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"If I'm better than average, then I'm ok?": Comparative information influences beliefs about risk and benefits☆

Angela Fagerlin [a,b,c,*], Brian J. Zikmund-Fisher [a,b,c], Peter A. Ubel [a,b,c,d]

[a] *VA Health Services Research & Development Center for Practice Management and Outcomes Research, VA Ann Arbor Healthcare System, Ann Arbor, MI, United States*

[b] *Division of General Internal Medicine, University of Michigan, Ann Arbor, MI, United States*

[c] *Center for Behavioral and Decision Sciences in Medicine, Ann Arbor, MI, United States*

[d] *Department of Psychology, University of Michigan, Ann Arbor, MI, United States*

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Abstract

Objective: To test whether providing comparative risk information changes risk perceptions.

Methods: Two hundred and forty-nine female visitors to a hospital cafeteria were randomized to one of two conditions which differed in whether their hypothetical breast cancer risks was lower or higher than the average women's. Participants read a scenario describing a breast cancer prevention pill and indicated their: (1) likelihood of taking the pill and (2) perception of whether the pill provides breast cancer risk reduction.

Results: Women told that their hypothetical risk of breast cancer was above average were more likely to endorse taking the pill (2.79 vs. 2.23, $F = 4.95$, $p = 0.002$) and more likely to believe that the pill provided a significant risk reduction in breast cancer (3.15 vs. 2.73, $F = 4.32$, $p = 0.005$), even though the risks were equivalent.

Conclusions: Providing people with comparative risk information changes their risk perceptions. People who have above average risk may feel compelled to take a treatment because they are at above average risk and therefore may not thoroughly consider the trade-offs in the risks and benefits of treatment.

Practice implications: Physicians and decision aid developers must reconsider the practice of communicating ''average risk'' information to patients.

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Keywords: Breast cancer; Risk communication; Decision making; Comparative risk

1. Introduction

When patients are confronted with difficult medical decisions, health care providers and decision aids both play a critical role in informing patients about the risks and benefits of treatment. This is particularly crucial when the treatment decision confronting the patient is a preference sensitive decision [1,2]. In these types of decisions, there is not a medically dominant treatment, and the ''best'' treatment depends on the patient's perceptions of the risks and benefits of treatment. During consultation with patients about these decisions, physicians must consider whether or not to provide their patients with comparative risk information. That is, should they tell a patient the average person's risk of the same health condition (or risks and benefits of treatment)? Will this information help the patient's decision making? This same issue comes to the forefront when decision aid developers are designing decision aids to help communicate the risks and benefits of treatment to patients. Does providing comparative risk information within a decision aid improve patients' decision-making process?

To put the above in context, imagine a woman with a 6% risk of developing breast cancer in the next 5 years. To reduce this risk, she may consider taking tamoxifen as prophylaxis against a first breast cancer. Randomized controlled trials (RCTs) have shown that tamoxifen can cut the risk of breast cancer in half for

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* Corresponding author at: Division of General Medicine, University of Michigan, 300 North Ingalls Building, RM 7C27, Ann Arbor, MI 48109-0429, United States. Tel.: +1 734 647 6160; fax: +1 734 936 8944.

E-mail address: fagerlin@umich.edu (A. Fagerlin).

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women whose 5-year risks exceed 1.66% [3–6]. However, tamoxifen has broad ranging effects, some beneficial (e.g., reducing osteoporotic bone fractures), and others harmful (e.g., increasing risks of cataracts and endometrial cancer) [7]. Given these advantages and disadvantages, this woman faces a difficult decision regarding whether or not to take tamoxifen. She must decide if a reduction in the 5-year risk of breast cancer (from 6% to 3%) is beneficial enough to make up for the harms of tamoxifen.

Now imagine that this same woman is also told that the average woman faces a 12% risk of developing breast cancer in the next 5 years. Should this comparative risk information change her evaluation of tamoxifen? Standard models of rational choice hold that patients' decisions about whether or not to undergo interventions should be based on consideration of each person's likelihood of experiencing the associated risks and benefits. Under this rationale, comparative risk information should not change a woman's decision, because it does not change the trade-offs. Her 5-year risk of breast cancer is still 6%, and the costs and benefits of tamoxifen are unchanged.

