Brief Report

MDM Medical Decision Making

Medical Decision Making
2020, Vol. 40(8) 941–945

DOI: 10.1177/0272989X20951775
journals.sagepub.com/home/mdm
SAGE

Availability, Affect, and Decisions to Seek Information about Cancer Risks

Michelle McDowell, and Thorsten Pachur

How do people decide which risks they want to get informed about? The present study examines the role of the availability and affect heuristics on these decisions. Participants ($N = 100$, aged 19–72 years) selected for which of 23 cancers they would like to receive an information brochure, reported the number of occurrences of each type of cancer in their social circle (availability), and rated their dread reaction to each type of cancer (affect); they also made relative judgments about which of 2 cancers was more common in Germany (judged risk). Participants tended to choose information brochures for those cancers for which they indicated a higher availability within their social networks as well as for cancers they dreaded. Mediation analyses suggested that the influence of availability and affect on information choice was only partly mediated by judged risk. The results demonstrate the operation of 2 key judgment heuristics (availability and affect), previously studied in risk perception, also in decisions about information choice. We discuss how our findings can be used to identify which risks are likely to fall from people's radar.

Keywords
information seeking, risk perception

Date received: September 23, 2019; accepted: July 15, 2020

Through a variety of sources and channels—including health professionals, websites, news media, and social networks—the public now has access to a wealth of information about health risks. However, given limited time and attentional resources, people actually pick up only a small proportion of the available information. How do people decide which health risks they want to receive information about? Engagement in information-seeking behavior has been associated with positive health behaviors, such as promoting the discussion of search results with a physician, improving knowledge of treatment options, and making decisions about treatment.[1] Insights about the mechanisms underlying people's selections of health information might indicate for which risks, even if information about them is generally available, awareness should be enhanced.

Prior studies have focused on identifying the characteristics of people who seek health information (e.g., greater perceived risk, having a family history, prior knowledge[2,3]). These studies typically examine intentions to seek health information in general (e.g., cancer information) or focus on information seeking about a specific disease[4–6] and find factors such as negative affect or worry influence information-seeking behavior.[7,8] However, few studies have explored how people choose *which* health risks to seek information about.

To make progress on this issue, one starting point is to draw on insights from research on heuristics people use to make judgments about the frequency of different risks.[9,10] People have been found to use heuristic cues such as availability (i.e., the number of instances of cancer mortalities they have encountered in their social environment) and affect (i.e., how much dread the cancer risk elicits) to judge cancer mortalities.[10] It is currently unclear, however, to what extent these mechanisms might also operate when people choose among risks when seeking information. Moreover, given that people's

Corresponding Author
Michelle McDowell, Harding Center for Risk Literacy, University of Potsdam, Virchowstrasse 2, Potsdam, DE 14482, Germany (mcdowell@uni-potsdam.de).

judgments about risks have been implicated in both information-seeking (e.g., to reduce the threat[7]) and information-avoidance behavior (e.g., to avoid negative emotions evoked by the threat[11]), availability and affect could be positively or negatively related to selection of information.

We addressed these questions by exploring how people choose to seek information about different types of cancer risks—one of the most frequent causes of death in many societies. Previous studies on health information seeking have tended to rely on self-report measures, and only few have assessed actual behavior,[1] such as whether the participant takes or reads an information sheet,[12,13] or clicks on relevant weblinks at the conclusion of a study.[14] Here we assess actual behavior by asking participants to select for which of 24 different cancers they would like to receive information brochures, which we provide to the participant to take with them (the cancer set has been used in previous studies[9,10] and represents broad cancer categories, excluding nonmelanoma skin cancer). We then used person-specific measures of availability and affect to predict people's brochure choices (using an approach proposed in Pachur et al.[10]); in addition, we measured people's judgments about cancer incidence to gauge the potential effect of this factor for mediating the influence of availability and affect on information choice.

Method

Sample

One hundred participants were recruited from the participant pool of the Max Planck Institute for Human Development, Berlin. As the study was exploratory, we aimed for a sample size similar to prior studies examining the role of availability and affect in risk perceptions[10] and increased it somewhat, as the size of potential effects was uncertain. Participants received 12 Euros for their participation. Ethical approval was obtained from the institution's ethics committee. Participants were aged between 19 and 72 years (M = 37.8, SD = 15.6), the majority were female (61%), and many were highly educated (43% had a university degree).

Harding Center for Risk Literacy, Faculty for Health Sciences Brandenburg, University of Potsdam, Potsdam, Germany (MM); Max Planck Institute for Human Development, Berlin, Germany (MM); Center for Adaptive Rationality, Max Planck Institute for Human Development, Berlin, Germany (TP). The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: Financial support for this study was provided entirely by the Center for Adaptive Behavior and Cognition, Max Planck Institute for Human Development. The funding agreement ensured the authors' independence in designing the study, interpreting the data, writing, and publishing the report. The following authors are employed by the sponsor: Michelle McDowell.

