Fear of Detection and Efficacy of Prevention: Using Construal Level to Encourage Health Behaviors

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Abstract
This research examines the psychological processes and factors that shape illness-detection versus illness-prevention health actions. Four experiments using contexts of mental health, skin cancer, and breast cancer show that illness detection evokes fear, which undermines engagement in detection behaviors. Considering detection at low (vs. high) levels of thought reduced fear and increased health persuasion. Illness prevention is driven by self-efficacy perceptions and considering prevention at high (vs. low) levels of thought increases persuasion. In further evidence of process, trait fear moderated the detection effects, and dispositional self-efficacy moderated the prevention effects. As an intervention, framing a detection action as serving illness-prevention goals increased people’s likelihood of engaging with an online breast cancer detection tool. These findings illuminate the psychology of detection as being distinct from the psychology of prevention, identify the role of fear in the consideration of health behaviors, and show contexts in which construal levels have divergent effects on health persuasion.

Keywords
construal level theory, detection health behaviors, fear, health messaging

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Health behaviors such as receiving a dermoscopy or mammogram are conducted with the goal of detecting health problems and are termed “detection behaviors.” An advertisement about mammograms with the tag line “Any woman can develop breast cancer... get your annual mammogram scheduled” encourages consumers to take a breast cancer screening test and could be considered a detection health appeal. Although detection healthcare services are widely available and commonly used, research that examines detection health behaviors is sparse. This gap in research is reflected across meta-analyses: Snyder and Hamilton (2002) examine 48 studies on public health campaigns and record that 7 of them (approximately 14%) are about detection. Keller and Lehmann (2008) find that only 20% of the studies in scholarly articles about health messaging between 1961 and 2007 examine detection behaviors, and Tannenbaum et al. (2015) record that 40 of the 248 studies (approximately 16%) on health-related fear appeals include detection behaviors. The majority of the literature on health and marketing has instead examined prevention behaviors, which serve the health goal of preventing the onset of a problem. For example, a breast cancer ad detailing “7 ways to reduce breast cancer risk” focuses on prevention by encouraging consumers to reduce the likelihood of developing breast cancer. Given that the literature on detection is small, health marketers and policy makers might be tempted to rely on the findings related to prevention behaviors to inform decisions related to detection behaviors. Yet the limited research comparing the two has suggested that illness prevention is conceptually different from detection (Mathur et al. 2013; Rothman et al. 1999), indicating that generalizing across the two behaviors may not be appropriate.

In the current research, we propose that a fear-based process drives detection behaviors, and in doing so, we add to the understanding of the distinct psychological processes underlying detection versus prevention behaviors. We posit that...
Detection health behaviors are associated with fear because they involve the possibility of finding out unpleasant news about one’s health. Fear arises in response to considering an unpleasant and uncertain event with a low sense of personal control (Smith and Ellsworth 1985). Undergoing a mammogram involves consideration that the procedure could potentially reveal breast cancer. By contrast, the behaviors intended to prevent breast cancer are associated with perceptions of control in leading to a desirable outcome, or at least maintaining the status quo (Rothman et al. 1993). Thus, we suggest consideration of a detection (vs. prevention) behavior invokes an experience of fear.

What factors determine the extent of fear associated with considering detection actions, and what is the downstream consequence of such fear? We propose that thinking about the outcome of an action with a detection goal is likely to lead to an experience of fear, because it involves considerations of possible unpleasant outcomes of that action (e.g., the discovery of an illness, its ramifications). By contrast, thinking about the process of executing a detection behavior will shift the focus to tasks (e.g., finding a specialist, arranging an appointment) and reduce the salience of the unpleasant and uncertain outcome. Linking this reasoning to construal-level theory (Trope and Liberman 2003)—which suggests that higher (vs. lower) levels of construal are associated with thinking about the outcomes (vs. execution) of an action—we predict that high- (vs. low-) level thought increases the fear of engaging in detection behaviors. Furthermore, drawing on emotions research showing that fear is associated with avoidance of or withdrawal from fear elicitors (Lerner and Keltner 2001; Roseman and Evdokas 2004), we argue that the fear invoked by possibility of detecting an illness reduces engagement in detection actions.

In the case of illness prevention, a vast body of work supports the notion that self-efficacy is an important determinant of preventive health behaviors such that greater perceptions of self-efficacy increase the likelihood of engaging in preventive actions (e.g., Rosenstock 1974; Schwarzer and Renner 2000; Schwarzer 2008). Self-efficacy is individuals’ perceived belief in their ability to fulfill and control designated actions. For an action with a prevention goal, the higher- (vs. lower-) level construal of that behavior would focus on the desirability of its outcome (i.e., avoiding an illness) rather than the feasibility of the process (i.e., action execution, barriers to action). Therefore, we predict that higher- (vs. lower-) level thought would reduce the focus on execution concerns, resulting in higher self-efficacy perceptions and increased likelihood of engagement in the prevention action.

This research enriches the literature in health marketing by proposing a difference in the extent of fear associated with two types of health behaviors and fear’s consequence for health persuasion. We do so by contrasting two types of health messages or behaviors (detection vs. prevention) and demonstrating distinct psychological paths (fear from considering the outcomes of detection vs. perceived self-efficacy of executing prevention) that shape consumers’ likelihood of engagement in those behaviors. In addition, we contribute to the health messaging literature by demonstrating that high- (vs. low-) level thought has diverging effects on consumer behavior based on the nature of health actions recommended. We diverge from prior research (Agrawal and Wan 2009; Fujita and Roberts 2010) in showing that high- (vs. low-) level thought can hinder engagement in some health behaviors (e.g., illness detection due to fear), and we converge with prior research in showing that high- (vs. low-) level thought enhances engagement in some health behaviors (e.g., illness prevention) by increasing perceptions of self-efficacy. Thus, our work builds the case for a nuanced approach to health behaviors. Finally, our research furthers the understanding of the role fear plays in health. We identify contexts in which fear undermines engagement in health behaviors despite the health benefits of such behaviors. In the following sections, we present a review of relevant literature and derive our hypotheses.

**Theoretical Development**

Health care actions that are broadly considered “health behaviors” may vary in nature and objective when examined closely. One such type of distinction is between illness-detection and illness-prevention behaviors. In the current research, we contrast two types of health care considerations—detection versus prevention—that one could take in response to a health message. We begin by providing a review of the extant literature on the two behaviors, with a deeper focus on detection.

**Detection and Prevention Health Behaviors**

A detection action is one that enables diagnosis, screening, or detection of health problems. Prevention actions, by contrast, are intended to prevent the development of a health problem (Fielding 1978). The fundamental difference between the two types of health actions is the nature of the health goal in each case. People undertake prevention behaviors with the health goal of preventing an illness, whereas detection behaviors serve the health goal of finding an existing illness (Fielding 1978; Keller and Lehman 2008; Rosenstock 1974). The goals of prevention versus detection could hold different temporal associations, which could further vary by the illness with which they are associated. Rosenstock (1974) suggests that consumers who undertake a detection (vs. prevention) behavior are more likely to have observed symptoms of the disease—that is, that the clinical status of patients of detection is different from that of patients of prevention. Overall, although both prevention and detection behaviors have benefits—prevention could reduce the likelihood of contracting a disease, and detection might improve survival likelihood and treatment options—differences discussed in past research suggest consumers may think about prevention and detection behaviors in systematically different ways.

The limited research that has examined the systematic differences between prevention and detection behaviors has been developed from the perspective of risk perceptions. Previous
studies have conceptualized that prevention and detection behaviors differ in the risk of learning that one has a health problem (Rothman and Salovey 1997; Salovey et al. 2000). They suggest that engaging in a detection behavior is a gamble (one might find out bad news), whereas engaging in a prevention behavior is a nongamble (one maintains a healthy status quo). Applying prospect theory (Kahneman and Tversky 1984), Rothman and colleagues (1999) find that even using fictitious diseases to control for other risk-related correlates, gain- (vs. loss-) framed messages were more effective when a treatment was framed as prevention (vs. detection). Mathur et al. (2013) extend this line of research by showing individuals could be differentially sensitive to such framing effects for detection and prevention behaviors. Specifically, they found that incremental theorists, being more sensitive to contextual cues, show the framing effects that Rothman et al. (1999) document in the context of detecting (vs. preventing) dental plaque, but entity theorists, being more focused on the outcome, are not frame sensitive and do not show the framing effect (Mathur et al. 2013; Study 3). In summary, the few studies that have empirically examined detection versus prevention behaviors suggest that detection behaviors are associated with uncertain and undesirable outcomes, whereas prevention behaviors are associated with relatively certain, future desirable outcomes, and these associations have implications for persuasion (see Keller [2006], p. 113).