Nevertheless, this new comparative risk information could change how she feels about her breast cancer risk and tamoxifen. For instance, the comparative information may influence her perceptions of what it means to have a 6% risk, causing the risk to feel lower than it otherwise would have felt. Likewise, consider an alternative scenario in which this woman was told that the average woman's risk of breast cancer is only 3%. In that case, she may feel particularly alarmed about her own risk. In other words, the risk of breast cancer, and the risks and benefits of tamoxifen, might feel different if people are told that their risk of breast cancer is above or below average, even if their own risk remains unchanged. In fact, some studies have found that comparative risk information has a significant impact on cognitive and affective responses [8]. However, other studies have found that statistics that reflect a person's absolute risk are more powerful than comparative risk information [9].

In this study, we tested whether comparative risk information would influence women's perceptions and decisions about a hypothetical medication that reduces the risk of breast cancer. Participants were told that their (hypothetical) breast cancer risk was below or above average. Using this randomized design, we tested the impact of comparative risk information on perceptions of the medication and of breast cancer risk in general.

2. Methods

2.1. Participants

Participants were adult female visitors to a hospital cafeteria approached by research assistants.

2.2. Design

2.2.1. Scenario

Participants read a scenario describing an unnamed pill that could reduce a woman's risk of breast cancer by half but was also accompanied by side effects (scenario is presented in Table 1). In both versions of the questionnaire, participant's risk was constant (6%). However, we randomized participants to receive different information about the average woman's hypothetical risk of breast cancer. Half of participants were given comparative risk information that indicated that their risk was below average (i.e., average woman's risk was 12%), while half were given comparative risk information that revealed that their risk was above average (i.e., average woman's risk was 3%). We then asked participants about their perceptions of the pill.

Table 1
Scenario read by participants

Imagine that based on family and medical history, your risk for developing breast cancer in the next 5 years is 6%. In addition, imagine that the average woman's risk is 3%, meaning that your risk is higher than the average woman's risk.
Now suppose that there is a pill that would reduce your risk of developing breast cancer to 3%, if you took it every day. If the average woman took this pill, her risk would be reduced to 1.5%.
Women who take this pill, however, commonly report side effects. All women report having hot flashes several times each week, and most have them every day for at least ten minutes. A small number of women have more serious side effects. The pill causes about 1–2% of women to develop cataracts and less than 1% of women to have stroke or heart attack.

2.2.2. Questionnaire

After reading the scenario, participants responded to two questions. Questions were: (1) If your risk of developing breast cancer was 6%, how likely would you be to take this pill, which would reduce your risk of breast cancer to 3%?, (2) We told you that the cancer reducing pill would lower your risk from 6% to 3%. Does this seem like a significant reduction to you?, and (3) When choosing whether or not to take the cancer reducing pill, how helpful was it to know the average woman's 5-year risk of developing breast cancer? All responses were on five-point Likert scales with the endpoints labeled (e.g., Not at All Likely/Significant/Helpful to Extremely Likely/Significant/Helpful), but the midpoints left unlabeled. Higher numbers reflected greater endorsement of the question.

Finally, we collected standard demographics information, with two additional questions inquiring whether participants identified themselves as a health professional and whether they had a close friend or family member who had been diagnosed with breast cancer.

At the end of the survey, participants read the following debriefing paragraph: ''Please understand that the hypothetical risk information we told you in this study may *not* be *your actual risk*. In fact, the average American woman has less than a 1% risk of developing breast cancer within the next 5 years, and your actual risk depends on a variety of medical and non-medical factors. If you would like to know more about your risk, please talk to your doctor. You may also find out more about breast cancer by calling the Cancer Information Service at 1-800-4-CANCER, or by going to the National Cancer Institute's website at www.cancer.gov.

This research received Institutional Review Board approval.