Materials and Procedure

Participants were handed a list of the cancers and asked to tick for which cancers they would like to receive an information brochure. The brochures were developed based on information provided by the Robert Koch Institute[15] and other cancer-specific websites in Germany. They contained information on epidemiology, risk factors, early detection and treatment options, and statistics on incidence and mortality. Due to an error in the printing of materials, pancreatic cancer was absent from the list. Analyses were conducted on the remaining 23 cancers. To obtain a measure of *availability*, participants were asked to indicate how many family members, friends, or acquaintances they knew who had been diagnosed with each cancer. As a measure of *affect*, participants rated the amount of dread elicited when considering each cancer risk on a 7-point scale (very strong to no dread; reverse-scored for analyses). We also assessed judged risk for the different types of cancers by asking participants to judge, for all 276 pairs of cancers, which of the 2 cancers they thought was more common in Germany. We calculated a risk judgment score for each participant indicating how many times each cancer type was judged to be more common than another. Further details about these measures can be found in Pachur et al.[10] Participants completed the availability and affect items and the risk judgment task prior to selecting the brochures. Data and analysis script can be found at https://osf.io/e4a93/.

Results

Overall, each participant selected, on average, 4.31 (SD = 5.82; median = 3) brochures. Thirty percent of participants did not select any brochure and 7% selected all brochures. Table 1 presents aggregate responses on the different variables for each cancer. As can be seen, there was quite some variability across the different types of cancer in the frequency of brochure choice. The most frequent selections were breast cancer (34%), malignant melanoma (29%), and lung cancer (28%). The least selected brochure was for cancer of the gallbladder (10%). The types of cancer for which participants reported the largest number of network members with a diagnosis were breast, lung, and prostate cancers; cases of mesothelium and soft tissue cancer were reported least frequently. Five percent of participants did not report

Table 1 Summary of the Variables by Type of Cancer[a]

Type of Cancer	Annual Incidence	Judged Risk, Mean (SD)	Dread Score,[b] Mean (SD)	Number of Recalled Instances,[b] Mean (SD)	Brochure Requested (%)
Breast cancer	64,804	19.0 (3.41)	4.43 (2.35)	2.69 (2.96)	34
Prostate cancer	58,483	16.7 (4.61)	3.29 (2.37)	0.94 (1.71)	18
Lung cancer	48,776	19.5 (3.61)	4.81 (2.06)	1.30 (1.48)	28
Colon cancer	40,596	13.5 (5.05)	4.22 (2.05)	0.61 (0.93)	23
Leukemia and lymphoma	27,891	16.1 (4.87)	4.43 (2.20)	0.90 (1.14)	17
Rectal cancer	19,771	11.1 (5.88)	3.70 (2.03)	0.20 (0.54)	12
Stomach cancer	16,826	13.3 (5.06)	4.22 (2.11)	0.65 (0.93)	21
Malignant melanoma	15,189	16.1 (6.67)	4.60 (1.91)	0.84 (1.60)	29
Bladder cancer	15,135	8.3 (3.78)	3.61 (2.11)	0.18 (0.52)	11
Pancreatic cancer	14,374	12.7 (4.17)	4.40 (2.14)	0.74 (1.58)	—
Kidney cancer	13,669	7.8 (4.77)	3.86 (2.06)	0.27 (0.58)	11
Cancer of the mouth and throat	12,160	8.8 (5.34)	4.05 (2.17)	0.27 (0.58)	13
Ovarian cancer	8434	11.2 (4.63)	3.76 (2.30)	0.40 (0.65)	22
Liver cancer	7394	10.9 (4.91)	4.09 (2.15)	0.45 (0.94)	16
Cancer of the central nervous system	6642	8.6 (5.93)	4.60 (2.24)	0.68 (1.32)	24
Esophageal cancer	5789	9.5 (3.89)	4.05 (2.20)	0.23 (0.80)	14
Cancer of the gallbladder and biliary tract	5654	7.6 (3.92)	3.56 (1.91)	0.08 (0.40)	10
Mesothelium and soft tissue cancer	4993	4.8 (4.52)	3.34 (2.00)	0.02 (0.14)	21
Thyroid cancer	4883	12.0 (5.46)	3.87 (2.12)	0.52 (1.18)	24
Cervical cancer	4756	16.0 (4.24)	3.70 (2.33)	0.86 (1.38)	23
Testicular cancer	3910	9.9 (4.64)	3.18 (2.25)	0.40 (0.65)	14
Laryngeal cancer	3844	10.8 (4.82)	4.12 (2.21)	0.50 (0.94)	13
Bone cancer	799	9.7 (5.20)	4.12 (2.15)	0.42 (0.82)	17
Penis cancer	625	2.3 (3.56)	3.09 (2.31)	0.07 (0.30)	16

[a]Annual incidence rates in Germany were obtained from the Robert Koch Institute[16] and averaged across the 10-year period from 2000 to 2010. Risk judgment refers to the average number of times a cancer type was judged to be more common than another in a paired-comparison task. Higher dread scores indicated higher feelings of dread.
[b]$n = 98$.

any friends, relatives, or acquaintances diagnosed with any of the cancers. Affect (i.e., dread ratings) was highest, on average, for lung cancer, followed by malignant melanoma and cancer of the central nervous system. Penis cancer triggered the lowest affect ratings.