Previous research has also examined the role of affective states in detection behaviors. Keller, Lipkus, and Rimer (2003) show that incidental (positive vs. negative) affective states have diverging effects on the effectiveness of loss- (vs. gain-) framed detection messages. They find that participants’ intentions to get a mammogram are higher when the cancer screening message is loss (vs. gain) framed and is processed under positive (vs. negative) mood. Other enquiry into detection behaviors comes from the perspective of examining the influence of past detection outcomes on future detection decisions. Kahn and Luce (2003) show that past false-positive detection results increase the disutility of medical testing, especially in cases of life-threatening contexts such as breast cancer. Together, these findings suggest detection behaviors are associated with uncertainty and with negative affect arising from the consideration of a potential undesirable outcome that one is unable to control (see also Keller 2006). These associations lead us to consider the emotion of fear in cases of illness detection.

In the following subsection, we present a discussion on the nature of illness detection and its emotional implications, followed by the influence of thought level on this process. Subsequently, we present a parallel discussion on illness prevention.

The Fear of Illness Detection

Screening for illnesses presents a challenging situation: illness detection is useful in that it is a necessary step to address health problems, but illness detection is intimidating in that a screening test could lead to unpleasant news. Detection behaviors are thus characterized by uncertain and undesirable health outcomes over which one has little control (i.e., finding an illness). Fear is an emotional state that arises as a response to a negative, uncertain situation appraised to be not in one’s control (Lazarus 1991; Lerner and Keltner 2001; Smith and Ellsworth 1985; Öhman 2008). Thus, we suggest that consideration of detection behaviors would elicit feelings of fear.

We further theorize that the consideration of the potential outcome (vs. execution/process) of the detection behavior is likely to enhance the fear associated with the health behavior. Thinking about detection at a higher level of thought would make salient the outcome (i.e., “why” aspects), whereas thinking about detection at a lower level of thought would make salient its execution (i.e., “how” aspects) (Trope and Liberman 2003). Consider the previous mammogram example. The purpose of mammography is cancer detection; thus, thinking about why one should get a mammogram makes salient an uncertain, uncontrollable, and potentially unpleasant outcome (Keller 2006; Salovey et al. 2000). Higher-level thought of detection could evoke fear by highlighting the possibility, however small, of discovering that one could develop breast cancer. Considerations of why contrast with elaborating on the how of mammography, which increases thoughts about execution, such as arranging an appointment and preparing for the procedure, while diminishing the focus on the potentially scary outcome. Such reduced focus on the outcome should lead to reduced feelings of fear. Thus, high (vs. low) levels of thought about detection should increase fear. How does the fear of illness detection shape health behaviors?

To predict the consequence of fear on health engagement, we turn to three literature streams: those on specific emotions, fear appeals, and clinical fear avoidance. Emotions research on appraisal tendencies suggests that fear predisposes individuals to make pessimistic risk estimates and be risk averse (Lerner and Keltner 2001). This line of research would predict that as fear from considering detection actions increases, people would be more likely to avoid the “risky” action of detection (Rothman et al. 1993). Behaviorally, studies show that fear is associated with avoidance or withdrawal tendencies such as “feel like running away” (Roseman, Wiest, and Swartz 1994, p. 217) and “prepare to move away from or stop moving toward” (Roseman and Evdokas 2004, p. 5) fear elicitors. Research on fear appeals in health that examines illness-detection behavior converges with these findings. For example, Leventhal and Watts (1966) report that high (vs. low) fear appeal about lung cancer reduces the likelihood of a screening X-ray. Kok et al. (2018) suggest that fear appeals may decrease persuasion when the context is one of low control over the outcome (similar to detection behaviors). Clinical research also suggests that fear is correlated with avoidance of health-improving actions. Waddell et al. (1993) show that fear of lower-back pain, controlling for actual pain, predicts avoidance of physical exercises. Expanding these findings to the context of illness detection, we predict that the fear evoked by considering a detection action should discourage consumers from...
taking that action, especially when focusing on the focal outcome of the action. This reasoning leads to our first hypothesis:

**H1:** In the case of detection health behaviors, considering the why (vs. how) of the action increases fear, which reduces the likelihood of engagement in the behavior.

H1 diverges from previous findings that examine individuals’ health behavior through the lens of self-control and thought level. For example, Fujita and Roberts (2010) show that among participants who valued a health goal, high- (vs. low-) level thought improved healthy-snack eating by increasing the focus on the superordinate goal (being healthy) and reducing the focus on the subordinate means (engaging in self-control; see also Agrawal and Wan 2009). These findings are consistent with our theorization about prevention health behaviors (e.g., eating healthy, flossing) presented in the following section.

**The Role of Self-Efficacy in Illness Prevention**

The concept of self-efficacy, defined as the expectations about one’s ability to engage in a behavior, is a key component of many classic models of health-behavior change, including the health belief model (Rosenstock 1974), social learning theory (Bandura and Walters 1977), and protection motivation theory (Rogers 1975; for an integrated commentary on PMT, see Block and Keller [1998]). Strecher et al. (1986) examine weight control, alcohol-use reduction, contraception, cigarette smoking, and exercise behaviors to suggest that self-efficacy concerns are a significant barrier to illness-prevention behaviors. Perceptions of difficulty in engaging in a behavior lower self-efficacy and often undermine health outcomes (Conner and Armitage 1998; De Hoog, Stroebe, and De Wit 2007; Keller 2006; Kok et al. 2018; Peters, Ruiter, and Kok 2013). Thus, engagement in a prevention behavior would depend on the consumer’s belief in the ease or difficulty with which they could follow the prevention recommendation (Block and Keller 1995).

What conditions enhance versus reduce efficacy concerns? Consider the behavior of following a low-fat diet plan to prevent future weight gain. In this case, the “why” of the preventive behavior (e.g., to stay fit, avoid heart disease) is very attractive, but the “how” of sticking to a diet is loaded with concerns about execution. A higher-level construal of an action makes the outcome-related aspects salient, which, in the case of prevention, are highly desirable, favorable and therefore compelling. However, the lower-level construal of preventive actions would make the feasibility aspects (e.g., efforts, skills, steps) salient. These feasibility aspects would include the potential barriers and concerns related to one’s ability to execute that action (Trope and Liberman 2003). Such consideration of feasibility aspects, relative to not thinking about feasibility at all, would lead one to evaluate the barriers in executing an action, consequently undermining self-efficacy associated with that action. For an action with a prevention goal, the higher- (vs. lower-) level construal of that behavior would highlight the desirability of its outcome or the goal (i.e., avoiding an illness) rather than the feasibility of the process (i.e., action execution; Agrawal and Wan 2009). When consumers are not thinking about challenges of execution, their self-efficacy associated with a prevention action could be higher than when they are thinking about the barriers to execution. Thus, we predict that considering prevention actions at higher- (vs. lower-) level thought leads to greater perceived self-efficacy (based on the construal literature) and subsequently increases health engagement (based on the health literature). Stated formally,

**H2:** In the case of prevention health behaviors, considering the why (vs. how) of the action increases self-efficacy, which enhances the likelihood of engagement in the behavior.

In the following sections, we report five studies that systematically test our hypotheses. As a pilot study, we use sentiment analysis of data gathered from Twitter to show that tweets about cancer detection (vs. prevention) contain more fear-related and risk-related words. In Studies 1 and 2, we use the context of mental health to experimentally test whether considering detection (vs. prevention) actions at higher- (vs. lower-) level thought lowers health intentions. We find that dual processes of fear (in the case of detection) and self-efficacy (in the case of prevention) drive this interaction between the type of health behavior and thought level. We find converging process evidence in Study 3 by using premeasured trait fear and self-efficacy as moderators of health intentions in the context of skin cancer. Finally, we present a framing intervention in Study 4 to address the negative consequences of the fear of detection in context of breast cancer. Framing a detection behavior as serving a prevention goal attenuates the negative effect of higher- (vs. lower-) level thought on participants’ choice to use a breast cancer assessment tool.

**Pilot Test: Sentiment Analysis of Detection and Prevention Tweets**

The objective of this pilot study was to use real-world data to test whether detection (vs. prevention) behaviors are loaded with fear. For this purpose, we used data from the social media website Twitter to examine if the sentiments expressed in tweets vary when addressing detection versus prevention health behaviors. We use the context of cancer detection and cancer prevention, because cancer represents a broad variety of severe illnesses that are familiar and often discussed. We gathered tweets about cancer detection/prevention and analyzed the emotive content of the texts. Drawing on previous literature on risk perception differences across detection versus prevention (e.g., Rothman et al. 1993) and our theory of fear differences, we anticipate a greater occurrence of fear-related and risk-related sentiment in detection (vs. prevention) tweets.
Sampling. We gathered a data set of tweets about cancer detection and prevention from Twitter during the period from January 1, 2017, to January 1, 2018. Search criteria for the tweets were such that each tweet could be assigned to detection or prevention conditions. For the detection condition, we collected tweets that included the phrases “cancer detection,” “cancer screening,” or “detect cancer” and excluded the words “prevention” or “prevent.” For the prevention condition, we collected tweets that included the phrase “cancer prevention,” “prevent cancer,” or “avoid cancer” and excluded the phrases “detection,” “detect,” “screen,” or “screening.” For example, we classified “A5: from what I know about cervical cancer, it’s a very scary, deadly type of cancer, so detection is crucial” to the detection condition, and we classified “I am personally committing. High fiber, protein, water intake, potassium, and Vitamin D. Which eliminates plenty of unnecessary carbs and calories for that matter. Apparently, it is really good for overall health and cancer prevention. #Health #Dad” to the prevention condition. We collected only tweets with English textual content. This sampling approach yielded a total of 13,528 tweets across detection (n = 4,599) and prevention (n = 8,929) conditions. The variables in the data set are tweet ID (a unique identifier of each tweet), the user’s full name and username (provided in their profile), date and time of when the tweet was shared, number of replies to the tweet, number of times the tweet was retweeted, number of times the tweet was favorited, the full text of the tweet, and the condition (detection or prevention, based on the search criteria).

