

Conceptualizing and Assessing Risk Perceptions: A Self-Regulatory Perspective

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In this presentation, I consider the concept of risk perception from the perspective of the Common-Sense Model (CSM), which is a self-regulation model of health threat cognition and behavior developed by Howard Leventhal and colleagues (Brownlee, Leventhal, & Leventhal, 2000; Leventhal, Brissette, & Leventhal, 2003; Leventhal, Leventhal, & Cameron, 2001). This model suggests a number of important cognitive and affective facets of risk perceptions. I will focus on five key features of the CSM that may be of particular relevance for discussions of ways to advance the conceptualization and assessment of risk perceptions. First, it delineates the structure and role of illness representations in responses to health threats. Perceptions of health risks are fundamentally based on perceptions of the target illness or disability condition, and so construals of risk perceptions must incorporate, or at least be consistent with, our theoretical understanding of illness representations. Second, it identifies two parallel and partially independent motivational processes: one that is problem-focused and the other that is emotion-focused. Third, it identifies that mental constructs such as risk representations have both abstract-conceptual contents and concrete-perceptual contents. Fourth, it identifies the use of “if-then” cognitive rules that link representations, behaviors, and appraisals of outcomes. And finally, it indicates linkages of health threat cognitions and behaviors with the self-system.

The Common Sense Model

According to CSM (see Figure 1), health threat stimuli (e.g., a media message about melanoma or a symptom such as an unusual mole) elicit the activation and development of a representation of illness risk. Considerable research has established that this representation has five key domains: identity, cause, timeline, consequences, and control/cure (see Baumann, 2003; Leventhal et al., 2001). The representation guides the identification and use of procedures for controlling the health threat. The outcomes are then appraised in terms of their success in controlling the threat, and these appraisals feed back to update the illness representation.

At the same time as this problem-focused motivational process is activated, both the stimuli and the threat representation activate emotional responses—most commonly, fear-related responses such as anxiety and worry (although other emotions such as depression and anger may occur as well). The cognitive representation of fear elicits procedures to control the emotional arousal, the outcomes of which are appraised for their success. The problem-focused and emotional motivational processes operate in parallel, and they are partially independent—they may serve to motivate the same behaviors, or they may motivate contrasting behaviors.

Both of these self-regulation processes involve abstract-conceptual processing and contents, and concrete-perceptual processing and contents. At the problem-focused level, for example, a representation of melanoma may include abstract information about the causes of melanoma as well as concrete memories of bad sunburns, a relative’s melanoma lesions, etc. At the emotional level, concrete-perceptual experiences of fear and worry are dominant, but they also give rise to the

conceptual awareness and labeling of the emotional state, reasoned considerations of ways to regulate the emotion, and appraisals of effectiveness. This abstract-conceptual processing of emotion involves many of the emotion regulation processes identified by Salovey and colleagues in their work on emotional intelligence (Salovey & Mayer, 1990), as well as the emotion regulation principles delineated by Gross and colleagues (see Gross, 1999).

This health threat regulation process links directly with the self-system. Specifically, a representation of personal illness risk arises from matching characteristics of the self with attributes of the illness representation. For example, a person's melanoma risk representation will be based on matching self-characteristics with illness causal factors (e.g., I have a family history of melanoma, I've had a lot of sunburns, I have fair skin, etc.). The risk representation will, in turn, impact on one's sense of self (e.g., possible future self, general health status, etc.) and one's general representation of the illness. An illness risk representation may be transient and poorly developed—for example, if it is prompted only by a query about perceived risk in the absence of any enduring concern or contemplation. As Winschitl (2002) notes, risk judgments are often likely to be ad hoc constructions rather than pre-formed beliefs. If the risk is of continuing concern and contemplation, however, then the risk representation is likely to be more developed and relatively stable.

