on concern about risk. At high levels of consumption (a), self-affirmation decreases underresponding among defensive individuals (reducing Type II error). At low levels of consumption (b), self-affirmation decreases overresponding (reducing Type I error).

Defensiveness was measured by the short form of the Optimistic Denial subscale of the Threat Orientation Measure (Thompson & Schlehofer, 2008, $\alpha = .75$; $M = 4.34$, $SD = 1.12$). Higher scores on this subscale have been shown to predict reduced responsiveness to messages about health risks under conditions of high personal relevance (Thompson, Schlehofer, Gonzalez, & Denison, in press). Personal relevance was operationalized as the reported level of tuna consumption. Participants reported the frequencies with which they consumed canned tuna ($M = 2.98$, $SD = 0.95$) and tuna sushi and tuna steak ($M = 2.35$, $SD = 1.13$) on a 5-point scale (from 1, *never*, to 5, *more than once a week*). These frequencies were standardized and summed into a composite measure of consumption.

We assessed responsiveness to the health-warning message using a range of measures, including reported depth of thought about the information (“I thought deeply about the information” and “I thought about the risk of methylmercury build-up in my body”; $\alpha = .64$), message relevance (“The content of the article was relevant to me”), personal risk (“How likely are you to get methylmercury build-up in your body”), and reported negative affect about reading the brochure (“I worried about the amount I eat of the types of fish and shellfish high in mercury,” “I felt fearful while reading the leaflet,” “How much did the leaflet make you feel tense?” “How much did the leaflet make you feel anxious?” and “I worry about the consequences of eating the types of fish or shellfish high in mercury”; $\alpha = .92$). Depth of thought and message relevance were rated on 6-point scales (from 1, *not at all*, to 6, *very*

much), and personal risk and negative affect were rated on 7-point scales (e.g., from 1, *not at all worried*, to 7, *extremely worried*; 1, *strongly disagree*, to 7, *strongly agree*).

Results

Mean-centered predictors (self-affirmation condition, tuna consumption, and defensiveness) and their cross-product terms were entered simultaneously into linear regression equations predicting each of the dependent measures. A nonselective amplification effect (which would support the alarm model) would be indicated by a main effect of self-affirmation (as depicted in Fig. 2), with self-affirmation leading to increased responsivity for both frequent and infrequent consumers of tuna, regardless of defensiveness. A selective effect of self-affirmation (which would support the calibration model) would be indicated by a three-way interaction among self-affirmation, level of tuna consumption, and defensiveness (as depicted in Fig. 3), with self-affirmation leading to increased responsivity only for relatively defensive frequent consumers of tuna and to decreased responsivity for infrequent consumers of tuna.¹ Significant three-way interactions were probed using the Johnson-Neyman regions-of-significance test (Preacher, Curran, & Bauer, 2006) to identify, separately for high and low consumption, the levels of defensiveness with significant self-affirmation effects. Table 1 shows the levels of defensiveness at which self-affirmation had significant effects among frequent and infrequent consumers of tuna.²

Table 1. Results From Johnson-Neyman Regions-of-Significance Tests: Levels of Defensiveness at Which Self-Affirmation Significantly Increased or Decreased Self-Reported Concern

Dependent measure	Frequent consumers of tuna		Infrequent consumers of tuna	
	+1 SD	+2 SD	-1 SD	-2 SD
Depth of thought	increased, > +0.23 SD	increased, > -0.16 SD	decreased, > -0.39 SD	decreased, > -0.46 SD
Personal risk	decreased, < -0.89 SD	decreased, < +1.03 SD	—	—
	increased, > +0.50 SD	increased, > +0.46 SD	—	—
Message relevance	—	increased, > +0.78 SD	decreased, > +0.29 SD to < +1.47 SD	decreased, > +0.22 SD
Negative affect	decreased, < -1.53 SD	decreased, < +1.45 SD	—	decreased, > +0.55 SD
	increased, > +0.47 SD	increased, > +0.34 SD	—	—

Note: Frequent consumers were participants at 1 and 2 standard deviations above mean levels of tuna consumption, whereas infrequent consumers were those at 1 and 2 standard deviations below mean levels of consumption. For each cell in which there was a significant effect, the table indicates whether self-affirmation increased or decreased the ratings on the dependent variable and then gives the point on the defensiveness scale (expressed as standard deviations above or below the mean) beyond which the effect of self-affirmation was significant ($\alpha = .05$).

