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Information Unwantedness and the Decision to Avoid Health Information

A dissertation submitted in partial satisfaction of the requirements
for the degree Doctor of Philosophy
in

Psychological Sciences

by

Jacqueline Nga Hua

Committee in charge:

Professor Jennifer Howell, Chair
Professor Anna Song
Professor Matthew Zawadzki

The Dissertation of Jacqueline Nga Hua is approved, and it is acceptable
in quality and form for publication on microfilm and electronically:

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Chair

University of California, Merced

2022

Dedication

      First, I would like to thank my family—Phuong Hua, Tri Hua, and Dennis Hua—for having provided me with so much love and support as I pursued my passion for psychological research. Second, I would like to thank my graduate advisor, Jenny Howell, for her kindness, patience, and wisdom. Jenny has been one of my biggest supporters and I owe much of my success to her mentorship. I would also like to thank the professors whom I worked with as an undergraduate student- Kate Sweeny, Megan Robbins, and Cecilia Cheung. As the only person in my family to have ever attended graduate school, their guidance was invaluable to my development as a graduate researcher and scholar. Third, I would like to thank my cohort and all of the friends I have had the pleasure of making during graduate school, including my brilliant lab mates—Angela Johnson, Bianca Hinojosa, and Will Meese. Finally, I want to thank all of the undergraduate research assistants who worked tirelessly to help me collect data for my studies throughout the years.

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2. **Hua, J**., Johnson, A. E., Pino, S.*, Olson, D.*, Nguyen, T.*, Lawson, L.*, Bedolla, B.*, & Howell, J. L. (2022). Social threat and alcohol use among college students. *Alcohol and Alcoholism*.

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5. Hussain, M., Johnson, A. E., **Hua, J**., Hinojosa, B. M., Zawadzki, M., & Howell, J. L. (2021). When belongingness backfires: Experienced discrimination predicts increased metabolic risk among college students high, but not low in social belonging. *Journal of Behavioral Medicine.*

6. Alegria, K. E., Fleszar-Pavlović, S. E., Ngo, D., Beam, A., Halliday, D. M., Hinojosa, B. M., **Hua, J**., Johnson, A. E., McAnally, K., McKinley, L. E., Temourian, A. A., & Song, A. V. (2021). The role of risk perceptions and affective consequences in COVID-19 protective behaviors. *International Journal of Behavioral Medicine.*

7. **Hua, J**., & Howell, J. L. (2020). Coping self-efficacy influences health information avoidance. *Journal of Health Psychology.*

8. **Hua, J**., Howell., J. L., Sweeny, K., & Andrews, S. E. (2020). Outcomes of physicians' communication goals during patient interactions. *Health Communication.*

Information Unwantedness and the Decision to Avoid Health Information

Jacqueline Nga Hua

Doctor of Philosophy

University of California, Merced

2022

Professor Jennifer Howell, Chair

Abstract

Despite the potential negative implications of avoiding information about one's health, research finds that people sometimes avoid this information. Current theorizing on avoidance implies that information is avoided to the extent that it is unwanted, however, no research has measured this construct of unwantedness nor examined its potential role in avoidance behavior. Further, although past work examines links between individual factors and avoidance, it generally fails to consider how these factors may work in tandem to predict avoidance. The present work proposes and defines a novel construct which can summarize multiple factors that contribute to health information avoidance: unwantedness of information, or the extent to which one does not desire information.

In Study 1, participants completed a disease risk calculator, faced a decision to learn or forego their disease-risk feedback, and completed three measures of unwantedness. The results revealed that a brief 2-item measure of unwantedness accounted for as much variance in avoidance as more extended measures. Further, unwantedness of disease-risk feedback was associated with a greater likelihood of avoiding disease-risk feedback. In Study 2, participants completed a disease risk calculator, the 2-item measure of unwantedness, and then faced a decision to learn or forego their disease-risk feedback. The results revealed that the 2-item measure of unwantedness demonstrated convergent and discriminant validity. Moreover, disutility of learning information and lack of resources for learning information were both associated with greater unwantedness of information which, in turn, was associated with a greater likelihood of information avoidance. In Study 3, participants were assigned to a behavioral obligation manipulation, a manipulation emphasizing lack of treatment, or a control condition before completing a risk calculator for TAA deficiency (a fictitious disease). Next, they completed the 2-item measure of unwantedness and faced a decision to learn or forego their disease-risk feedback. The results suggested that the behavioral obligation manipulation increased unwantedness of disease-risk feedback and, in turn, avoidance. Collectively, these findings support the role of unwantedness of information in decisions to avoid health information and suggest that unwantedness is a promising target for future research aimed at reducing avoidance of health information.