Sentiment analysis of text. We measured the emotional content of the tweet texts using the text analysis software Linguistic Inquiry and Word Count (LIWC; Pennebaker et al. 2015; Tausczik and Pennebaker 2010). We programmed the analysis of the tweets to identify three variables pertinent to our research question: (1) overall negative emotion (e.g., hurt, nasty), (2) fear (e.g., afraid, worried), and (3) risk (e.g., danger, doubt). We ran independent sample t-tests across all three output variables, using the detection versus prevention condition as independent variables. Results show that tweets about cancer detection (vs. prevention) display a significantly higher occurrence of negative affective words in general (M_prev = .48, SD = 1.63; M_det = 3.49, SD = 4.63; p < .001), specifically fear-related words (M_prev = .09, SD = .66; M_det = 2.54, SD = 3.97; p < .001) and risk-related words (M_prev = .25, SD = 1.11; M_det = 6.56, SD = 3.78; p < .001). These findings suggest external validity to the systematic differences proposed across illness detection versus prevention in the current theorization (about fear) and extant literature (about risk).

Although sentiment analysis of social media data is a useful tool in testing external validity of the research premise, some important limitations of this approach should be noted. One, because we did not randomly assign tweets to the conditions, these data do not allow us to make causal inferences about the type of tweet and the sentiments associated with that health behavior. Second, the variance in natural language used in the tweets presents significant noise and there is no content control across conditions. Thus, these data should be interpreted as patterns of differences in the sentiment expressed by consumers when conversing about cancer detection versus prevention, and not as making causal inferences or as tests of hypotheses. In the following sections, we report results of experiments that test our hypotheses.

Study 1: Dual Processes of Fear and Efficacy in Help-Seeking for Clinical Depression

We designed Study 1 to test H1 and H2 in the context of mental health. For this purpose, we designed an experiment in which participants would be randomly assigned to either detection or prevention conditions combined with “how” or “why” conditions. We first presented all participants in this study with a message about clinical depression that did not mention detection or prevention. On the next page, they were randomly assigned to a writing task that manipulated the health action and thought level. Following the writing task, we measured their intentions to seek help for depression as the primary dependent variable. Help-seeking intentions are a commonly used dependent variable in mental health research and are held to be predictive of behavior (e.g., Gulliver, Griffiths, and Christensen 2010). We also measured participants’ perceived fear (H1) and self-efficacy (H2), to be used as mediators of the predicted effect. In addition, we measured variables that capture potential alternative mechanisms driven by (1) participants’ perceived risk of depression to self and other, (2) believability of the message and action, (3) experienced emotional valence, (4) task ease, and (5) state regulatory focus.

Methods and Procedure

Participants, design, and premeasure. We conducted this study using the undergraduate subject pool at a North American university. The study had a 2 (health action: detection vs. prevention) × 2 (thought level: how vs. why) between-subjects design and was carried out in two steps: premeasure and main. We designed the premeasure step to identify participants who were already seeking professional help with depression. We presented the premeasure step as an ostensible “Student Health Survey” with a battery of questions about various aspects of participants’ health and lifestyle. Among these, we included the measure from Eisenberg et al. (2009) for whether a participant was currently seeking help. We asked participants, “In the past 12 months, have you received counseling or support for feelings of depression from any of the following sources? (check all that apply)” among “religious counselor,” “non-religious counselor,” “support group,” “other non-clinical source,” or “none of the above.” The main study followed the premeasure study after two unrelated studies, and we used lab computer IDs to match participant data across steps. Because the intention to seek help is our primary...
dependent variable, we removed participants who indicated that they were already seeking help with depression (n = 52). This approach yielded a final sample of 391 students (M age = 20.75 years, 192 women). We did not collect any identifiable information about participants.

Action type and thought-level manipulation. As the first step of the main study, all participants were shown a health advertisement regarding clinical depression among college students. The message presented information about student life and depression (for the message, see Web Appendix A). After indicating that they read the message, participants were directed to the next page, where they completed the thought-level and health-action manipulation as a writing task. Each participant’s writing instructions were based on assignment to one of four experimental conditions: how they would go about detecting depression (detection-how condition), how they would go about preventing depression (prevention-how condition), why they would go about detecting depression (detection-why condition), or why they would go about preventing depression (prevention-why condition; see Web Appendix B for full instruction, adapted from White, MacDonnell, and Dahl [2011]). The study software measured the time spent writing, and a hypothesis-blind research assistant counted the number of words that each participant entered (after data collection ended) to test whether ease/difficulty of the writing task varied between conditions.

Help-seeking intentions. After the writing task, the experiment took participants to a page of help-seeking-intention questions adapted from Clement et al. (2015). They were asked to respond to the following questions on ten-point scales (combined r = .78): “How likely are you to seek help for depression—either on or off campus?”; “How likely are you to seek help for depression—either from a professional or a personal contact?”; and “How interested are you in attending a webinar on seeking help for depression? This will be a webinar developed for students.” For descriptive statistics on these measures, see Web Appendix D.

Fear, perceived efficacy, and other measures. On the next page, participants responded to fear and self-efficacy measures in randomized order. They were asked to finish the statement “thinking and writing about depression made me feel . . . .” anchored on two bipolar items (1 = “not scared,” and 10 = “very scared”; 1 = “not afraid,” and 10 = “very afraid”). We combined these items to form an index of fear (r = .92). Similarly, we measured perceived efficacy using the statement “thinking and writing about depression made me feel . . . .” anchored on two bipolar items (1 = “not self-confident,” and 10 = “very self-confident”; 1 = “not sure of my abilities,” and 10 = “very sure of my abilities”). We combined these items to form an index of perceived efficacy (r = .74). After responding to the fear and efficacy measures, we used seven other variables as measures of alternative mechanisms. For descriptive statistics of all items, see Web Appendix D. Next, we administered manipulation checks detailed in Web Appendix C. Finally, participants were elaborately debriefed and provided information on sources for seeking help with depression on and off campus.

Results and Discussion

Help-seeking intentions. We ran an analysis of variance (ANOVA) procedure using the index of intentions to seek help for depression as the dependent variable with action type and thought level as the independent variables. This model was significant (F(3, 387) = 4.34, p = .005). We found a significant effect of the action-type variable (Mdet = 3.39, Mprev = 3.92; F(1, 387) = 3.96 p = .047). Participants in the prevention (vs. detection) condition reported overall higher intentions to seek help. We found a nonsignificant effect of the thought-level variable (F(1, 387) = .002, p = .99) and a significant interaction between the two factors (F(1, 387) = 8.80, p = .003). Probing of the interaction showed that, consistent with H1, participants in the detection condition indicated higher intentions to seek help when they thought about how (vs. why; Mdet-how = 3.78, SD = 2.70; Mdet-why = 3.01, SD = 2.50; p = .040). Consistent with H2, those in the prevention condition indicated higher intentions when they thought about why (vs. how; Mprev-how = 3.55, SD = 2.28; Mprev-why = 4.31, SD = 2.86; p = .041). Participants were more willing to seek help with detection (vs. prevention) of depression when they thought about the why (vs. how) of that action. These results are plotted in Figure 1, Panel A.

Fear. We ran an ANOVA using the index of fear as the dependent variable, with action type and thought level as the independent variables, and found this model to be significant (F(3, 387) = 3.18, p = .024). We found no significant effect of action type (F(1, 387) = 1.88, p = .17), no significant effect of thought level (F(1, 387) = 2.54, p = .12), and a significant interaction (F(1, 387) = 4.85, p = .028). Probing of this interaction revealed that participants in the detection condition reported higher fear in the why (vs. how) condition (Mdet-how = 2.61, SD = 2.58; Mdet-why = 3.52, SD = 2.01; p = .006), whereas participants’ reported fear of preventing depression did not vary across thought levels (Mprev-how = 2.78, SD = 2.21; Mprev-why = 2.67, SD = 2.56; p = .75). Consistent with H1, participants experienced greater fear when they contemplated the reasons rather than steps for engaging in detection. The two levels of thought did not change the experience of fear when thinking about depression prevention. The pattern of results is plotted in Figure 1, Panel B.