A Closer Look at Illness Risk Representations

Given that people store and represent illness information within the five content domains of identity, cause, timeline, consequences, and controllability, we can consider how these domains relate to risk perceptions. Generally, three of the domains may serve primarily as the basis for the generation of likelihood estimates: identity, cause, and timeline. Identity includes beliefs about whether or not one is at risk or in the early stages of illness progression. At an abstract-conceptual level, an individual may have a clear label of “at risk”, such as the acceptance of a doctor's diagnosis that he or she is at risk for coronary heart disease. At a concrete-perceptual level, one may identify symptoms indicative of risk; for example, an individual may identify his or her breathlessness after exercising as an indicator of a weakened cardiovascular system that could be in the first stages of heart disease. Causal beliefs concern personal and environmental factors that place one at risk. For example, an individual may have abstract-conceptual beliefs that “heart disease runs in the family” as well as concrete memories of his or her father in critical condition in the cardiac unit. Timeline beliefs that are of potential importance for understanding responses to future health risks are perceived timelines of when illness strikes (e.g., “Heart disease strikes in your late 40's”), and the speed and nature of the development and progression of the illness (e.g., “You have high blood pressure that steadily increases over a number of years, and then you have a heart attack”).

The remaining two domains, consequences and controllability, are likely to serve as the basis for severity estimates. Consequence beliefs include abstract-conceptual knowledge and concrete-perceptual images regarding the disabilities, social consequences, and other outcomes of the illness or condition (e.g., “A heart attack could leave me an invalid, and I'd have to quit work”). Controllability beliefs involving whether the illness condition can be cured or controlled through medication, surgery, or other sorts of treatment should directly influence severity appraisals as well.

Likelihood and severity estimates are the most commonly assessed facets of risk judgments, and we expect that the five content domains of illness representations underpin these basic components of risk judgments. A potential advantage to considering likelihood estimates and severity estimates in terms of these illness representation domains is these domains directly represent the mental contents driving

emotional responses and behavior. It is important to note, however, that much (but not all) of the empirical research on these five representational domains as predictors of behavior has been conducted with individuals who already have the target illness condition (Kaptein et al., 2003; Leventhal et al., 2001). Although we expect that these same five domains will form the critical basis of illness risk representations, further research may reveal that new domains may need to be added or that some of these five domains may need to be modified in order to most accurately model representations of illness risks.

Representations of Coping Procedures

Illness risk representations activate representations of procedures that can be used to protect against the health threat. These representations of coping procedures connect specific actions to concrete cues in the relevant context (Leventhal et al., 2003). These representations are schemas with five content domains that mirror those of the illness risk representation: identity (the action's label and its concrete effects), timeline (the time it takes for the action to produce a change in status), consequences (the social, physical, and other costs and benefits of the action), cause-related beliefs about who applies the procedure (self, expert, or other) and his/her efficacy in doing so, and controllability (the ability to regulate the risks and benefits of the action).

There are a number of critical characteristics of these coping procedure representations. First, they are highly concrete-perceptual in nature, and their contents largely consist of action scripts, vivid imagery, and contextual cues. Assessments of risk-related behaviors may need to be designed in ways that clearly tap into concrete-perceptual contents. Second, these representations also link with other domains of the self-system. For example, exercise may link with goals for having a trim and attractive body, goals of interacting with friends at the gym, goals of running a marathon in the upcoming year, etc. Moreover, a coping procedure representation may link with several health threat representations; for example, exercise may link with heart disease, cancer, weight control, osteoporosis, and other health threats. Finally, the procedure representation may be activated directly (e.g., when invited for a brisk walk) and it may or may not activate an illness risk representation. Whether or not it does so will largely depend on the strength of the associative links between the illness risk and procedure representations.

The Links between Risk Representations and Emotional Processes

The emotion regulation arm of the CSM is conceptually congruent with the "behavioral inhibition system" (BIS) identified by Gray (1987), Carver and Scheier (1998; Carver, Sutton, & Scheier, 2000), and other theorists. Given the empirical evidence derived from research on BIS processes, as well as the considerable research guided by the CSM and other models of interactions between cognitions and emotions, we can identify a number of established influences of anxiety on responses to health risks (see Cameron, 2003 for a review). First, anxiety and worry have strong motivational influences on behavior, and their influences can sustain over prolonged periods of time. It is also clear that anxiety, worry, and other fear-related emotions can influence cognitive risk representations via their effects on a number of information processing mechanisms. For example, anxiety enhances vigilance in processing risk information, and it promotes rumination of threat-related information over prolonged periods. These effects can foster the development of more extensive and detailed risk representations. Anxiety can serve as a "heuristic", in that it can serve as a concrete cue regarding one's view of the danger and risk involved (Slovic, 2001). Anxiety has been found to enhance attention to concrete-experiential cues while inhibiting verbal/conceptual processing of information (Gray 2001), and to motivate attention to short-term consequences rather than long-term consequences (Gray, 1999). These latter effects suggest

some interesting ways in which worry may affect risk representations (such as by enhancing the concrete-perceptual contents and reducing abstract-conceptual information) and behavior (such as by motivating behaviors that optimize short-term gains). For example, anxiety about breast cancer may motivate swift use of genetic testing by increasing the focus on the prospect of obtaining relief if the results are normal while decreasing attention to potential long-term consequences of testing for oneself and one's family.