Overview of findings

All four dependent variables (depth of thought, message relevance, personal risk, and negative affect) showed significant three-way interactions among self-affirmation, consumption, and defensiveness. Thus, the results broadly supported the calibration hypothesis. Self-affirmation heightened concern among highly defensive frequent consumers of tuna, who showed increases in reported depth of thought, message relevance, personal risk, and negative affect. In contrast, self-affirmation reduced concern among highly nondefensive frequent consumers, who showed decreases in message relevance, personal risk, and negative affect (but not depth of thought). Across all variables, self-affirmation decreased concern (as indexed by these dependent variables) among infrequent consumers, especially those higher in defensiveness.

Specific findings

The regression analysis on reported depth of thought revealed a significant three-way interaction among self-affirmation, consumption, and defensiveness, a pattern consistent with the calibration model, $\beta = 0.22$, $t(157) = 2.17$, $p = .03$, as well as a negative main effect of defensiveness, $\beta = -0.26$, $t(157) = 2.96$, $p = .004$, and a two-way interaction between self-affirmation and level of consumption, $\beta = 0.37$, $t(157) = 2.97$, $p = .003$. Figure 4 presents regions of significance for depth of thought: Self-affirmation significantly increased reported depth of thought among frequent consumers of tuna who had above-average levels of defensiveness. In contrast, among infrequent consumers, self-affirmation significantly decreased reported depth of thought in all but those low in defensiveness.

Ratings of personal risk also showed a three-way interaction among self-affirmation, consumption, and defensiveness, $\beta = 0.36$, $t(157) = 2.88$, $p = .005$, as well as a significant positive main effect for consumption, a negative main effect for defensiveness, and a two-way interaction between self-affirmation and defensiveness. A regions-of-significance test revealed that for moderately frequent tuna consumers (those at 1 *SD* above the mean), self-affirmation significantly increased risk estimates for defensive individuals and reduced risk estimates for nondefensive individuals (see Table 1).

The regression analysis on message relevance also revealed a significant three-way interaction among self-affirmation, consumption, and defensiveness, $\beta = 0.31$, $t(157) = 2.25$, $p = .03$. For very frequent consumers (consumption defined as 2 *SD* above the mean), self-affirmation increased perceived relevance among defensive individuals (see Table 1). For infrequent consumers, self-affirmation decreased perceived relevance among individuals with moderate to high levels of defensiveness.

Affective reactions also showed the three-way interaction among self-affirmation, consumption, and defensiveness, $\beta = 0.35$, $t(157) = 3.13$, $p = .002$, as well as a significant positive main effect for consumption and a negative main effect for defensiveness. For moderately frequent consumers, self-affirmation increased reported negative affect among defensive individuals and decreased reported negative affect among highly nondefensive individuals.

Finally, using a mediation analysis for moderated regression (Muller, Judd, & Yzerbyt, 2005), we examined whether the three-way interactions were consistent with mediation by negative affect, that is, whether the combination of self-affirmation, level of consumption, and defensiveness together created an affective response that in turn triggered the