Self-efficacy. Next, we ran an ANOVA using the index of self-efficacy as the dependent variable, and action type and thought

2 In the interest of space, manipulation-check descriptive statistics and tests for all studies are in Web Appendix C.
3 The main effect of the action-type variable found in these data was not predicted and did not replicate in other experiments.
Figure 1. Help-seeking intentions, fear of detection actions, and self-efficacy for prevention actions moderated by thought level.

level as the independent variables, and found this model to be significant (F(3, 387) = 4.51, p = .004). We found no significant effect of action type (F(1, 387) = .05, p = .82), no significant effect of thought level (F(1, 387) = 1.51, p = .22), and a significant interaction (F(1, 387) = 5.21, p = .023). Consistent with H2, further analyses revealed higher perceived self-efficacy of preventing depression under why (vs. how) conditions (Mprev-how = 5.30, SD = 2.33; Mprev-why = 6.07, SD = 2.52; p < .001). However, the two detection conditions did not vary in self-efficacy across how versus why (Mdet-how = 5.72, SD = 2.45; Mdet-why = 5.54, SD = 2.14; p = .59). The pattern of results is plotted in Figure 1, Panel C.

Dual mediation. We performed a moderated mediation analysis using PROCESS Model 8 (5,000 bootstrap samples; Hayes 2013) to examine whether fear and self-efficacy mediated the effect of thought level on the intentions to seek help for detection versus prevention of depression. We used help-seeking intentions as the dependent variable, action type as the predictor, thought level as the moderator, and fear and self-efficacy as two mediators. The model significantly predicted the variance in intentions to seek help (F(5, 385) = 7.40, p < .001). In this model, fear reduced intentions to seek help (b = -.30, p < .001), and self-efficacy increased help-seeking intentions (b = .25, p = .016). Probing of the fear effects revealed that fear mediated the effect in the detection conditions (b = -.27, 95% confidence interval [CI] = [-.52, -.07]) but not the prevention conditions (b = .02, 95% CI = [-.19, .22]). Fear had an overall significant negative indirect effect in this model (index of moderated mediation: b = -.30, SE = .16; 95% CI = [-.66, -.04]). Probing of the self-efficacy effects revealed that self-efficacy mediated the effect only in the prevention conditions (b = .11, 95% CI = [.0001, .27]) and not the detection conditions (b = .02, 95% CI = [-.08, .14]). Self-efficacy had an overall significant positive indirect effect (index of moderated mediation: b = .14, SE = .09; 95% CI = [.01, .39]).

Other variables. Finally, we conducted analyses to test for potential alternative mechanisms. We conducted several additional ANOVA procedures with action type and thought level as independent variables, and with dependent variables as (1) the word count of the writing task as measure of task ease (interaction F(1, 387) = .52; p = .47), (2) time spent writing as measure of task ease (interaction F(1, 387) = 1.26; p = .26), (3) reported valence of thoughts (interaction F(1, 387) = 1.37; p = .24), (4) state prevention focus (interaction F(1, 387) = .46; p = .50), (5) state promotion focus (interaction F(1, 387) = .60; p = .44), (6) believability of detection action (interaction F(1, 387) = .03; p = .87), (7) believability of prevention action (interaction F(1, 387) = .22; p = .64), (8) perceptions of self’s risk for depression (interaction F(1, 387) = .33; p = .57), and (9) perceptions of an average other’s risk for depression (F(1, 387) = 1.38; p = .24). The results of these analyses appear in Web Appendix E. Because none of these ANOVA models were statistically significant, we did not conduct mediation analyses.

Discussion. This study used a controlled, experimental setting to test H1 and H2. The dual mediation suggests that two different psychological mechanisms drove participants’ help-seeking intentions across the two types of health actions: fear in the case of detecting depression and self-efficacy in the case of preventing depression. In addition to these hypothesized effects, we also measured some potential alternative explanations in this study such as ease or difficulty of engaging in a task (arising from “fit” between action type and thought level),
believability of detection/prevention, valence, regulatory focus, and perceived risk for self and others. We found that these variables did not shift as a result of the experimental treatment.

Study 2: Mental Health Help-Seeking with a Thought-Level Control Condition

Study 1 tested for the process of fear and self-efficacy driving the detection and prevention action considerations. The pattern of results from Study 1 lead to the question: Does thinking about the “why” of detection increase fear or does “how” reduce fear? The primary objective of Study 2 was to add a control condition to the thought-level factor such that participants in that condition would not be prompted to think about how/why or outcome/process. A control condition is informative about the direction of such shifts relative to a baseline. Importantly, the control condition also tests for the parsimony of combining the health-action type with thought level in enhancing health persuasion. That is, the control condition tests if prompting a thought level is more effective than no prompting at all. A secondary objective of this study was to account for two alternative explanations for the demonstrated effects. First, we tested if participants’ actual risk of a health condition was a driver of the fear mechanism. We investigated whether participants’ susceptibility to a health condition—and not consideration of an unpleasant outcome—accounted for the fear of detection actions. To do so, we independently premeasured and covaried participants’ actual health risk in our analyses, and tested whether fear had an independent effect while accounting for health risk. Second, we tested whether a process of meta-cognitive fluency drives the interaction between message type and thought level. For this purpose, we measured self-reported processing fluency across all conditions, in addition to measures of task difficulty such as word count and time spent writing used in Study 1.

Methods and Procedure

We used a two-way 2 (action: detection vs. prevention) × 3 (thought level: how vs. why vs. control) between-subjects design set in the context of clinical anxiety and depression, conducted in two phases of data collection that began ten days apart.

Premeasure. At the premeasure phase, we recruited 850 participants (M_{age} = 40.01 years; 371 women) using TurkPrime panels (Litman, Robinson, and Abberbock 2017). We measured participants’ risk of anxiety and depression by using the Patient Health Questionnaire (PHQ-4) inventory in an ostensible “Consumer Health Survey,” containing a battery of questions. The PHQ-4 (a = .91) is a widely validated instrument of screening patients for the risk of anxiety and depression (e.g., Kroenke et al. 2009). This scale consists of four questions, two each for anxiety (e.g., “Over the last two weeks, how often have you been feeling nervous, anxious, or on edge?”) and depression (e.g., “Over the last two weeks, how often have you been feeling down, depressed, or hopeless?”). The primary dependent variable in this study was help-seeking intentions. As in Study 1, we screened out participants (n = 67) who reported to already receiving mental health care.

Main study. Ten days later, we invited the remaining 783 participants for the main study and stopped data collection after five days. Six hundred forty-seven participants (M_{age} = 37.07 years; 328 women) returned to participate in the second phase. First, participants across all conditions saw an advertisement titled “Depression, Anxiety, and Mental Health.” This message detailed how depression and anxiety could manifest in daily life (for the message, see Web Appendix A). Next, participants were randomly assigned to one of the six writing-task conditions. The writing-task instructions were the same as in Study 1 for the why and how conditions. For the control conditions, the instructions did not cue higher or lower thought level (see Web Appendix B). The study software measured the time participants spent engaging in this writing task. Next, participants were taken to a page with questions about help-seeking intentions (as in Study 1), following which they were presented items measuring state fear (three items; e.g., “I felt afraid when I had to write about depression and anxiety”; a = .92), perceived self-efficacy (three items; adapted from the General Self-Efficacy scale by Schwarzer and Jerusalem [1995]; e.g., “I am confident in my ability to take care of my depression and anxiety”; a = .95), and processing fluency (three items; adapted from Lee, Keller, and Sternthal [2009]; e.g., “It felt right to write about depression and anxiety”; a = .72). The items for fear, self-efficacy, and fluency were blocked together and were presented in randomized order. For a list of all items and their descriptive statistics, see Web Appendix D. Next, participants completed the manipulation-check procedures (Web Appendix C), after which they were elaborately debriefed on the nature of the study and provided with information on resources to seek help with mental health concerns. After the study was completed, we used unique participant IDs to match data. After matching data across phases, we destroyed participant IDs as stipulated in the ethics approval for this study.

Results and Discussion

Help-seeking intentions. We ran an ANOVA model with participants’ intentions as the dependent variable, thought level and action type as the independent variables, and PHQ-4 score as the covariate. This model was specified to test the separate and combined effects of thought level and action type on participants’ intentions while controlling for their actual risk for anxiety and depression. We found that the model was significant (F(5, 641) = 12.17, p < .001), with a significant main effect of PHQ-4 (F(1, 641) = 49.89, p < .001) such that participants with higher risk of anxiety and depression expressed significantly higher intentions to seek help. We also found a significant main effect of thought level (F(2, 641) = 6.17, p = .013) not found in Study 1 when this factor only had two levels.
Table 1. Health Intentions, Fear, Self-Efficacy, Sentiment of Written Content, and Fluency Responses by Health-Action Type and Thought-Level Conditions.