In support of the CSM, there is substantial evidence that risk representations and worry independently influence information processing and behavior—findings which highlight the need to consider both risk representations and affect in conceptualizing risk perceptions. A number of researchers have identified conditions in which worry predicts health behavior whereas risk judgments do not (Diefenbach, Miller, & Daly, 1996; McCaul, Schroeder, & Reid, 1996). In our research group, for example, we have found that breast cancer worry (but not perceived risk) independently predicted greater interest in genetic testing (Cameron & Diefenbach, 2001). Similarly, in a study of skin detection behaviors in young adults, we found that worry predicted skin self-examinations whereas risk judgments did not (Ying & Cameron, 2003). We have also observed several instances in which worry and risk judgments can have contrasting influences on perceptions and behavior. For example, we assessed perceived risk and worry of recurrence in a sample of 116 breast cancer patients soon after diagnosis (Cameron, Booth, & Schlatter, 2003). Generally, and not surprisingly, we found this group to be highly motivated to adopt healthier habits in order to reduce their chances of recurrence. Interestingly, we found that perceived risk and worry were not strongly correlated ($r = .29$). We also found that perceived risk of recurrence predicted reductions in alcohol use over the subsequent four months, whereas worry about recurrence predicted increases in alcohol use over this time period. This latter effect might be interpreted as reflecting that highly anxious women were using alcohol as a way to cope with their anxiety. In summary, not only do worry and risk representations influence each other, but they may differentially influence behavior.

Abstract-Conceptual and Concrete-Perceptual Contents of Risk Representations

According to the CSM, the concrete-perceptual contents of risk representations are believed to be more predictive of behavior than are abstract-conceptual contents. As noted by Metcalfe and Mischel (1999), concrete-perceptual contents are “hot” and so they are highly motivational and likely to induce automatic, impulsive reactions. Relative to abstract-conceptual contents, they are also more strongly linked to the concrete-perceptual contents of representations for coping procedures—that is, the concrete action scripts and cues that make up the representations of protective behaviors. Concrete-perceptual contents of risk beliefs that are connected with protective behavior representations are therefore likely to be a dominant predictor of that behavior.

Risk Regulation is a Dynamic Process

Another attribute of the CSM is its dynamic nature—it is a dynamic processing system in which representations, behavior, and emotions evolve and change over time. The relationships between risk beliefs, emotional responses, and behavior are not static. Moreover, the CSM construes risk-related behavior as problem-solving behavior. When people are confronted with risk information, they invariably ask questions such as:

- *Do others like me have signs of risk?* This question evokes social comparison behaviors. The “prevalence rule” is an example of how social comparison strategies influence risk perceptions: If

many people have the risk signs, then the condition must not be too serious (Jemmott, Ditto, & Croyle, 1986).

- *Do I have the illness already?* This question motivates consideration of detection practices, medical consultations, and other diagnostic behaviors.
- *Does a given protective behavior reduce my risk status?* This question motivates individuals to engage in protective behavior and then monitor for changes in symptoms and other concrete cues that would indicate risk reduction.

These dynamics involve the use of “if-then” contingency rules. These rules are the mechanisms that integrate representations, procedures, and appraisals. The following is an example illustrating how if-then rules are involved in the reciprocal relationship between risk representations and behavior (for a discussion of the reciprocal nature of the risk perception-behavior relationship, see Gerrard, Gibbons, Benthin, & Hessling, 1996; Weinstein & Nicolich, 1993). Consider a man who has learned that he has high blood pressure (HBP) and so is at risk for heart disease. This man has the following series of thoughts:

- *IF HBP is caused by being unfit, THEN exercise will reduce it.* The causal representation guides the selection of the coping procedure.
- *IF it takes about 6 weeks to become fit, THEN after 6 weeks of walking I should less breathlessness upon exertion/slower heart rates while exercising.* The representation of the coping procedure guides the appraisal criterion.
- *IF I have these signs, THEN my HBP should be lower and my risk of heart disease should be reduced.* The appraisal modifies the illness risk representation.