2.3. Data analysis

We used analysis of variance tests to compare women's risk perceptions across questionnaire versions (with significant results being followed up by Tukey post hoc tests) and across their personal experience with breast cancer. We also used analysis of variance (for continuous variables) and chi-square tests (for categorical variables) to analyze differences in demographic characteristics across questionnaire versions.

3. Results

3.1. Sample

In total, 249 women completed the questionnaire. Their average age was 44.7 (S.D. = 15.1, range 19–86); 5.6% identified themselves as African American, and 89.2% indicated they were Caucasian. The sample was well educated, with 41.5% having obtained a bachelor's degree or higher. Sixty-three percent reported having a close friend or family member who had been diagnosed with breast cancer. Additionally, 48.0% of respondents were employed or training in a medical profession. Health professionals did not differ from non-health professionals on either of the dependent variables (p's > 0.05). Furthermore, there were no health profession X version interactions for either of the dependent variables. Demographic characteristics did not differ across questionnaire version (p's > 0.05).

3.2. Impact of providing comparative information on women's perceptions of risks and benefits

Fig. 1 shows participants' responses on our main outcome measure, broken down by whether they were told they were above or below average risk. Even though all participants were told that their personal (hypothetical) risk of breast cancer was 6%, women who were told that their risk of breast cancer was above average were more likely to endorse taking the pill (2.79 vs. 2.23, $F = 4.95$, $p = 0.002$) and more likely to believe that the pill provided a significant reduction in breast cancer (3.15 vs. 2.73, $F = 4.32$, $p = 0.005$) than those in the below average group.

Fig. 1. Differences in attitudes by comparative risk provided.

3.3. Do people believe that comparative information is helpful?

Most respondents thought that comparative information is helpful (62% rated the helpfulness of comparative information as a four or five on a five-point scale, only 15% rated the helpfulness as one or two).

4. Discussion and conclusion

4.1. Discussion

Many health care providers provide their patients with comparative risk information without realizing the impact such information has on patients' risk perceptions, and perhaps, their decision making. The results of this study show that comparative risk information changes the way women perceive risk. For instance, when women perceived themselves to be at an above average risk for developing breast cancer, they reported that they were more willing to take a drug aimed at preventing breast cancer and to think that the drug provides a significant reduction in breast cancer risk. This work extends the findings by Lipkus and colleagues, who did not find any differences in desire to change health behaviors [10]. Furthermore, our research addresses the controversy in the literature in regards to whether comparative risk information has any impact on risk perceptions [8,11]. Our results clearly indicate that comparative risk information can have a significant impact on people's risk perceptions.

We contend that the comparative risk information in this study was uninformative and should not have changed risk perceptions. 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. Regardless of whether one believes that comparative information is useful, it is crucial to understand its impact on attitudes and decisions. Based on this study, using a hypothetical scenario, people's attitudes toward the risks and benefits of a medical treatment were significantly altered by comparative risk information, even though the risks and benefits of the treatment were held constant. If a prevention strategy reduces a person's risk by half, it should not matter whether others receive greater or lesser benefit from the pill. However, others might argue that comparative information provides a metric to measure whether someone should take the drug, allowing some people to conclude, for example, that because they are at ''low risk,'' they do not need to take it.

These findings complement previous research which has shown that people's objective knowledge about the risk of an event occurring can differ significantly from their ''intuitive perceptions'' about whether or not the event will occur [12]. In one study participants were told about two health conditions that had a 12% prevalence rate for women. One condition had a 4% prevalence rate for men, while the other had a 20% prevalence rate for men. People perceived a female patient to be more at risk for the disease that had a 4% prevalence rate in

men, even though the risks of both diseases were equivalent [12]. Similar effects of comparative data have been shown in other studies. For example, even though the odds are the same, people prefer to try to pick a winning jelly bean from a bowl filled with 10 winning and 90 losing beans than from a bowl with only one winning and nine losing beans [13]. We recently showed that women's perceptions of their lifetime risk of breast cancer are influenced by whether they are first asked to estimate the risk: their estimates are almost always too high, and thus they respond with relief when they discover the true risk [14].