Introduction

For many chronic diseases such as diabetes and cancer, early detection and diagnosis are crucial for lowering mortality and increasing the efficacy of treatment (Edwards et al., 2010; Herman et al., 2015). One way to facilitate early detection and diagnosis is through risk assessment and screening (Gulcher & Stefansson, 2010). Nevertheless, people sometimes deliberately avoid information about their health, such as their risk for disease (Howell et al., 2018). For instance, past research finds that nearly 40% of Americans would rather avoid learning their risk for cancer (Emanuel et al., 2015). Avoiding such information may provide some temporary benefit such as preventing momentary distress, however, doing so can ultimately delay treatment and, thus, increase mortality (Brashers, 2001; Herman et al., 2015). A great deal of work has examined the personal and situational factors that influence information avoidance. Nevertheless, these studies often focus on the direct effects of specific situational or personal factors in the decision to avoid and ignore the fact that other situational or personal factors might be increasing or decreasing someone's likelihood of avoidance. In the present work, I propose a novel factor contributing to avoidance that may serve to summarize the psychosocial underpinnings of the decision to avoid: unwantedness of information.

Health Information Avoidance

Engaging in behavior to prevent the acquisition of available information is known as *information avoidance* (Sweeny et al., 2010). *Health information avoidance* represents a version this broader phenomenon applied to health-specific information and is well-documented with many health outcomes (Howell et al., 2018). For example, smokers might avoid looking at graphic warning labels on cigarette packets (McCloud et al., 2017), people may avoid learning the number of calories in a dessert that they would like to eat (Woolley & Risen, 2018), or people might avoid cost-free genetic testing (Thompson et al., 2002).

Of course, people can fail to learn information for a variety of reasons and not all forms of failure to learn information represent avoidance. For instance, a person might not receive the results of a diabetes screening because they are preoccupied with work and miss their physician's call with the results. Or they may simply *not seek* information—they might not ask their physician about their risk for diabetes because they do not realize they can or should. Neither of these two forms of failure to learn information represent health information avoidance. Instead, information avoidance is an *active* behavior where one purposefully avoids information that is available to them (Sweeny et al., 2010). For example, intentionally declining a physician's call to avoid learning the results of a diabetes screening or cancelling one's appointment to avoid a possible diagnosis of diabetes would represent avoidance of health information.

Consequences of Health Information Avoidance

Knowing information about one's health can be valuable for promoting positive outcomes, such as facilitating informed decision-making about treatment and care (Wang et al., 2004). Conversely, avoiding health information can be problematic, especially when early detection and diagnosis are crucial for slowing the progression of disease and reducing mortality (Levin & Stevens, 2011). For instance, early detection of chronic kidney disease is associated with a slower decline in kidney functioning (Levin &

Stevens, 2011). Furthermore, colorectal cancer—a leading cause of cancer-related deaths in the U.S.—has a five-year survivability rate of over 90% when the cancer is detected and treated at the localized level versus 14% when the cancer has metastasized throughout the body (Howlader et al., 2019). In these cases, if people delay or avoid diagnoses, disease has a chance to spread and worsen, reducing their likelihood of survival. Given the potentially dire health consequences of avoiding (and benefits of learning) health information, it is important to understand the factors underlying health information avoidance.

Why People Avoid Health Information

Past research from the psychology literature broadly suggests that information avoidance is driven by perceived threats to one's beliefs, emotions, or behavior (Howell et al., 2018). In other words, people are more inclined to avoid health information when they believe it might threaten the way they think, feel, or behave (Shepperd & Howell, 2015). In an expansion of this and other models of information avoidance, a recent review of the information avoidance literature proposes that health information avoidance stems from two main factors: 1) the disutility associated with learning information and 2) one's resources for coping with the disutility of the information (Hua & Howell, 2022).

Disutility refers to perceptions of the negative hedonic and/or strategic value of learning information (Golman et al., 2017). For instance, if people feel that learning information will cause undesired negative affect, the information has hedonic disutility. Multiple studies find that people who anticipate greater negative affective responses to health information are more likely to avoid that information (Ferrer et al., 2015; Leyva et al., 2020; Vrinten et al., 2018). Similarly, if people feel that learning information might negatively affect the way others behave around them or how others perceive them, the information has strategic disutility. For example, in one study with undergraduate students, more than half of participants who avoided learning the results of a Herpes Simplex Virus test cited concerns that others might find out the results of their test (Ganguly & Tasoff, 2017). In another study with a sample of community adults, participants were more likely to avoid testing for a medical condition that was stigmatizing as compared to a medical condition that was not stigmatizing (Lipsey & Shepperd, 2019a).