<table>
<thead>
<tr>
<th>Outcome Variable</th>
<th>Prevention Condition</th>
<th>Detection Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
<td>How</td>
</tr>
<tr>
<td>Behavioral intentions</td>
<td>5.12*</td>
<td>5.78*</td>
</tr>
<tr>
<td></td>
<td>(3.15)</td>
<td>(3.00)</td>
</tr>
<tr>
<td>Fear</td>
<td>3.62*</td>
<td>3.58*</td>
</tr>
<tr>
<td></td>
<td>(2.64)</td>
<td>(2.34)</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>7.40*</td>
<td>7.12*</td>
</tr>
<tr>
<td></td>
<td>(2.51)</td>
<td>(2.34)</td>
</tr>
<tr>
<td>Sentiment: Fear-related</td>
<td>2.91*</td>
<td>1.65*</td>
</tr>
<tr>
<td></td>
<td>(3.49)</td>
<td>(2.42)</td>
</tr>
<tr>
<td>Sentiment: Risk-related</td>
<td>1.37*</td>
<td>0.90*</td>
</tr>
<tr>
<td></td>
<td>(3.39)</td>
<td>(2.23)</td>
</tr>
<tr>
<td>Processing fluency</td>
<td>7.68*</td>
<td>7.92*</td>
</tr>
<tr>
<td></td>
<td>(2.55)</td>
<td>(2.27)</td>
</tr>
</tbody>
</table>

Notes: Participants were randomly assigned to each condition. Cells contain means with standard deviations in parentheses. Different superscripts within a row indicate the means are significantly different at \( p < .05 \). The processing-fluency row shows a main effect of thought level (\( p = .012 \)), but no significant interaction between health action and thought level (\( p = .73 \)).

Descriptive statistics by condition are presented in Table 1 below. Pairwise main-effect comparison tests show that, overall, participants in the control condition expressed significantly lower intentions to seek help than those in the how (\( M_{control} = 5.45, M_{how} = 6.17; p = .009 \)) or the why (\( M_{why} = 6.17; p = .008 \)) conditions. We found no significant effect of action type (\( F(1, 641) = .11, p = .74 \)) and a significant two-way interaction (\( F(2, 641) = 3.70, p = .025 \)). Within this interaction, participants in the detection condition were more likely to seek help when they wrote about the how versus why (\( M_{det-how} = 6.40, M_{det-why} = 5.60; p = .05 \)). Participants in the control condition (\( M_{det-control} = 5.71; p = .76 \)) did not significantly differ from those in the why condition, but they expressed significantly lower intentions than those in the how condition (\( p = .04 \)). In the prevention condition, participants were more likely to seek help when they wrote about the how versus why (\( M_{prev-how} = 6.74; p = .015 \)). Participants in the control condition (\( M_{prev-control} = 5.12 \)) indicated significantly lower intentions than those in the why condition (\( p < .001 \)) and marginally lower intentions than those in the how condition (\( p = .10 \)). These results indicate that when participants thought about the detection of health issues, how (vs. why vs. control) considerations were more effective, whereas when they thought about prevention, why (vs. how vs. control) considerations were more effective in enhancing intentions to seek help.

**Fear.** Next, we ran an ANOVA model with participants’ indicated fear as the dependent variable, the thought level and action type as the independent variables, and the PHQ-4 score as the covariate. Descriptive statistics by condition are presented in Table 1. We found the model to be significant (\( F(5, 641) = 24.96, p < .001 \)), with a significant main effect of PHQ-4 (\( F(1, 641) = 123.99, p < .001 \); those at higher risk expressed more fear), no significant main effect of thought level (\( F(2, 641) = 2.18, p = .14 \)), a marginally significant main effect of action type (\( F(1, 641) = 3.11, p = .078 \)), and a significant interaction (\( F(2, 641) = 3.24, p = .04 \)). Specifically, participants in the prevention condition did not vary in fear across thought-level conditions (\( M_{prev-con} = 3.62, M_{prev-how} = 3.58, M_{prev-why} = 3.73 \)). By contrast, for participants in the detection condition, fear varied by thought level. Those in the why condition reported significantly higher fear than those in the how condition (\( M_{det-why} = 4.78, M_{det-how} = 3.42; p < .001 \)) and marginally higher fear than those in the control condition (\( M_{det-con} = 4.12; p = .07 \)). Those in the control (vs. how) condition reported higher fear (\( p = .042 \)), indicating lower-level thoughts about detection reduce fear.

**Self-efficacy.** We ran an ANOVA model with perceived self-efficacy as the dependent variable, the thought level and action type as the independent variables, and the PHQ-4 score as the covariate. We found that the model was significant (\( F(5, 641) = 4.59, p < .001 \)), with a significant main effect of PHQ-4 (\( F(1, 641) = 12.87, p = .001 \); those at higher risk expressed higher self-efficacy), a nonsignificant main effect of thought level (\( F(2, 641) = 2.43, p = .12 \)), and a significant main effect of action type (\( F(1, 641) = 3.94, p = .047 \)). Pairwise comparisons of the thought-level factor showed that, overall, those in the why condition reported higher self-efficacy than those in the how condition (\( M_{why} = 7.61, M_{how} = 7.16; p = .036 \)) and reported marginally higher self-efficacy than those in the control condition (\( M_{con} = 7.26; p = .10 \)). Participants in the how and control condition did not differ on self-efficacy scores. Pairwise comparisons of the action-type factor showed that, overall, those in the prevention condition reported higher self-efficacy than those in the detection condition (\( M_{det} = 7.17, M_{prev} = 7.52; p = .047 \)). In addition to these main effects, we also found a significant interaction (\( F(2, 641) = 3.41, p = .034 \)). Probing of the interaction showed that those in the detection condition did not vary in perceived self-efficacy across
thought-level conditions ($M_{det-con} = 7.12, M_{det-how} = 7.27$, $M_{det-why} = 7.07$; both $ps > .5$). By contrast, participants in the prevention condition varied by thought level in their reported self-efficacy. Those in the why condition reported significantly higher self-efficacy than those in the how condition ($M_{prev-why} = 8.06, M_{prev-how} = 7.12; p = .001$) and those in the control condition ($M_{prev-cont} = 7.40; p = .025$). Those in the control condition did not differ from those in the how condition in reported self-efficacy ($p = .38$). Results with per-cell means and standard deviations are presented in Table 1.

Sentiment analysis. We conducted sentiment analysis on the open-ended written content collected in this study using the LIWC software described in the pilot study. We measured the extent of fear-related (e.g., afraid, worried), anger-related (e.g., hate, annoyed), sadness-related (e.g., crying, sad), and risk-related (e.g., doubt, danger) words in participants’ written responses using this software. Fear-related sentiment (interaction $F(2, 641) = 6.45, p = .002$) and risk-related sentiment (interaction $F(2, 641) = 6.98, p = .001$) data replicate the pattern of results found with self-reported fear. Interestingly, anger-related sentiment (interaction $F(2, 641) = .29, p = .75$) and sadness-related sentiment (interaction $F(2, 641) = .34, p = .71$) did not show the same effect, indicating toward the specificity of the fear experience, rather than general valence effects, in response to consideration of illness detection. Fear and risk sentiment analysis are presented in Table 1, anger and sadness analysis results are not included for brevity and can be provided on request.

Fluency. We ran an ANOVA procedure specifying the combined score on fluency as the dependent variable, the thought level and action type as the independent variables, and the PHQ-4 score as the covariate. We found the model was significant ($F(5, 641) = 7.06, p < .001$), with a significant main effect of PHQ-4 ($F(1, 641) = 27.34, p < .001$; those at higher risk reported the writing task to be significantly easier), an unpredicted significant main effect of thought level ($F(2, 641) = 4.45, p = .012$), no significant main effect of action type ($F(1, 641) = .83, p = .36$), and no significant interaction ($F(2, 641) = .32, p = .72$). Descriptive statistics by condition are presented in Table 1. Pairwise comparisons of the thought-level factor showed that, overall, those in the why condition reported greater ease and fluency than those in the how condition ($M_{why} = 7.15, M_{how} = 7.88; p = .003$). Participants in the control condition did not differ significantly in reported fluency from those in the why condition ($M_{why} = 7.15, M_{cont} = 7.26; p = .16$) or how condition ($M_{how} = 7.88, M_{cont} = 7.26; p = .12$). However, fluency did not vary as the interaction between thought level and action type, indicating a process of fluency did not drive help-seeking intentions.

Discussion. This study replicated the findings from Study 1 using a different sample population and provides further insights into the nature of psychological processes of detection and prevention. The addition of a control condition that does not prompt a level of thought provides a baseline of variables to infer the direction of movement in the data. We found that consideration of the detection (prevention) of depression combined with how (why) enhances intentions in comparison to the control condition. The pattern of results suggests considerations of the outcomes (vs. control) of a detection behavior lead to an increased experience of fear. Consistent with our conceptualization, we found that lower-level thoughts reduced fear. Similarly, we found that higher level thoughts about prevention enhanced efficacy perceptions compared to the control condition. This finding is consistent with prior construal-level research suggesting higher construal increases focus on the desirable health outcome or goal, while undermining feasibility or efficacy concerns (e.g., Agrawal and Wan 2009). Our findings show the caveat to this effect of construal level on health intentions is the nature of the health goal: higher-level thoughts enhance efficacy beliefs when a prevention goal is salient, but not when a detection goal is salient. In Studies 1 and 2, we measured fear and self-efficacy as evidence for the proposed process. In Study 3, we utilize dispositional fear and self-efficacy as tests of process using the health context of skin cancer.