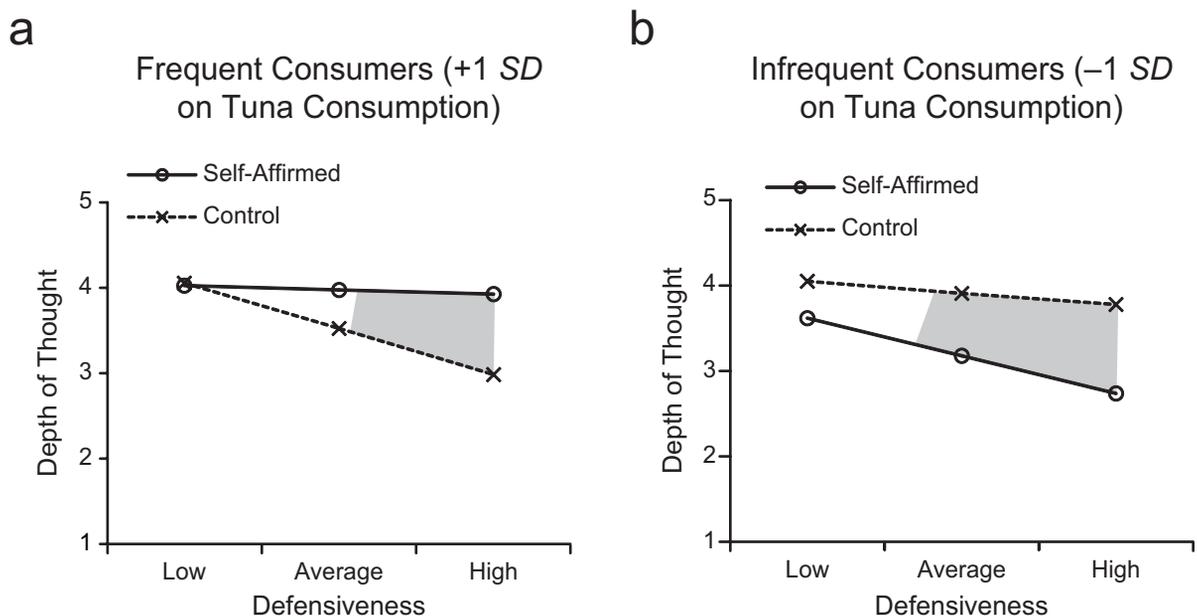


Fig. 4. The effect of self-affirmation on reported depth of thought at different levels of consumption and defensiveness. The high-consumption graph (a) represents the pattern for individuals 1 standard deviation above the mean in tuna consumption. The low-consumption graph (b) represents the pattern for individuals 1 standard deviation below the mean in tuna consumption. The shaded areas represent regions where the self-affirmation and control groups differed significantly in reported depth of thought (see Table 1).

outcome response. In this analysis, we tested whether negative affect (the mediator) was related to the dependent variable within conditions, and whether the between-condition pattern of the Self-Affirmation \times Consumption \times Defensiveness interaction for negative affect corresponded with the pattern of the interaction for each dependent measure. This multistep analysis revealed that for each dependent variable, the pattern defined by Muller et al. was fulfilled: In particular, there was a significant Self-Affirmation \times Consumption \times Defensiveness interaction when negative affect was treated as a dependent variable; the Self-Affirmation \times Consumption \times Defensiveness interactions on the other dependent variables were reduced to nonsignificance when affect and its interactions with self-affirmation, consumption, and defensiveness were added; and when affect was added as a mediator, affect as a main effect remained a significant predictor of each dependent variable.

Discussion

Responses to health warnings have been linked with two types of miscalibration: defensive responding that dismisses a truly relevant threat and oversensitivity to emotional arousal that exaggerates a truly irrelevant threat. Our findings demonstrate that both types of error are reduced by self-affirmation and provide no support for the alarm model. Across the dependent measures, self-affirmation improved the fit between the message and the participant and calibrated responses to risk. In addition to clarifying the type of open-mindedness induced by self-affirmation, the finding that this manipulation can reduce both Type I and Type II errors has encouraging implications for applied health-communication practice. The concern expressed in the California Court of Appeal ruling (Hightower, 2009) would be mitigated if self-affirmation manipulations could be integrated with fear-arousing health warnings and similar health communications; this possibility suggests a useful direction for applied research.

Fear appeals have a long history of use in health communication, but have met with mixed success. Our model illustrates one reason for this mixed record (see Fig. 1): Both overresponse and underresponse to the same health warning can occur, depending on the makeup of the audience. Notably, by using the Food and Drug Administration's actual warning and a field sample of adult consumers, we were able to generate a clear theoretical test under conditions of substantial external validity.

The results of the mediation analysis suggest that negative affect may be used as an input to subsequent judgments about risk and relevance, which is consistent with the affect heuristic (Slovic et al., 2002). A natural extension of this research would be to examine how self-affirmation affects responses to risks that are known to be typically overestimated or typically underestimated (e.g., Slovic et al., 1982). Another fruitful avenue for future research would be to examine how self-affirmation influences affective experience among people high and low in defensiveness.