We modeled brochure choice using mixed-effects logistic regression (using the lme4 package in R) with availability and affect as fixed-effects predictors and participant and type of cancer as random effects (for an introduction to mixed-effects modeling, see Singmann and Kellen[16]). That is, the model estimated the influence of availability and affect on whether the brochure for a cancer was selected with a separate intercept for each cancer and taking into account that the data are clustered (or nested) within participants. Availability was log-transformed (with base 2 to facilitate interpretation: the odds ratio refers to a doubling of the predictor) to reduce skew (as for some cancers, the response was zero, 1 was added to all counts prior to transformation[17]; the conclusions were the same when alternative transformations were applied [e.g., square root]). To rule out that the predictors would show links with brochure choice through an association with actual frequency, (log-transformed) actual cancer frequency (see Table 1) was included as a covariate (data were obtained from the Robert Koch Institute; see Table 1). Two participants did not provide ratings for availability or affect and were excluded from the analysis. Age, sex, and education were not associated with brochure choice and were not included in the model (see online supplemental material for an analysis in which we tested whether females and males differed in their brochure selection of sex-specific cancers).

As shown in Table 2, participants were more likely to select a brochure for a given cancer the higher the number of known cancer cases reported for that cancer (availability) and the higher the affect rating for it (Suppl. Figures S1 and S2 show availability and affect as a function of brochure selection). Based on the odds ratios, the probability of selecting a brochure for a given cancer was 2.7 percentage points higher when availability increased from 2 to 4 instances and 14.8 percentage points higher

Table 2 Results of Mixed-Effects Logistic Regressions on Brochure Choice

Characteristic	Estimates	SE	*P*	Odds Ratio (95% CI)[a]
Model 1: Availability and affect heuristics as predictors of brochure choice				
Intercept	−5.03	0.97	<0.001	0.01 (0.00−0.04)
Actual cancer frequency	−0.01	0.10	0.923	0.99 (0.82−1.19)
Availability	0.73	0.13	<0.001	2.07 (1.63−2.68)
Affect	0.51	0.06	<0.001	1.67 (1.49−1.89)
Random effects				
ID: σ^2 intercept = 7.59, SD = 2.76; Cancer: σ^2 intercept = 0.15, SD = 0.39				
Model 2: Availability, affect, and cancer judged risk as predictors of brochure choice[b]				
Intercept	−4.37	0.98	<0.001	0.01 (0.00−0.08)
Actual cancer frequency	−0.13	0.10	0.109	0.88 (0.71−1.07)
Availability	0.57	0.14	<0.001	1.76 (1.36−2.29)
Affect	0.46	0.06	<0.001	1.59 (1.42−1.80)
Judged risk	0.06	0.02	<0.001	1.06 (1.03−1.10)
Random effects				
ID: σ^2 intercept = 7.46, SD = 2.73; Cancer: σ^2 intercept = 0.15, SD = 0.39				

[a]Bootstrapped confidence intervals.
[b]Relative to model 1, model 2 had a better goodness of fit, as indicated by a likelihood ratio test, $\chi^2(1) = 13.8$, $P < 0.001$.

when the affect rating was 1 standard deviation above v. below the mean. To explore the extent to which the effect of availability and affect on brochure choice might have been direct or indirect through judged risk, we conducted a mediation analysis. Both availability (b = 2.00; SE = 0.15; 95% CI, 1.71–2.29) and affect (b = 0.29; SE = 0.05; 95% CI, 0.20–0.38) were positively linked with judged risk (intercept = –10.61, SE = 4.40; 95% CI, –19.33 to –2.10; actual cancer frequency = 2.19, SE = .48; 95% CI, 1.24–3.12). As can be seen in the bottom panel of Table 2, when judged risk was included in the overall analysis (v. not included; top panel of Table 2), the relationships of availability and, to some extent, also of affect with brochure choice were reduced (but still significant), suggesting only partial mediation. The odds ratios decreased to 1.76 and 1.59 for availability and affect, respectively. A substantial portion of the impact of availability and affect on information choice thus seems to be unrelated to the influence of these factors on judged risk.