Study 3: Moderation by Dispositional Fear and Self-Efficacy as Process Evidence

The main objective of Study 3 was to use a moderation approach as converging evidence of process. For this purpose, we independently measured participants’ dispositional fear and self-efficacy to be tested as moderators of the effect. Our reasoning for using this approach was as follows. If, indeed, a mechanism of fear drives detection behaviors, participants more likely to experience fear (i.e., high vs. low trait fear) should be more susceptible to the effect of varying thought levels on detection actions. Among those susceptible to feel fear, how (vs. why) considerations should reduce fear, whereas those less susceptible to fear should be less likely to vary in their responses across thought-level conditions. Conversely, if a mechanism of perceived self-efficacy indeed drives the process of prevention, participants with chronically weak beliefs of self-efficacy (i.e., low vs. high trait self-efficacy) should be more susceptible to shifts in that process. Among low self-efficacy participants, why (vs. how) should enhance intentions to engage in prevention behaviors, whereas those with high self-efficacy should be equally likely to engage in prevention behaviors across thought-level conditions. In summary, we predicted that high trait fear (low trait self-efficacy) would exacerbate the proposed interaction between thought level and health action conditions.

Methods and Procedure

This experiment was set in the context of skin cancer with two phases of data collection spaced five days apart. In the first phase, we premeasured participants’ trait fear and self-efficacy
among other demographic information. In the second phase, we ran the main experiment.

**Premeasured trait fear and self-efficacy.** At the premeasure phase, we recruited 502\(^4\) participants (\(M_{age} = 35.97; 214\) women) using TurkPrime panels (Litman, Robinson, and Abberbock 2017) and presented them with a cover story of “Consumer Opinions Study” containing a battery of questions about their opinions. We measured dispositional fear and self-efficacy in randomized order. Adapting from Lerner and Keltner (2001), we administered the illness and health subscale of the Fear Survey Schedule II developed by Greer (1965; \(\alpha = .87\); Web Appendix G). We measured trait self-efficacy using the New General Self-Efficacy scale (Chen, Gully, and Eden 2001; \(\alpha = .94\); Web Appendix G). In addition to these measures, we collected demographic information and participants’ history of skin cancer. Eight participants (1.6\%) reported having been diagnosed or treated for skin cancer.

**Main study.** Five days later, we invited this pool of participants for the main study and stopped data collection after five days. Four hundred seven participants (\(M_{age} = 36.36\) years; 180 women) returned to participate. The main study had a two-way 2 (action: detection vs. prevention) \(\times\) 2 (thought level: how vs. why) between-subjects design. All participants were first shown an advertisement titled “Skin Cancer Facts” that presented a brief description of skin cancer, its common cause, and symptoms (Web Appendix A). Like Study 1, we assigned them to four conditions based on the writing instructions. For examples of thought listings by participants, see Web Appendix F. We adapted the main dependent variable items from Studies 1 and 2, measuring their interest in seeking health care for skin cancer (see Web Appendix D). We chose this general measure of health intentions because the message did not advocate for a type of product or procedure. Next, participants completed the manipulation checks (Web Appendix C), followed by a debriefing procedure.

**Results and Discussion**

**Trait fear and health intentions.** We ran a bootstrapped regression (Model 3, PROCESS; Hayes 2013) with 5,000 bootstrap samples indicating participants’ intentions as the dependent variable, action type, and thought level, trait self-efficacy, three two-way interaction terms and one three-way interaction term as predictors. We found that the model was significant (\(F(7, 399) = 2.53, p = .015\)), with a significant two-way interaction between action type and thought level (\(b = -6.44, p = .039\)) and a significant three-way interaction (\(b = 1.37, p = .014\)).\(^5\) We also found a significant main effect of trait self-efficacy (\(b = 1.37, p < .001\)), indicating dispositional self-efficacy was an independent and positive predictor of health intentions. The interaction between action type and thought level was significant only among participants with low trait self-efficacy (low (-1 SD) self-efficacy \(b = -1.58, p = .046\); mean self-efficacy \(b = -2.23, p = .69\); high (+1 SD) self-efficacy \(b = 4.5, p = .54\)). In the prevention condition, those with low trait self-efficacy indicated stronger intentions to address skin cancer concerns when asked to consider why versus how (\(b = 1.61, p = .003\)), whereas those with high trait self-efficacy did not significantly vary across how versus why conditions (\(b = -2.1, p = .70\)). In the detection conditions, participants’ trait self-efficacy did not significantly predict variance in their health intentions across how versus why conditions (\(b = -1.18, p = .038\)), whereas those with low trait fear did not significantly vary across how versus why conditions (\(b = 49, p = .54\)). In the detection conditions, those with high trait fear indicated stronger interest in seeking health care support for skin cancer when asked to consider how (vs. why; \(b = -1.18, p = .038\)), whereas those with low trait fear did not significantly vary across how versus why conditions (\(b = -45, p = .15\)). These results suggest that trait fear exacerbates the effect of thought level on detection, indicating a mechanism of fear drives intentions for detection—but not prevention—actions.

**Trait self-efficacy and health intentions.** We ran a second bootstrapped regression (Model 3, PROCESS; Hayes 2013) with 5,000 bootstrap samples indicating participants’ intentions as the dependent variable, action type, and thought level, trait self-efficacy, three two-way interaction terms and one three-way interaction term as predictors. We found that the model was significant (\(F(7, 399) = 2.53, p = .015\)), with a significant two-way interaction between action type and thought level (\(b = -6.44, p = .039\)) and a significant three-way interaction (\(b = 1.37, p = .014\)).\(^5\) We also found a significant main effect of trait self-efficacy (\(b = 1.37, p < .001\)), indicating dispositional self-efficacy was an independent and positive predictor of health intentions. The interaction between action type and thought level was significant only among participants with low trait self-efficacy (low (-1 SD) self-efficacy \(b = -1.58, p = .046\); mean self-efficacy \(b = -2.23, p = .69\); high (+1 SD) self-efficacy \(b = 4.5, p = .54\)). In the prevention condition, those with low trait self-efficacy indicated stronger intentions to address skin cancer concerns when asked to consider why versus how (\(b = 1.61, p = .003\)), whereas those with high trait self-efficacy did not significantly vary across how versus why conditions (\(b = -2.1, p = .70\)). In the detection conditions, participants’ trait self-efficacy did not significantly predict variance in their health intentions across how versus why conditions (\(b = -1.18, p = .038\)), whereas those with low trait fear did not significantly vary across how versus why conditions (\(b = 49, p = .54\)). In the detection conditions, those with high trait fear indicated stronger interest in seeking health care support for skin cancer when asked to consider how (vs. why; \(b = -1.18, p = .038\)), whereas those with low trait fear did not significantly vary across how versus why conditions (\(b = -45, p = .15\)). These results suggest that trait fear exacerbates the effect of thought level on detection, indicating a mechanism of fear drives intentions for detection—but not prevention—actions.

\(^4\) We invited 500 participants for Study 3 and 400 participants for Study 4. In both studies, two additional participants signed up and participated concurrently before the studies closed. We compensated and included them in the final sample.

\(^5\) We conducted analyses including participants’ previous history with skin cancer as a covariate. We found similar pattern of results as reported here.
account. This moderation approach rules out alternate theoretical accounts such as processing fluency, or valence perceptions; an effect driven by other mechanisms would not be moderated by trait fear. Also note that trait fear did not moderate the prevention effect, indicating the process of fear is a significant driving mechanism in detection considerations, but not so in prevention actions. Similar reasoning applies to self-efficacy and skin cancer prevention; participants with chronically low beliefs about their self-efficacy were sensitive to why (vs. how) considerations when indicating their intentions, whereas those with high self-efficacy indicated higher health prevention intentions irrespective of thought levels. In both regression models reported here, we found dispositional fear and self-efficacy are independent predictors of health intentions, highlighting the importance of consideration of these variables in health persuasion. On a related note, we found that trait fear and self-efficacy in our data are correlated ($r = -.17$, $p = .001$), such that participants who were chronically disposed to feel afraid were also likely to hold weaker beliefs about their self-efficacy. We ran additional regression models such that trait self-efficacy was covaried in the fear-as-moderator model and vice versa. We found a similar pattern of results on the interactions.

