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Perceived breast cancer risk: heuristic reasoning and search for a dominance structure

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Abstract

Studies suggest that people construct their risk perceptions by using inferential rules called heuristics. The purpose of this study was to identify heuristics that influence perceived breast cancer risk. We examined 11 interviews from women of diverse ethnic/cultural backgrounds who were recruited from community settings. Narratives in which women elaborated about their own breast cancer risk were analyzed with Argument and Heuristic Reasoning Analysis methodology, which is based on applied logic. The availability, simulation, representativeness, affect, and perceived control heuristics, and search for a dominance structure were commonly used for making risk assessments. Risk assessments were based on experiences with an abnormal breast symptom, experiences with affected family members and friends, beliefs about living a healthy lifestyle, and trust in health providers. Assessment of the potential threat of a breast symptom was facilitated by the search for a dominance structure. Experiences with family members and friends were incorporated into risk assessments through the availability, simulation, representativeness, and affect heuristics. Mistrust in health providers led to an inappropriate dependence on the perceived control heuristic. Identified heuristics appear to create predictable biases and suggest that perceived breast cancer risk is based on common cognitive patterns.

Keywords: Breast cancer; Perceived risk; Heuristic reasoning analysis; Dominance structure; Optimistic bias; USA

Introduction

How do individuals assess their own susceptibility to disease? How do they decide whether they are at risk for one or the other health problem? Kelly (1996) argued that existing gaps in risk assessment services and inadequacy of the media to address individual concerns and to resolve conflicting information, force individuals to make estimations of the likelihood of disease based on subjective understandings of probabilities, subjective understanding of risk factors, and subjective meanings that they attach to risk attributes.

Simon (1982) argued that people most often are forced to make decisions about future risks under constraints of limited time, limited information, and limited computational abilities. Whenever people estimate the probability of future risks, instead of making elaborate calculations of all relevant information, all potential courses of action, and all potential outcomes, they seek to make fast decisions that lead to adaptation and survival. Judgment and decision-making theory suggests that in cases of uncertain information, judgments and behaviors are influenced by both rational and irrational information processing mechanisms

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(Kahneman, Slovic, & Tversky, 1982; Nisbett & Ross, 1980). Predictions and judgments are often mediated by a small number of distinctive mental operations, which are called heuristics. Heuristics are logical shortcuts that people use when processing information; they help reduce complex mental operations to simpler cognitive tasks (Kahneman et al., 1982). Heuristics help in decision-making when a complete and exhaustive consideration of all possibilities would have proved to be too slow or inefficient (Gigerenzer & Todd, 1999). Therefore, heuristics save cognitive resources and time. Some risk assessments may be answered strictly analytically through an algorithmic analysis, e.g. what are the chances of beating a given hand in poker? Other questions demand a different type of analysis e.g. did John Doe kill his wife? It is in these latter cases that people are more likely to rely on heuristic thinking (Tversky & Kahneman, 1983). Although heuristics facilitate risk assessments, they can produce both valid and invalid judgments, and sometimes they lead to characteristic systematic errors.

Besides logical shortcuts, people often rely on affective reactions as a means to facilitate information processing and judgment. The contribution of feelings in risk assessments represents the "affect heuristic" (Slovic, Finucane, Peters, & MacGregor, 2002). The affect heuristic acts in two ways. First, it acts as a conscious or unconscious feeling state (e.g. fear, anger) that the individual experiences during the decision-making process. Second, it represents the affective evaluations, positive or negative, of an external or internal stimulus or of a mental image. Table 1 presents some commonly used heuristics.

Simon (1982) suggested that because people have limited information-processing and computational abilities, during the decision-making process various alternatives are examined sequentially. The first alternative that meets or exceeds a specific aspiration level is selected. This phenomenon, termed "satisficing" helps in terminating the search for alternatives and speeds the decision-making process.

Montgomery (1989) further suggested that decision-making under uncertainty is facilitated by a cognitive mechanism called "search for a dominance structure". This mechanism is based on heuristic shortcuts and on "satisficing". By this mechanism, individuals structure information such that one alternative choice is perceived to be better than other choices. The search for a dominance structure occurs in four phases. In the first phase, termed pre-editing, individuals consider the various alternative choices. In the second phase, they select one alternative that they see as dominant over the others. In the third phase, they examine whether the promising alternative has any disadvantages compared to other alternatives or to other general values. In the final phase, the drawbacks of the dominant alternative are evaluated and the dominance structure is created. The resulting dominance structure can be in good contact with reality or not, depending on the cognitive mechanisms that the individual uses for choosing the dominant alternative. De-emphasizing the disadvantages of the chosen alternative or bolstering its advantages may create a dominance structure that is not in good contact with reality, whereas counterbalancing disadvantages with advantages, and collapsing two or more attributes to one, more comprehensive,

Table 1
Common heuristics

Affect	(1) Positive or negative feelings that are experienced as a conscious or unconscious feeling state. (2) Positive or negative quality of a stimulus or a mental image.
Anchoring and adjustment	The estimation of the probability of an event starts from an initial point, which is suggested by the formulation of the problem or is the result of partial computation. Final estimates are adjusted towards initial values.
Availability	The probability of an event is judged by the ease with which instances of that event come to mind.
Loss aversion	If choices are framed as gains, people become risk averse and favor the status quo. When choices are framed as losses, people become risk seeking.
\ *Perceived control*	People behave as if chance events are subject to control. Hindsight bias of prior events leads to heuristic assertion of control over "similar" events.
Representativeness	As long as A is significantly similar to B, the probability that A originates from B is judged to be high and vice versa.
Simulation	Mental scenarios of an event and its consequences. With those mental scenarios people rehearse the event and estimate its likelihood to occur.