In addition to perceptions of the disutility of learning information, considerations of one's material, psychosocial, and informational *resources* for coping with information matter for avoidance. If people perceive low material resources for dealing with the disutility of health information (e.g., lacking funds for medication costs or time to attend a doctor's appointment), they are more likely to avoid that information (Jung, 2014; McCloud et al., 2013; Persoskie et al., 2013). For instance, if people feel that learning information will obligate undesirable or untenable (changes in) personal behavior, they may perceive the information to have high resource burden and be more likely to avoid it. Indeed, participants in one study were more inclined to avoid learning about their risk for disease when they were informed that a high-risk test result would obligate them to undergo a lifelong treatment regimen versus a short-term treatment regimen (Howell & Shepperd, 2012a). Avoidance also depends on one's interpersonal and intrapsychic resources to cope with disutility (Howell et al., 2014). Some evidence suggests that people who perceive low personal coping resources only avoid cancer information when

they also perceive low interpersonal coping resources for learning health information (Chae et al., 2020). Moreover, people are less likely to avoid their risk for disease to the extent that they feel like they are able to cope effectively with bad news (Hua & Howell, 2020).

Collectively, past research has examined causal and correlational links between multiple situational and personal factors and health information avoidance. Nevertheless, although studies examine the relationship between factors such as hedonic disutility or coping resources and health information avoidance, this research is often myopically focused on only one or a few factors that influence avoidance. For instance, most experimental work has focused on single motives for avoidance such as behavioral obligation (Howell & Shepperd, 2013c), threats to self-views (Dwyer et al., 2015), or perceptions of coping ability (Hua & Howell, 2020)—testing whether situations with high versus low levels of these constructs prompt different amounts of avoidance behavior. In the present study I propose that, in all situations, there is a more proximal psychological factor that summarizes the pathway through which multiple situational factors influence health information avoidance—unwantedness of information.

Unwantedness of Information

I define *unwantedness of* specific *information* as the extent to which a person does not desire that information. Importantly, unwantedness of information is conceptually distinct from behavioral intention to avoid information and willingness to avoid information. Behavioral intention and willingness to avoid are properties of avoidance behavior representing the degree to which one has formulated plans to avoid information (see Warshaw & Davis, 1985) or a favorable disposition toward avoiding and a readiness to engage in information avoidance (see De Massis et al., 2014) respectively. By contrast, unwantedness is a property of the information that might be avoided and simply represents a desire not to know, regardless of what one is willing or intending to do when it comes to learning or avoiding the information. As such, although unwantedness of information is likely related to willingness and intentions to avoid, it is distinct from both constructs. Further, unwantedness generally remains agnostic to the valance of information. Put another way, unwantedness of information does not specifically reflect expectations for good or bad news, though it may be influenced by it. Indeed, people sometimes want to learn bad news (e.g., that they have cancer; Emanuel et al., 2015) and sometimes do not want to learn good news (e.g., the happy ending of a story they are reading; Johnson & Rosenbaum, 2015).

Thus far, theorizing has passively assumed that information unwantedness is a factor in avoidance (Sweeny et al., 2010). It might seem obvious that people will avoid information they do not want, however, there is a clear distinction between not wanting a piece of information and actually avoiding it. Still, no research has directly focused on this potential component of avoidance. Perhaps the most relevant work up to this point consists of studies suggesting that information can evoke psychological threat which refers to the psychological discomfort that one expects will accompany learning specific health information (Shepperd & Howell, 2015). I suspect that psychological threat produces unwantedness, but it likely works in tandem with other factors (e.g., strategic utility, coping resources) to influence avoidance. Indeed, one can perceive information as threatening—for example, one might expect that learning they have a sexually

transmitted infection will make them feel badly about their prior behavior, change their view of themselves as smart and safe, and require undesired behavior such as disclosing the infection to prior sexual partners—but still want to learn that information—to protect others and promote better disease course. Indeed, there are many cases where people might want to learn health information that seems to pose immense psychological threat immediately, but that is also valuable in the long term.

Research that focuses on the direct link between the perceived disutility of health information and avoidance generally implies that as information carries more disutility (e.g., as information is more threatening), it becomes more unwanted and, in turn, people should be more likely to avoid. Indeed, the original definition of information avoidance contains the idea that information is "available, but potentially *unwanted*" (Sweeny et al., 2010, p. 341). However, no studies have actually attempted to measure unwantedness nor have they tested the role of unwantedness in avoidance. In the present work, I aim to bridge this gap in the literature by examining the role of information unwantedness in information avoidance behavior.