Summary of Implications for Conceptualizing and Measuring Risk Perceptions

This self-regulatory perspective of risk perceptions suggests a number of implications for efforts to advance our understanding and assessment of risk perceptions. First, it suggests that it is important to consider how illness representation attributes relate to risk perceptions. As noted, it is predicted that specific linkages exist between likelihood estimates, severity appraisals, and the five content domains of illness representations. Specifically, it is predicted that likelihood estimates are based primarily on beliefs regarding identity, cause, and timeline whereas severity estimates are largely determined by beliefs concerning consequences and controllability.

One issue to consider is whether measures of risk judgments and worry are sufficient indicants of the illness representation attributes influencing behavior, or whether we need more detailed assessments of the illness representations in order to predict responses. It may be that influences of representational beliefs on behavior are completely accounted for by simple measures of risk judgment and worry (see Figure 2). This remains an empirical question, and it is likely that the relationships between representational attributes, risk judgments and worry, and behavior are not as straightforward as depicted in Figure 2. Some representational beliefs may influence behavior in ways that are not accounted for by risk and worry ratings, and this evidence will provide important information for theory development. Researchers may find it advantageous to use established illness representation measures such as the Illness Perceptions Questionnaire-Revised (IPQ-R; Moss-Morris et al., 2002; for other measures, see Kaptein et al., 2003) in projects exploring the relationships between representational attributes, risk and worry, and protective behavior, although such measures will need to be adapted to focus on future health threats rather than on existing illness conditions.

A second implication of this self-regulatory perspective is that we need to assess both risk cognitions and affect so that we can further explore how each may be uniquely influencing behaviors and experiences (see also Loewenstein, Weber, Hsee, & Welch, 2001). Evidence suggests that worry and fear often influence behaviors independently of the influence of abstract-conceptual risk beliefs, and that there are situations in which worry and fear predict behaviors whereas risk judgments do not. Yet these findings should not lead researchers to abandon the use of risk cognition measures in efforts to identify the determinants of protective behavior. Even in a situation where it is found that worry motivates protective behavior and risk cognitions do not, efforts to develop interventions to promote that behavior will still require attention to risk cognitions. Intervention efforts to promote protective behavior cannot successfully target worry alone because worry cannot be permanently altered without changing the risk cognitions that elicit this affective response. To change behavior, we must identify and target those representational beliefs that evoke worry.

Third, abstract-conceptual and concrete-perceptual contents are likely to have unique influences on responses and behavior. As such, the field may benefit from the development and use of measures to assess concrete-perceptual contents of risk representations and representations of protective behaviors. It would be useful to develop tools for assessing the vividness of the imagery associated with an illness risk, the number of experiences with family members and friends who have had an illness (assuming that such experiences produce more concrete-perceptual memories), and other aspects of concrete-perceptual contents.

Fourth, it is important when assessing risk perceptions to consider the potential “if-then” conditional perceptions that may be used in formulating a particular risk appraisal. The utility of this approach is supported by recent discussions of the importance of assessing conditional risk judgments rather than unconditional judgments (Goldberg, Halpern-Felsher, & Millstein, 2002; Weinstein, Rothman, & Nicolich, 1998). As these researchers note, the use of contingency scenarios in assessments of risk perceptions minimizes the variation in interpretations of the risk situation. According to the CSM, these contingency scenario assessments are also better because they more accurately reflect the way that people think about behavior and health status: as a dynamic, conditional relationship.

Finally, the self-regulatory perspective highlights the fact that illness representations evolve and become more detailed with increasing experience and learning. Some people have vague, “fuzzy” representations whereas others have rich, detailed representations. The latter should be more stable and they should more reliably influence behavior and responses. Yet these developmental characteristics of risk representations aren’t discerned with our existing measures of perceived risk, such as the typical measures of perceived likelihood and severity. An individual with an elaborate risk representation and an individual with a vague representation may give similar estimates of likelihood and severity, but they may have very different responses to risk-related situations.