People's perceptions of risk are not merely cognitive appraisals of numeric risk (e.g., 6% vs. 7%). They include intuitive and emotional reactions which translate being ''high'' or ''low'' into ''something to worry about'' or ''something to be relieved about.'' Our current results support this idea. If the objective number (i.e., 6%) were the only consideration, we would not have found any differences in risk perceptions across groups. That we did find differences suggests that people's intuitions about risk varied significantly from objective probability and that their intuition played a role, independent of objective probability, in their risk perceptions and their hypothetical decisions.

This study has several limitations. First, the risks presented in the scenarios were high, and they were clearly identified as hypothetical and not based on respondents' actual medical histories. We used a hypothetical scenario because we were concerned that our manipulation could cause women to make critical medical decisions that were not in their best interest. In fact, because of our results, we excluded comparative risk information from our tamoxifen decision aid. Furthermore, because the risk statistics were presented as hypothetical, it did not make sense to assess whether the women in our study felt that the scenario had discussed ''accurate'' risk information. Nevertheless, the risk numbers we chose were based on the average risk of women who were eligible for the P1 trial of tamoxifen. Thus, while high, these numbers are realistic and are representative of a situation in which physicians would be likely to provide comparative risk information.

A second limitation of our study is that we used a convenience sample of women, whose responses may not necessarily be representative of the general population. Still, the fact that our sample included a broad range of ages and education levels supports the generalizeability of our results. Moreover, our purpose was to test people's perceptions in the context of a randomized experiment. Our results confirm that in this broad group of women, perceptions were significantly influenced by comparative risk information.

Some readers might question why we did not preface our scenario by asking our participants about their beliefs regarding their own risk of getting breast cancer. Our previous research has shown that asking women to estimate their risk of breast cancer before giving them accurate risk information can significantly change how women react to that information [14]. Specifically, women who estimated the risk felt more relief about the actual risk of breast cancer and perceived the risk of breast cancer as lower than did women who did not make estimates. By avoiding the use of such priming questions in this study, we are better able to identify the independent effect of comparative risk information. However, future research could ask patients to make a risk estimate prior to their receiving risk information in order to mirror what sometimes occurs in actual clinical practice.

4.2. Conclusions

In summary, the results of this study demonstrate that people are more likely to act upon a risk when they feel that their risk is above average. Thus, patients' preferences for a treatment might be more influenced by whether they perceive themselves as lower or higher risk than the average person, rather than on the risk/benefit trade-off of the treatment. Thus, clinicians and health educators should carefully consider whether or not to include comparative risk information in their discussions of treatment alternatives. In doing so, they must be aware of the influence such comparative risk information has on patients' attitudes and decisions.

4.3. Practice implications

These results have important implications for decision aid design. Decision aids are designed to help patients understand the risks and benefits of treatment, so they can use their own values to make the best decision for themselves [15]. It is essential that all information contained in decision aids are presented so that it does not unduly influence patients. We found in our own development of a tamoxifen decision aid that women repeatedly asked to receive both their own risk and comparative risk information. The current results suggest that incorporating comparative risk information into a tailored decision aid can have unintended results. When patients' risks are below average, receiving the comparative information may discourage them from undergoing beneficial treatments that they might otherwise have chosen. By the same token, patients whose risks are above average may be inclined to undergo risky treatments that they otherwise might not have chosen. Given the potential biasing effects of comparative risk information, we must ask if it is wise to give patients the information they want, since that information may actually harm them (or at least bias their decision making). When designing decision aids, developers must contemplate the potential implications of providing comparative information to patients and not just include it simply because patients want to see it.

The results of this study also have potential implications for physician–patient communication, because they show that patients' responses to risk information could be influenced by whether the risk communication makes them feel at high or low risk. When the goal of communication is to prepare patients to make informed decisions, physicians should probably 16.3(ijse)c2ur includationnces in2-even Wh6the r97nformation trea8.2(62justirr

example, informing a smoker that his lifetime risk of lung cancer is *X*% will potentially be less persuasive than supplementing that number with information about the risk facing a non-smoker. Thus, decisions about providing this type of information must be carefully considered and should be based on the goals of the clinical encounter.

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