In my view, a myriad of factors can contribute to the unwantedness of information. Therefore, focusing on the direct effect of any one situational or personal factor on avoidance behavior can miss the broader context in which the decision occurs as well as the psychological processes (unwantedness) through which it occurs. I propose that between situational factors and avoidance behavior is the construct of unwantedness. Unwantedness represents the combination of multiple personal and situational factors influencing whether information is desired or undesired in any given moment. For instance, it is often the case that people realize learning information will be unpleasant, but feel it is important to learn so that they can protect themselves from negative outcomes. In this case, unwantedness might be moderate because although people recognize the hedonic disutility of learning—creating higher unwantedness—they might also recognize the strategic utility of learning—creating lower unwantedness.

In the present endeavor, I focus on unwantedness of one specific type of health information: disease-risk feedback. Numerous studies in the health information avoidance literature have examined avoidance of information regarding one's risk for disease (e.g., Howell & Shepperd, 2013c; Melnyk & Shepperd, 2012; Yaniv et al., 2004). Consistently, research finds that the possibility of learning that one is at high-risk for disease can be threatening, and thus some people choose to avoid this information (Howell et al., 2014). Of course, disease-risk information is not always unwanted. Some people might want to learn whether they are at high-risk for disease because doing so can help them take preventative action to lower their risk. Given that no studies have examined the potential role of unwantedness in information avoidance, I ground my initial work in the context of disease-risk feedback avoidance to best situate it in the existing health information avoidance literature.

The Present Work

Given the negative potential consequences of avoiding health information, it is crucial to gain a comprehensive understanding of why people avoid. Although past research assumes that unwantedness of information plays a role in information avoidance, no studies to date have examined the construct directly. In the present work, I propose that: 1) unwantedness of information is associated with a greater likelihood of avoiding

health information, 2) disutility and (lack of) resources both predict greater unwantedness of information which, subsequently, predicts greater avoidance of health information, and 3) manipulations targeting unwantedness can prompt greater unwantedness of information and, subsequently, greater avoidance of health information. To test these predictions, I conducted three studies guided by the following aims:

1. Develop a valid and reliable measure of unwantedness of information which optimizes variance explained while minimizing participant burden (Studies 1 & 2).
2. Demonstrate that unwantedness is associated with a greater likelihood of avoiding disease-risk feedback (Studies 1, 2, & 3).
3. Demonstrate that disutility and (lack of) resources predict greater unwantedness and, subsequently, avoidance of disease-risk feedback (Study 2).
4. Examine whether two manipulations known to cause avoidance do so via unwantedness (Study 3).

Study 1

To my knowledge, no studies have attempted to measure unwantedness of information nor examine its link to health information avoidance. Thus, Study 1 developed and tested the predictive validity of three potential measures of unwantedness of information. The study also aimed to provide conceptual clarity between unwantedness of information and health information avoidance behavior.

I developed measures of unwantedness by adapting items from the Information Avoidance Scale (Howell & Shepperd, 2016). This scale has been widely used in research on health information avoidance (e.g., Kim et al., 2020; Lipsey & Shepperd, 2019b; Orom et al., 2018) and validated with multiple populations (e.g., adults, high school students, college students, adults from low socioeconomic backgrounds). Although the Information Avoidance Scale was originally intended to measure general tendency to avoid information, it has been criticized for using abstract items (e.g., "I would rather not know…") which do not actually align with avoidance behavior (Ho et al., 2021). Indeed, other studies have developed measures of information avoidance that more directly assess behavior with items such as "I avoid talking about cancer with my doctor or other medical professionals" and "I avoid reading things about cancer on the internet" (Chae, 2016; Chae et al., 2020). Indeed, two studies used negatively worded items from the Information Avoidance Scale (e.g., "I want to know everything about my health") to measure desire for health information (i.e., wantedness of health information; Link et al., 2021; Link & Baumann, 2022). As such, I propose that the items from the Information Avoidance scale do not measure avoidance behavior, but rather tap a general idea of information (un)wantedness. Given that the scale is established in the health information avoidance literature, is validated with multiple populations, and has been used by past research to measure (un)wantedness of information, I believed it would be advantageous to adapt the items to develop my measures.