To conclude, the self-regulatory perspective of risk perceptions provided by the CSM suggests a number of ways to advance the assessment of risk appraisals, and it identifies several issues regarding the behavioral influences of different facets of risk-related cognitions and affect to be addressed in future research. The CSM may serve as a useful theoretical framework for integrating principles involving the relative influences of risk-related cognitions and affect on protective behavior. More research is needed to expand the CSM so that it comprehensively delineates the critical features of illness risk representations.

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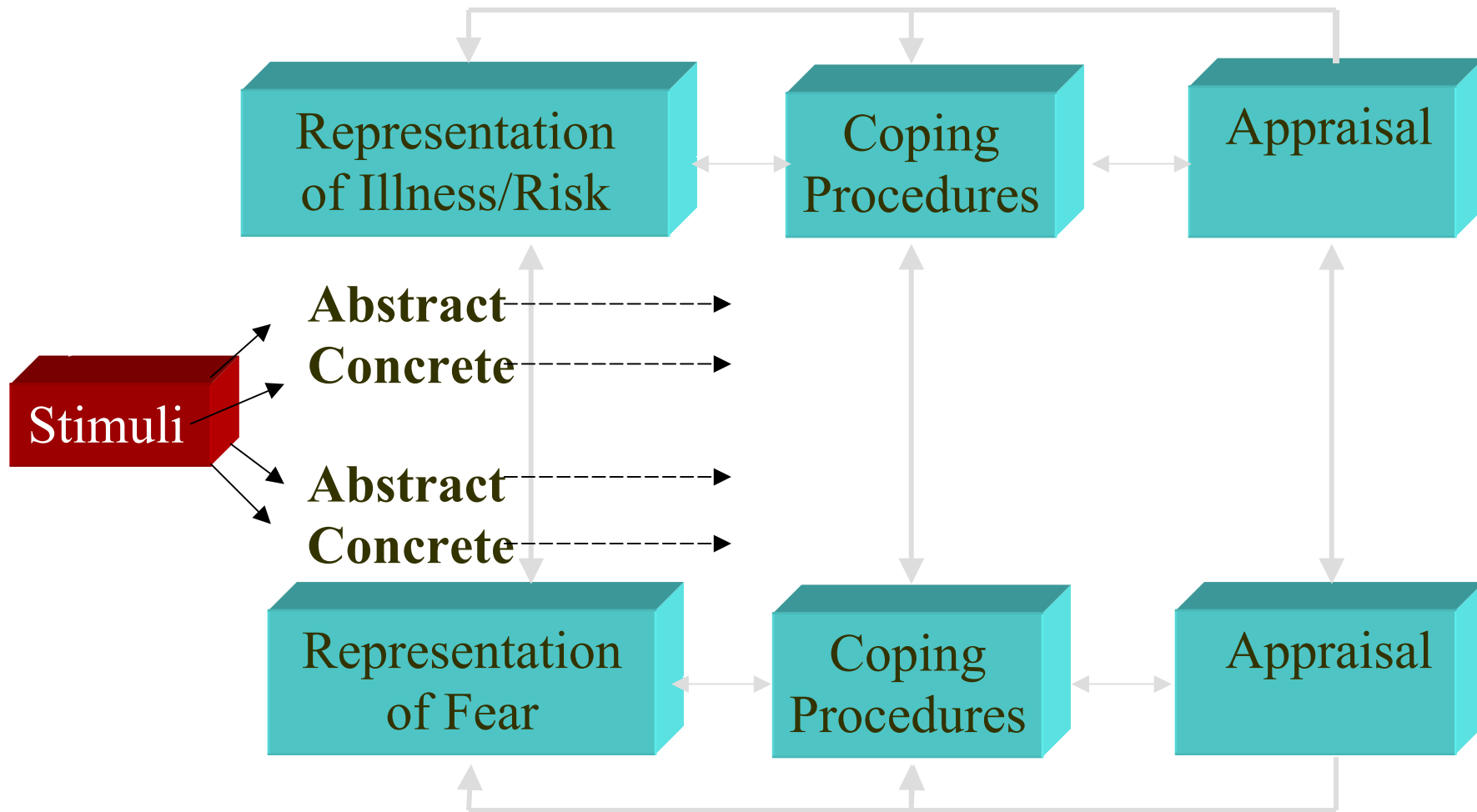
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Figure Captions

Figure 1. The common-sense model of the self-regulation of health threats.

Figure 2. A proposed model of the relationships between illness representation contents, risk perceptions and worry, and protective behavior.



The Common Sense Model

