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# Comparative Risk: Good or Bad Heuristic?

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## 1. Introduction

Heuristics and biases infect all human thought, leading to irrational thinking and behavior. Bioethics must recognize this psychological reality and develop new models for evaluating and supporting autonomous choice, as Blumenthal-Barby (2016) argues (Blumenthal-Barby 2016).

Simply trying to eradicate heuristics and biases from medical decisions will not work and is deeply misguided. In many situations, a heuristic or bias can provide a shortcut to an effective decision (Gigerenzer 2008) or can counter the impact of other heuristics and biases. It is often impossible to determine whether a heuristic or bias harms or helps a decision, because of the complexity of thought and the difficulty of defining and measuring the quality of a decision or its rationality.

The debate over whether patients should receive comparative risk information highlights these practical, ethical, and conceptual quandaries. Some experts have argued that patients facing certain types of choices should not be told whether their risk is above or below average, because this information may trigger a bias (Fagerlin et al. 2007). But careful consideration shows that the comparative risk heuristic can usefully guide decisions and improve their quality or rationality. Building on an earlier paper of mine (Schwartz 2009), I will argue here that doctors and decision aids should provide comparative risk information to patients, even while further research is conducted.*

## 2. The Comparative Risk Heuristic

"Personal risk" is the individual's probability of experiencing an undesirable outcome. "Comparative risk" classifies that probability as average, above average, or below average, compared to some group, and disclosing comparative risk information has a significant impact on risk perception and behavior (Klein 1997; Windschitl et al. 2002). In particular, learning that one's personal risk is above average increases concern and motivates action.

When healthcare providers or public health authorities have good reason to encourage specific actions, telling individuals that they have above-average risk appears ethical (Thaler

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& Sunnstein 2008). For instance, a cigarette smoker who knows her personal risk for lung cancer, emphysema, and heart disease may be further motivated to quit smoking by learning that her risks are significantly above average.

When the goal of communication is to support informed decision-making rather than encouraging a specific action, comparative risk information may also be helpful. For instance, if three cancers are equally prevalent in a population, and an individual does not know her personal risk for any of them, then it may be informative for her to learn that she has above average risk for one cancer and below average for the others. As Gerd Gigerenzer and others have emphasized, the use of "fast, frugal heuristics" can be optimal when information, time, energy, or brain power are limited (Gigerenzer 2008).

But when the goal of communication is to support informed decision-making, and patients know their personal risk, providing comparative risk information is more controversial. For instance, tamoxifen (an estrogen blocker) reduces the risk of breast cancer but can cause severe complications. Guidelines recommend that women whose breast cancer risk exceeds a certain level should consider tamoxifen for prevention, but no particular choice is favored: the decision is a truly "preference sensitive." Each woman should decide for herself whether the benefits are worth the risks.

In a study modeled on tamoxifen, women visiting a hospital cafeteria were asked to imagine that they have a 6% risk of developing breast cancer in the next five years and that taking a pill would reduce that risk to 3%. All participants were also told that the pill causes hot flashes in most women, cataracts in 1–2%, and stroke or heart attack in under 1%. Subjects were then randomized to be told that their hypothetical personal risk is double the average for women their age or that it is half the average (Fagerlin et al. 2007).

All participants saw the same information about personal risk and risk reduction (6% baseline, reduced to 3% if they took the pill), and all read the same side effect profile. But those who were told that their risk was above average had a significantly higher interest in taking the pill and thought it provided a more significant reduction in risk than did those who were told that their risk was below average (Fagerlin et al. 2007).