Previous research on self-affirmation has examined personal relevance, but the moderating role of defensiveness has not been investigated. By itself, consumption (our index of self-relevance) was a poor predictor of responsiveness to the message. In contrast, defensiveness was a strong diagnostic indicator of decreased responsiveness to health-threat messages in the control condition but not in the self-affirmation condition. Our findings serve as a confirmation of previously held assumptions that self-affirmation reduces defensive responding and provide new insight into the selectivity of this effect.

Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

Notes

1. A priori, we did not make a prediction as to whether self-affirmation would cause highly nondefensive frequent consumers to reduce their concern, and therefore Figure 3a could portray a disordinal rather than an ordinal interaction.
2. Given the arbitrary definition of high and low consumption, we examined regions of significance for levels of consumption both 1 and 2 standard deviations above and below the mean.

References

- Briñol, P., & Petty, R.E. (2009). Persuasion: Insights from the self-validation hypothesis. In M.P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 41, pp. 69–118). New York, NY: Academic Press.
- Correll, J., Spencer, S.J., & Zanna, M.P. (2004). An affirmed self and an open mind: Self-affirmation and sensitivity to argument strength. *Journal of Experimental Social Psychology*, *40*, 350–356.
- Harris, P.R., & Epton, T. (2009). The impact of self-affirmation on health cognition, health behaviour and other health-related responses: A narrative review. *Social and Personality Psychology Compass*, *3*, 962–978.
- Harris, P.R., & Napper, L. (2005). Self-affirmation and the biased processing of health-risk information. *Personality and Social Psychology Bulletin*, *31*, 1250–1263.
- Hightower, J.M. (2009). *Diagnosis: mercury: Money, politics, and poison*. Washington, DC: Shearwater Books.
- Muller, D., Judd, C.M., & Yzerbyt, V.Y. (2005). When moderation is mediated and mediation is moderated. *Journal of Personality and Social Psychology*, *89*, 852–863.
- Preacher, C.J., Curran, P.J., & Bauer, D.J. (2006). Computational tools for probing interactions in multiple regression, multilevel modeling, and latent curve analysis. *Journal of Educational and Behavioral Statistics*, *31*, 437–448.
- Slovic, P., Finucane, M.L., Peters, E., & MacGregor, D.G. (2002). The affect heuristic. In T. Gilovich, D. Griffin, & D. Kahneman (Eds.), *Heuristics and biases: The psychology of intuitive judgment* (pp. 397–420). New York, NY: Cambridge University Press.
- Slovic, P., Fischhoff, B., & Lichtenstein, S. (1982). Facts versus fears: Understanding perceived risk. In D. Kahneman, P. Slovic,

- & A. Tversky (Eds.), *Judgment under uncertainty: Heuristics and biases* (pp. 463–489). Cambridge, England: Cambridge University Press.
- Steele, C.M. (1988). The psychology of self-affirmation: Sustaining the integrity of the self. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 21, pp. 261–302). New York, NY: Academic Press.
- Thompson, S.C., & Schlehofer, M.M. (2008). Control, denial, and heightened sensitivity reactions to personal threat: Testing the generalizability of the threat orientation approach. *Personality and Social Psychology Bulletin*, *34*, 1070–1083.
- Thompson, S.C., Schlehofer, M.M., Gonzalez, A., & Denison, E. (in press). Reactions to a health threat: Dispositional threat orientations and message characteristics. *British Journal of Health Psychology*.
- U.S. Food and Drug Administration. (2009). *What you need to know about mercury in fish and shellfish*. Retrieved November 27, 2003, from <http://www.fda.gov/Food/ResourcesForYou/Consumers/ucm110591.htm>
- Wiebe, D.J., & Korbel, C. (2003). Defensive denial, affect, and the self-regulation of health threats. In L.D. Cameron & H. Leventhal (Eds.), *The self-regulation of health and illness behavior* (pp. 184–203). London, England: Routledge.
- Wolburg, J.M. (2006). College students' responses to anti-smoking messages: Denial, defiance, and other boomerang effects. *Journal of Consumer Affairs*, *40*, 293–323.