Discussion

How do people decide which risks they want to get informed about? Our results show that people are rather selective, choosing information brochures for only around 4 of the available 23 cancers. Furthermore, people's information choices were quite systematic. In particular, they chose information for those cancers for which members of their social networks had previously received a diagnosis and those cancers they dreaded, and both factors predicted information choice independently. A mediation analyses suggested that some of the effect of availability and affect may influence information-seeking behavior indirectly through cancer risk judgments.[10]

Our results identify 2 heuristic cues—availability and affect—that seem to guide people's decisions about which risks they want to get informed about. Given that availability and, to some extent, also affect are valid cues for the actual level of risk,[10] getting people to consider the occurrences of a disease in their social network might help promote adaptive information seeking even further. Conversely, our findings can also be used to predict which risks are likely to fall from people's radar—namely, those that people are less likely to have experienced in their social environment and those that they dread little. To the extent that it may be important to increase awareness and knowledge of some of these risks (e.g., new risks), provision of information about such risks should be accompanied by campaigns that target factors (e.g., dread) that might lead people to actually pick up this information.

As potential limitations, we note that asking about availability, affect, and risk judgments prior to brochure selection may have increased their use in participants' choices. Furthermore, participants may have been more willing to select information in the experimental setting

of our study relative to a more natural setting. An alternative approach would be to ask participants to freely request brochures rather than select from a given set of brochures. Future studies might explore also the influence of other factors on brochure selection, such as preexisting knowledge about the cancers or social norms.[5]

ORCID iD

Michelle McDowell https://orcid.org/0000-0002-1522-757X

Supplemental Material

Supplementary material for this article is available on the *Medical Decision Making* Web site at http://journals.sagepub.com/home/mdm.

References

1. Anker AE, Reinhart AM, Feeley TH. Health information seeking: a review of measures and methods. *Patient Educ Couns*. 2011;82:346–54.
2. Kahlor L. PRISM: a planned risk information seeking model. *Health Commun*. 2010;25:345–56.
3. Rutten LJ, Squiers L, Hesse B. Cancer-related information seeking: hints from the 2003 Health Information National Trends Survey (HINTS). *J Health Commun*. 2006;11(suppl 1):147–56.
4. Hovick S, Freimuth VS, Johnson-Turbes A, Chervin DD. Multiple health risk perception and information processing among African Americans and whites living in poverty. *Risk Anal*. 2011;31:1789–99.
5. Huurne ET, Gutteling J. Information needs and risk perception as predictors of risk information seeking. *J Risk Res*. 2008;11:847–62.
6. Arora NK, Hesse BW, Rimer BK, Viswanath K, Clayman ML, Croyle RT. Frustrated and confused: the American public rates its cancer-related information-seeking experiences. *J Gen Intern Med*. 2008;23:223–8.
7. Hay JL, McCaul KD, Magnan RE. Does worry about breast cancer predict screening behaviors? A meta-analysis of the prospective evidence. *Prev Med*. 2006;42:401–8.
8. Yang ZJ, Kahlor L. What, me worry? The role of affect in information seeking and avoidance. *Sci Commun*. 2012;35:189–212.
9. Hertwig R, Pachur T, Kurzenhauser S. Judgments of risk frequencies: tests of possible cognitive mechanisms. *J Exp Psychol Learn Mem Cogn*. 2005;31:621–42.
10. Pachur T, Hertwig R, Steinmann F. How do people judge risks: availability heuristic, affect heuristic, or both? *J Exp Psychol Appl*. 2012;18:314–30.
11. Emanuel AS, Kiviniemi MT, Howell JL, et al. Avoiding cancer risk information. *Soc Sci Med*. 2015;147:113–20.
12. Dawson E, Savitsky K, Dunning D. "Don't tell me, I don't want to know": understanding people's reluctance to obtain medical diagnostic information. *J Appl Soc Psychol*. 2006;36:751–68.
13. Rosen NO, Knauper B. A little uncertainty goes a long way: state and trait differences in uncertainty interact to increase information seeking but also increase worry. *Health Commun*. 2009;24:228–38.
14. Kievik M, ter Huurne EFJ, Gutteling JM. The action suited to the word? Use of the framework of risk information seeking to understand risk-related behaviors. *J Risk Res*. 2012;15:131–47.
15. Robert Koch-Institut. *Krebs in Deutschland* [Cancer in Germany]. Berlin: Robert Koch-Institut (Hrsg.) und die Gesellschaft der epidemiologischen Krebsregister in Deutschland e.V. (Hrsg.); 2012.
16. Singmann H, Kellen D. An introduction to linear mixed modeling in experimental psychology. In: Spieler DH, Schumacher E, eds. *New Methods in Neuroscience and Cognitive Psychology*. New York: Routledge; 2020. p 4–31.
17. Howell DC. *Statistical Methods for Psychology*. 8th ed. Belmont, CA: Wadsworth, Cengage Learning; 2012.