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Risk perceptions and health behavior

Rebecca A Ferrer and William MP Klein

Risk perceptions — or an individual's perceived susceptibility to a threat — are a key component of many health behavior change theories. Risk perceptions are often targeted in health behavior change interventions, and recent meta-analytic evidence suggests that interventions that successfully engage and change risk perceptions produce subsequent increases in health behaviors. Here, we review recent literature on risk perceptions and health behavior, including research on the formation of risk perceptions, types of risk perceptions (including deliberative, affective, and experiential), accuracy of risk perceptions, and associations and interactions among types of risk perceptions. Taken together, existing research suggests that disease risk perceptions are a critical determinant of health behavior, although the nature of the association among risk perceptions and health behavior may depend on the profile of different types of risk perceptions and the accuracy of such perceptions.

Address
National Cancer Institute, 9609 Medical Center Drive, Rockville, MD 20852, USA

Corresponding author: Ferrer, Rebecca A (ferrerra@mail.nih.gov)

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In health decision-making, individuals are expected to navigate choices involving weighing risk for consequences with benefits of action. Behaviors contributing to disease initiation and progression are often pleasurable (e.g., smoking or overeating). Motivation to forgo such pleasurable behaviors, or engage in inconvenient preventive behaviors, is believed to be driven to some extent by beliefs about the probability that a health consequence will occur [1,2]. Correlational evidence supports an at-least-modest association between risk perceptions and health behaviors [3,4].

Theory-guided health behavior change interventions and health communications often target risk perceptions toward the end of changing health behaviors [5]. A recent meta-analysis of experimental evidence supports the role of risk perceptions in health decision-making; when interventions successfully change risk perceptions, health behavior change often results [6••]. Risk perceptions may also have implications for overall well-being as threats unfold. For example, prospective evidence demonstrates that, among individuals with high cancer risk perceptions, subsequent cancer diagnosis is associated with poorer well-being; however, among those with low cancer risk perceptions, subsequent cancer diagnosis is unrelated to well-being [7].

Formation of risk perceptions

A growing body of literature has probed how risk perceptions are formed. Although risk perceptions can be optimistic (i.e., low) or pessimistic (i.e., high), they are empirically and conceptually distinct from general dispositional optimism, in part because they are domain-specific [8]. Indeed, evidence suggests that, in the general population, individuals are able to differentiate among specific threats when forming risk perceptions [9]. Moreover, several studies suggest that dispositional and domain-specific optimism may interact in ways with important implications for health [10]. For example, individuals high in dispositional optimism who also have optimistic risk perceptions regarding a looming threat may be more likely to minimize the threat's severity and less likely to seek additional health information [11].

Given that risk perceptions involve incorporating numeric information about a threat, the ability to produce, understand, and use numeric information plays an important role in the formation and use of risk perceptions [12]. Indeed, evidence shows that individuals who are highly numerate are more likely to retrieve and use numerical principles in decision-making, rendering them less susceptible to biases related to risk perception and decision-making, and less likely to incorporate irrelevant information into risk perceptions [13]. However, evidence suggests that risk perceptions are reflective of not only numeric information, but also information regarding personal experiences. For example, enactment of precautionary behavior results in subsequent, appropriate reductions in risk perception [14], and engaging in risky behaviors is associated with appropriately higher risk perceptions [15]. Moreover, risk perceptions are influenced by what information is most salient or available to an individual [16]. For example, individuals perceive their risk for disease to be higher when someone in their family has been diagnosed with a disease [17]. Although factors like family history arguably provide some relevant information about actual susceptibility to disease, other

salient information also plays a role in risk perception formation. For example, risk perceptions are often influenced by the frequency with which a threat is represented in media exposure [18].