Study 4: Breast Cancer Detection Tool Behavioral Study

Studies 1–3 tested the two hypotheses derived in the theory section. We designed Study 4 with two main objectives. First, we wanted to present an intervention for the fear process associated with detection health behaviors. For this purpose, we developed a messaging intervention that reframed the detection behavior in terms of prevention. Our reasoning was as follows: if the focal outcome of the detection behavior evokes fear as evidenced thus far, presenting the focal outcome of detection as something pleasant and desirable (rather than something dreadful) should attenuate the effect of fear. Thus, we predicted that presenting the outcome of detection behavior as illness prevention—where the focal outcome is eventual good health—would mitigate the effects of fear at higher (vs. lower) levels of thought construal.

Second, we wanted to test this intervention using an actual behavioral outcome. For this purpose, we provided the study participants with an opportunity to use a legitimate online breast cancer detection tool (Breast Cancer Risk Assessment Tool [BCRAT] developed by the National Cancer Institute) that is publicly available for free. We programmed the software using iframe HTML to embed this tool within the study window such that participants were redirected to the official BCRAT page—which included instructions, disclaimers, and further references—without leaving the study window (for a screenshot, see Web Appendix H). Participants’ choice of using this detection tool served as the behavioral dependent variable in this study.

Methods and Procedure

We recruited a panel of 402 female participants ($M_{\text{age}} = 46.12$ years) to take part in a 2 (message frame: detection as detection vs. detection as prevention) × 2 (elaboration: how vs. why) study design. As a cover story for the study, participants were told that an ostensible “Public Health Department” had prepared an advertisement about an online breast cancer detection tool.

Message and thought-level manipulations. Depending on their experimental condition, participants viewed a health message encouraging the use of an online tool to either detect (detection-as-detection frame) or prevent breast cancer (detection-as-prevention frame). Note that messages in both conditions advocated for detection; the product being promoted in the ads was a detection tool that estimates breast cancer risk in both conditions and was labeled as such. The only manipulation was in framing the outcome of detection behavior as detection or prevention (see Web Appendix A). After viewing the message, participants were instructed to write about how (vs. why) they would use the online breast cancer tool. Similar to the pilot study and Study 3, we analyzed the sentiment in the written content to measure the extent of fear-related and risk-related sentiment.

Breast cancer detection tool. Next, participants were told, “As compliments of participating in this study, the online Breast Cancer Risk Assessment Tool (BCRAT) developed by the National Cancer Institute is offered for your use. If you would like to use the tool, please go ahead and select ‘yes’, if not, select ‘no’.” Participants were informed that their choice would not affect compensation for study participation. If they chose to use the tool, they were taken to a window that embedded the BCRAT and they could spend as much time as they wished before receiving compensation for participation. If they chose not to use the tool, the study ended and participants received compensation. This choice served as the behavioral dependent variable in this study. Because participants were given the choice to leave the study without visiting the BCRAT page, we did not measure any other variables after this step.

Results and Discussion

BCRAT. A logistic regression with the dependent variable being whether participants used the tool (1 = yes) or not (0), and message frame, thought level, and the two-way interaction as independent variables, revealed a significant model ($\chi^2(3) = 8.34, p = .04$). Results indicated that in the detection-frame condition, why (vs. how) elaboration reduced the likelihood that participants would use the tool ($M_{\text{det-why}} = .77$, $M_{\text{det-how}} = .88; p = .032$). However, this difference was attenuated when the detection behavior was framed as prevention, such that why (vs. how) did not change the likelihood of use ($M_{\text{prev-why}} = .89$, $M_{\text{prev-how}} = .88; p = .90$). Participants’ choice varied across the why conditions ($b = -.44$, $SE = .20$, $p = .029$) but not how
conditions (b = .01, SE = .21, p = .98). This interaction is plotted in Figure 2.

**Sentiment analysis.** To analyze the sentiments expressed in written context before the participants made their choice of tool use, we ran two ANOVAs. We ran the first ANOVA with fear-related words as the dependent variable, and the thought level and message frame as independent variables. We found the model to be significant ($F(3, 398) = 5.56, p < .001$), with a marginally significant effect of message frame ($M_{\text{det}} = .40, M_{\text{prev}} = .15; p = .11$) and a significant main effect of thought level, such that participants expressed more fear-related words when writing about why rather than how ($M_{\text{why}} = .42, M_{\text{how}} = .08; p = .005$). We found a significant interaction ($F(1, 398) = 5.60, p = .018$) such that participants expressed greater fear-related content when writing about why versus how under the detection-as-detection frame ($M_{\text{det-why}} = .68, M_{\text{det-how}} = .02; p = .008$), but this difference in fear was attenuated in the detection-as-prevention frame ($M_{\text{prev-why}} = .18, M_{\text{prev-how}} = .12; p = .56$). The second ANOVA using the same predictors with risk-related words as the dependent variable was significant ($F(3, 398) = 17.29, p < .001$). This model found a significant main effect of both message frame ($F(1, 398) = 15.44; M_{\text{det}} = 2.79, M_{\text{prev}} = 1.19; p < .001$) and thought level ($F(1, 398) = 12.52; M_{\text{how}} = 1.23, M_{\text{why}} = 2.43; p < .001$), including a significant interaction ($F(1, 398) = 5.65; p = .018$). Similar to fear, participants expressed greater risk-related sentiment when writing about why versus how under the detection-as-detection condition ($M_{\text{det-why}} = 3.56, M_{\text{det-how}} = 1.71; p < .001$), but this difference was attenuated in the detection-as-prevention condition ($M_{\text{prev-why}} = 1.34, M_{\text{prev-how}} = .90; p = .26$).

**Discussion.** This study utilized a real behavioral outcome (i.e., whether participants in the study used an online cancer detection tool) to test our proposed intervention. The focal outcome of the detection-as-detection message was cancer detection—which is predicted to invoke fear—whereas the focal outcome presented in the detection-as-prevention message was eventual good health. When the outcome of the detection behavior was presented as detection, participants were less likely to use the BCRAT in the higher- (vs. lower-) level thought condition (replicating previous findings). However, presenting the outcome of the detection behavior as prevention mitigated this effect. This framing intervention therefore dampened the effects of fear of illness detection under higher (vs. lower) thought construal.

Given the nature of the behavioral dependent variable, two points should be noted. First, the data presented here show a very high likelihood of participants’ use of the BCRAT (mean likelihood of use is 85.5%). We attribute these high means to the availability of the BCRAT on the study window, which lowered the barriers of use. Second, we found no difference in participants’ likelihood of using the BCRAT in the detection-as-prevention condition across the *why* versus *how* conditions. This condition does not show the thought-construal effects from the prevention conditions of the previous studies. There are two reasons to not expect the detection-as-prevention condition to behave akin to the prevention conditions from previous studies: (1) the use of the BCRAT is still a detection behavior (the message says “risk assessment”) and this condition is unlikely to show clear prevention effects, and (2) because the advocated health behavior (use of detection tool) is provided on the study page, self-efficacy concerns that could have potentially driven prevention effects are attenuated.

**General Discussion**

This research demonstrates that unique psychological processes underlie illness-detection versus illness-prevention behaviors. We identified a fear-driven process in the case of detection health behaviors, and, importantly, highlight that findings from a prevention-focused literature may not be generalizable to detection. We demonstrate that (1) detection (vs. prevention) health behaviors elicit fear, (2) lower-(higher-) level thought construal increases the likelihood of engagement in detection (prevention) behavior, and (3) two different processes drive the effects of these behaviors—fear drives detection, whereas self-efficacy concerns shape prevention behaviors. When consumers consider illness detection, they experience fear associated with a potential negative health discovery, which is exacerbated by higher-(vs. lower-) level thought. By contrast, when consumers consider illness prevention, they are more likely to engage in the health behavior through enhanced perceptions of self-efficacy, especially when they have higher- (vs. lower-) level thought about the behavior. We test this theory through a variety of methods (data from social media, experiments), theoretical approaches (moderation by traits), and an intervention for detection. As an overview, we have summarized all our studies and findings in Table 2. Next, we now discuss...
the significant contributions of these findings to marketing theory and practice.

**Detection versus prevention health behaviors.** Our findings highlight the importance of delving deeper into the nature of different health behaviors (e.g., detection, prevention, remedy) and identifying the psychological processes activated when considering such behaviors. Extant work that contrasts detection and prevention health actions has predominantly considered the aspect of perceived risk (e.g., Mathur et al. 2013; Rothman and Salovey 1997; Rothman et al. 1993). Integrating these conceptual differences with construal-level theory, we identify that fear and self-efficacy are distinct processes that drive detection and prevention, respectively. However, detection and prevention health actions may differ in other aspects (in addition to risk perceptions and fear) that remain to be explored. For example, Rosenstock (1974) suggests that those engaging in detection behaviors are likely ill, whereas those engaging in prevention behaviors are likely relatively healthy. Detection messages may be more likely to be targeted toward consumers who have already experienced the onset of the disease, whereas prevention messages may target consumers with the opportunity to prevent onset. The dimension of health status difference poses the question of whether people who receive detection versus prevention messages infer a different health status about themselves. Specifically, recipients of detection (vs. prevention) messaging may be more likely to view themselves as “potential patients.” Another interesting aspect of the difference across detection and prevention behaviors could be the time construal of health goals. The goals associated with illness detection tend to be more specific and shorter term (e.g., get tested soon), whereas prevention goals are perhaps more spread out over time (e.g., avoid high-calorie food). Because our theorization did not include aspects of the relevance (perceived or actual health status) or nature of goals, studies reported here were designed to control or account for such factors. Considering that the extant literature on detection health behaviors is relatively small and has not systematically investigated these differences, future research can make significant contributions by testing the ways in which detection health actions are perceived by consumers to be similar to or different from prevention ones (health status, health goal, temporal perspective, goal concreteness, etc.) and outlining the psychological and compliance implications of these similarities and differences.