The researchers argue that the impact of the comparative risk information in this case was undesirable: "We believe that a person's decision should not be based on whether they consider themselves at low or high risk but rather on whether they think that the benefits of the treatment outweigh the associated risks" (Fagerlin et al. 2007, 142). As the researchers say, the comparative risk data didn't provide information about the participant's baseline risk or the benefit or risk conferred by taking the medication. At best, comparative risk data provides information just about whether *other* women had higher or lower risk. Because the researchers saw comparative risk information as introducing a bias, they decided not to disclose this information in the decision aid they were designing about tamoxifen (Fagerlin et al. 2007). Note that the researchers made this decision even though the majority of participants in the study found the comparative risk information helpful (4 or 5 on a 5-point scale) (Fagerlin et al. 2007).

## 3. Defending Comparative Risk Information

I believe that the researchers' conclusion that comparative risk information should not be disclosed to women considering tamoxifen for breast cancer prevention is mistaken. Identifying the weakness in their argument helps clarify the challenge for bioethics normatively evaluating heuristics and biases.

First, failing to disclose comparative risk information does not stop the individual from having an opinion about her comparative risk. In fact, it is very possible that a woman could believe that a personal risk of 6% is *below average*. Studies show that people generally overestimate their risk of getting cancer and that women overestimate their risk of getting breast cancer. In one study, the mean estimate women gave for their lifetime chance of getting breast cancer was 43%, while their actual risk was just 13% (Thaler & Sunnstein 2008). In other words, the comparative risk heuristic cannot be "turned off" just by avoiding disclosing data. Giving correct information could at least correct mistaken beliefs.

Second, a woman may misinterpret personal risk information for other reasons. For instance, a woman who learns that her personal risk is 6% may be in the grip of the optimism bias, an irrational tendency to believe that she will be luckier than most people (Shepperd et al. 2013). Or perhaps she doesn't know any women with breast cancer, so underestimates her risk due to the availability heuristic. Or she may simply not know any other women taking tamoxifen, so may be influenced by a social norm bias (Thaler & Sunnstein 2008). In all these cases, telling the woman that her risk is above average could trigger a bias that would counteract a heuristic or bias that is pushing in the opposite direction.

It is almost impossible to determine what heuristics are at play in a specific situation. We can test whether a woman knows that her personal risk is 6%, and we can measure whether informing her of this probability affects her perception of her risk. But there's no clear way to measure whether her perception is being determined by rational reflection or irrational biases. Even if a woman agrees with the statement, "I have a significant chance of getting breast cancer," or "I can reduce my risk of getting breast cancer," following Blumenthal-Barby's (2016) formulation (Blumenthal-Barby 2016), it is difficult (if not impossible) to know whether her perception is being minimized or exaggerated by irrational factors.

People always rely on emotional and subconscious factors when forming a "gist impression" of risk (Reyna 2004), making normative evaluation very difficult. Does a woman's concern about the side-effects of tamoxifen, for instance, reflect an autonomous preference to avoid such dangers or an irrational fear of one of the possible outcomes? Does a woman's desire to avoid breast cancer at almost any cost reflect rational priority setting or on an irrational phobia? If we cannot normatively evaluate gist impressions in specific cases, then we can't evaluate the impact of comparative risk information.

Given this uncertainty, healthcare professionals and decision aids should inform women whether their risk of breast cancer is above or below average. In general, I believe, we should treat information as *innocent until proven guilty*: if we can't prove that some information overwhelms or confuses patients, or hurts understanding or decision-making in some way, then we should disclose that information, or at least make it available. Remember

that the majority of participants in the study said that they found the comparative risk information helpful (Fagerlin et al. 2007).

There are situations where comparative risk information may lead to irrational choices, for instance if a person demands a screening test since his risk for a certain cancer is twice the average, even though the average risk is just 1 in 1,000,000 and the test is not recommended. That case, though, is very different from a woman with elevated risk for breast cancer choosing to take tamoxifen, when the treatment is considered reasonable.

Questions about whether to disclose comparative risk and how to do so will become even more important in the age of precision medicine, when people's specific risks will be calculated using genetic screening and other tools. Bioethics will be able to guide precision medicine effectively only after fully acknowledging and analyzing the proper role of heuristics and biases in decision-making.

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