Risk perceptions are also reliably influenced by contextual factors. For example, as looming threats become more immediate, risk perceptions tend to become more pessimistic [19]. Risk perceptions also tend to be higher when a health threat is seen as uncontrollable or dreaded [18]. Moreover, affective contextual factors play a critical role; individuals experiencing anger (a high certainty and control emotion) tend to have more optimistic risk perceptions, whereas those experiencing fear (a low certainty and control emotion) tend to have more pessimistic risk perceptions [20]. General affect can also influence the formation of risk perceptions. For example, distress is associated with higher risk perceptions [21], and depressed individuals may be more likely to adjust their risk perception estimates in response to health information than non-depressed individuals [22]. These tendencies have important implications for the formation of risk perceptions in a health context, particularly given that many health threats and clinical care contexts evoke strong emotions [23•].

In sum, risk perceptions are threat-specific, rather than reflecting a general sense of optimism or pessimism. Although risk perceptions incorporate numeric information, a number of additional factors contribute to their formation, including personal experiences, salience of available examples, and affective factors.

Types of risk perceptions

Classic health behavior theories largely treat risk perceptions as deliberatively derived judgments, and research synthesized thus far has fit this conceptualization. *Deliberative risk perceptions* are systematic, logical, and rule-based [24,25]. Theories that emphasize deliberative risk perceptions suggest that an individual relies on a number of reason-based strategies to derive an estimate of the likelihood that the negative outcome will occur. Deliberative risk perceptions are usually absolute (e.g., percentage likelihood of disease) or comparative (e.g., likelihood of disease compared to others).

However, recent models of risk perception and decision-making have highlighted the divide between (1) *deliberative* and (2) *affective* or *experiential* components [26–28]. *Affective risk perceptions* refer to affect associated with risk. Affect has been established as an essential determinant of optimal judgment and decision-making [29], and is a critical component of judgments involving risk and uncertainty [27]. Worry or anxiety about a threat is considered to be an affective analog to deliberative risk perceptions [27]. Meta-analytic evidence demonstrates that affective risk perceptions are related to preventive behaviors [30], and that interventions that successfully target these perceptions produce subsequent changes in behavior [6••].

Experiential risk perceptions refer to rapid judgments made by integrating deliberative and affective information [31,32]. Consistent with existing terminology and theory [33], experiential risk perceptions refer to the contents of the perception as opposed to the process through which the perception is derived; thus, they are by definition consciously accessible. For example, an individual is consciously aware that her intuition or 'gut' is telling her she is vulnerable to cancer, even if she has no conscious access to the processes that contributed to the formation of that judgment. Examples of experiential risk perceptions include gut-level assessments of vulnerability (e.g., 'how vulnerable do you feel?' [34] or gist-representations of risk [35••]). Experiential risk perceptions are often more predictive of intentions or behavior than are deliberative risk perceptions [34,36].

Critically, existing frameworks tend to combine or conflate *affective* and *experiential* components, or focus on one over the other as the non-deliberative component [26,28,37]. However, evidence suggests these are empirically distinct not only from deliberative components but also from one another [38••,39•,40,41]. Thus, a more fine-grained and accurate distinction among these three types of risk perception — deliberative, affective, and experiential — can improve the predictive value of existing and emerging frameworks, and help applied researchers and practitioners to more effectively target the active ingredients necessary to facilitate behavior change.

Accuracy of risk perceptions

The formation of accurate — or inaccurate — risk perceptions may have important consequences for health. Although low risk perceptions are by definition optimistic, if an individual is indeed at low risk for a disease threat, those risk perceptions are also realistic. However, often individuals believe themselves to be at lower risk for outcomes than is warranted when examining their objective risk; this phenomenon is termed 'unrealistic optimism' [42]. Note that accuracy of risk perceptions depends on measurement; an individual's risk perceptions regarding the same disease can be simultaneously pessimistic and optimistic when assessed with absolute and comparative measures, respectively [43••]. For example, a woman with objectively high risk of breast cancer can estimate she has a 70% chance of breast cancer (an unrealistically pessimistic absolute estimate), but simultaneously report she is at lower risk than other women her age (an unrealistically optimistic comparative estimate). Unrealistic optimism, particularly as a comparative assessment, is quite prevalent in the general population [44].