Another set of differences and similarities across the detection versus prevention behaviors merit a deeper discussion here is that of valence of the outcome versus process. We theorize on conceptual differences across outcome of detection (fearful, negative) versus outcome of prevention (desirable, positive) behaviors. This line of thinking is extended in our intervention study where we frame detection in the service of prevention to make it less fearful. Other ways of framing detection to reduce the negative valence association of the outcome could be examined (e.g., framing detection as finding out that one does not have the condition, “screening out” vs. “detection” tools). However, the case for valence differences across the process of detection and prevention is relatively less

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**Table 2. Summary of Study Designs and Findings.**

<table>
<thead>
<tr>
<th>Study</th>
<th>Health Context</th>
<th>Process Evidence</th>
<th>Study Design and Findings (All Between-Subjects Designs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot 1</td>
<td>Clinical depression</td>
<td>Sentiment analysis</td>
<td>Design: One-way (detection vs. prevention) Finding: Detection (vs. prevention) tweets contain greater negative sentiments, specifically fear- and risk-related words</td>
</tr>
<tr>
<td>2</td>
<td>Clinical depression and anxiety</td>
<td>Dual mediation as test of fear process for detection and self-efficacy process for prevention</td>
<td>Design: 2 (health action: detection vs. prevention) × 2 (thought level: how vs. why) Finding: When thinking about detection (prevention), a process of reduced fear (increased self-efficacy) enhances intentions of seeking mental health help under low- (high-) level thought</td>
</tr>
<tr>
<td>3</td>
<td>Skin cancer</td>
<td>Thought-level control condition as baseline; measured fear and self-efficacy</td>
<td>Design: 2 (health action: detection vs. prevention) × 3 (thought level: how vs. why vs. control) Finding: When thinking about detection (prevention), a process of reduced fear (increased self-efficacy) enhances intentions of seeking mental health help under low- (high-) level thought</td>
</tr>
<tr>
<td>4</td>
<td>Breast cancer detection tool</td>
<td>Moderation by dispositional fear and self-efficacy</td>
<td>Design A: (trait fear: continuous) × 2 (health action: detection vs. prevention) × 2 (thought-level: how vs. why) Design B: (trait self-efficacy: continuous) × 2 (health action: detection vs. prevention) × 2 (thought level: how vs. why) Finding: Health intention effects are exacerbated under high (vs. low) trait fear and low (vs. high) trait self-efficacy</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Reframing intervention</td>
<td>Design: 2 (message frame: detection as detection vs. prevention) × 2 (thought level: how vs. why) Finding: When detection behavior was reframed as leading to prevention, participants were more likely to use an online breast cancer detection tool even under high-level thought</td>
</tr>
</tbody>
</table>
clear. In some contexts, process of detection (vs. prevention) may be more negative (e.g., regular colonoscopy for detection vs. a one-time oral vaccine for prevention), whereas in some other contexts, it could be positive (e.g., a visual dermoscopy for melanoma detection vs. consistent adherence to a fat-free diet to prevent heart diseases). Indeed, empirical results across our studies indicate that the process of detection is not perceived by participants as more positive—that is, as invoking stronger feelings of self-efficacy or ease—than the process of prevention (e.g., self-efficacy and fluency data in Table 1). However, consumers may have differential lay expectations of the ease/difficulty of executing detection versus prevention behaviors. Our studies did not manipulate the valence of process versus outcome and cannot directly speak to this important direction. As such, the examination of process valence remains a valuable avenue for future research.

Fear, and health behaviors of detection and prevention. Previous research has predominantly examined persuasion related to prevention behaviors and messages in a variety of literature streams (e.g., public health messages, self-control). We extend the small stream of research on detection behaviors by identifying a distinct fear-driven emotional process mediating consumers’ engagement in detection in contrast to prevention. We draw from the literature on emotions and their associated appraisals (e.g., Lerner and Keltner 2001; Öhman 2008; Smith and Ellsworth 1985) to theorize a process driven by fear, because detection health behaviors are associated with experiences of the uncertainty of receiving unpleasant news, perceived to be out of one’s control. We found evidence for this fear process both when the message/appeal advocated for a detection action and when participants independently considered illness detection. This experience of fear is shown to undermine engagement in the beneficial and advocated behavior.

Contextualizing current research with respect to the fear appeals literature in health is important. Fear appeals are those designed to advocate for health behavior by highlighting a fear-eliciting outcome of not engaging in the advocated behavior (Keller and Block 1996; Witte and Allen 2000). Conceptually, the link between the advocated action and fear is different in the fear appeals set-up and in our theorizing. Fear appeals present the advocated health behavior (e.g., quitting smoking; Witte and Allen 2000) as a way to assuage the fear from an unpleasant outcome. In our setting, the advocated health behavior (e.g., breast cancer screening, mental health screening) is the one that arouses fear. Our research documents a different facet of fear in health, showing that engaging in some health behaviors in itself could be fearful, and in that way undermine health engagement. We find this process of fear is not a significant driver of health intentions in the case of prevention behaviors with desirable outcomes, where we converge with the fear appeals literature in finding self-efficacy as a key driver of prevention behaviors.

Health behaviors and thought construal. The fear mechanism demonstrated in this research enables us to also identify conditions under which this mechanism is exacerbated. Our findings indicate higher- versus lower-level thought is an antecedent to the extent of emotional and self-evaluative experience: in case of a fear-eliciting event (such as detection), lowering the level of thought shifts the focus away from the elicitor, and is shown to weaken the experience of the emotion. Similarly, in case of a desirable event (e.g., prevention), increasing the level of thought strengthens beliefs in one’s ability to bring about the event by shifting the focus away from operational concerns. Although our findings for prevention behaviors converge with previous findings on construal level and self-control (e.g., Agrawal and Wan 2009; Fujita and Roberts 2010), our findings for detection contrast from previous construal level and self-control identifying a condition when higher-level construal can undermine health behavior.

Speaking of convergence with the construal level and self-control research, our pattern of results for prevention is similar to the goals-means framework of Agrawal and Wan (2009) that emphasizes a resource allocation approach, and the goals-temptations framework of Fujita and Roberts (2010), which focuses on anticipated temptations. Both these approaches could help design compliance tactics and should be examined in future research. Our theorizing of prevention behaviors is conceptually quite close to the resource availability/ allocation framework used by Agrawal and Wan (2009), but because our research is in the context of disease/illness, instead of resource availability, we chose the variable of self-efficacy, which is fairly established in the public health literature (e.g., Fielding 1978; Keller 2006; Peters et al. 2013; Rosenstock 1974). Future research that examines how anticipated temptation-related strategies (e.g., precommitment) would work for detection behaviors would be useful. More broadly, further research that contrasts detection and prevention behaviors or other health behavior types (lifestyle change vs. medication) across various aspects of construal levels (inferences from distance, primary/secondary, power, temporal construal, etc.) would be informative to both the construal-level and health literature.

Managerial implications. This research presents significant implications for health marketing by identifying a fundamental difference in the extent of fear associated with considering detection versus prevention health actions and suggests conditions to enhance health intentions for each type. Detection considerations are undermined when paired with thoughts about outcomes of illness detection, such that increased fear mediates lowered health intentions. At the other pole of our contrast, we show that pairing low-level thought with prevention actions is less effective due to increased concerns about self-efficacy. These findings are particularly important because these effects amplify among consumers vulnerable to fear and low self-efficacy (Study 3). The takeaway for health marketers is the importance of encouraging thinking about the how (vs. why) of engaging in detection (vs. prevention) actions while advocating for these behaviors, either as part of messaging or conversations surrounding the behavior. Of further interest to health marketers, we attenuate the effect of fear at high-level
thought in a behavioral study by presenting an online breast cancer detection product as serving a prevention goal (Study 4). This study suggests another approach to mitigate the effect of fear in detection health behaviors: presenting the outcome of detection health behavior as being long-term good health. The prevention-framing tactic could be used to make detection message campaigns more effective. In summary, we hope that improved understanding of the psychology of detection and how it shapes persuasion will help health marketers more effectively persuade consumers adopt healthy—albeit fear-laden—detection behaviors.

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