Participants and Procedure

Participants were 1,651 adults (M_{age} = 33.98 years, SD_{age} = 12.75 years; 70.0% Female, 29.4% Male, 0.6% Missing/Other; 71.5% White, 7.8% Hispanic/Latino/a/x, 7.8% Asian, 6.7% Black, 3.7% Multiracial, 2.5% Missing/Other) aged 18 years old and older who were recruited via Prolific.co, a participant recruitment website. An a priori

power analysis suggested that a sample of 1,402 participants was required to detect a difference of $q = .15$ between two Pearson's r values with power set to .80 and alpha set to .05. Because I incorporated multiple risk calculators in this study, I collected data from as many participants as my resources would allow. Participants took part in an online study where they were first randomly assigned to complete one of six disease risk calculators (melanoma skin cancer, stroke, lung cancer, osteoporosis, prediabetes, and diabetes; adapted from https://siteman.wustl.edu/prevention/ydr/ and https://www.cdc.gov/prediabetes/takethetest/) before making a decision to either learn or forego their comparative disease risk feedback (i.e., their risk for disease relative to an average person who is the same age and gender). I incorporated multiple risk calculators in this study to ensure that the effects observed were not artifacts of response to any one disease risk, a process called *stimulus sampling* (Wells & Windschitl, 1999). Next, participants completed three measures of unwantedness of information and a measure of health information avoidance behavior from past research. The order of the unwantedness measures was counterbalanced to ensure that participants' responses to any one measure did not influence their responses to another measure of unwantedness. A full list of measures can be found in Appendix A. The study took participants, on average, 8 minutes to complete and they were compensated with $1.00 for their time. All procedures were approved by the university's Institutional Review Board.

Measures

Decision to Avoid Disease-risk feedback

After completing their assigned risk calculator, participants received the option to learn their comparative risk for disease. Specifically, they responded to a single item taken from past research (Hua & Howell, 2020) asking them to select from one of two options in the online survey: "Yes, please give me my risk for [disease]" (learning) or "No, I do not want to learn my risk for [disease]" (avoiding). To ensure that avoidance represented an active decision, the "Yes" option to learn risk results was pre-selected so participants had to actively change the response to avoid.

Unwantedness of Disease-risk feedback

To assess momentary unwantedness of disease-risk feedback, participants responded to a face-valid 2-item measure of unwantedness, a 4-item measure of unwantedness, and a 6-item measure of unwantedness. A full list of the items included in each measure and their descriptive statistics are presented in Table 1.

Table 1.
Items from three potential measures of unwantedness of information in Study 1.

Version	Items	M	SD
2-item	Right now, I would rather not know my risk for [disease].	1.93	1.03
	I want to know my risk for [disease] immediately. (R)	1.97	1.02
	Right now, I would rather not know my risk for [disease].	1.93	1.03
4-item	Right now, I would avoid learning my risk for [disease].	1.88	1.00
	Even if it will upset me, I want to know my risk for [disease] right now. (R)	1.90	1.01
	I want to know my risk for [disease] immediately. (R)	1.97	1.02

6-item	Right now, I would rather not know my risk for [disease].	1.93	1.03
	Right now, I would rather not know bad news about my risk for [disease].	2.04	1.09
	Right now, I would rather not know if I'm at high risk for [disease].	1.98	1.04
	I want to know my risk for [disease] immediately. (R)	1.97	1.02
	I want to know bad news about my risk for [disease] immediately. (R)	2.00	1.01
	I want to know if I am at high risk for [disease] immediately. (R)	1.97	1.02

2-item Measure. The face-valid 2-item measure of unwantedness included one positively valenced and one negatively valenced item from the Information Avoidance Scale (Howell & Shepperd, 2016). The positively valenced item was adapted to assess momentary unwantedness of information by adding "Right now" to the beginning of the item stem. Specifically, the positively valenced item was "*Right now*, I would rather not know my risk for [disease]." The negatively valenced item was taken directly from the Information Avoidance Scale as it already contained language which assessed momentary unwantedness. The negatively valenced item was "I want to know my risk for [disease] immediately" (1 = *strongly disagree*, 5 = *strongly agree*). I averaged across the two items to create the 2-item index of unwantedness of disease-risk feedback ($r = .71$; $M = 1.94$, $SD = .90$).

4-item Measure. The 4-item measure of unwantedness represented an expansion of the 2-item measure. Specifically, I included the items from the 2-item measure, and then adapted the original authors' 2-item version of the Information Avoidance Scale (Howell & Shepperd, 2016). Once again, "Right now" was added to the item stems to assess momentary unwantedness. The two additional statements were, "*Right now*, I would avoid learning my risk for [disease]" and "Even if it will upset me, I want to know my risk for [disease] *right now*" (1 = *strongly disagree*, 5 = *strongly agree*). Including these items allowed me to examine whether the relationship between unwantedness and avoidance would be improved by including the items from the authors' original short scale. I averaged across the items to create the 4-item index of unwantedness of disease-risk feedback ($\alpha = .93$; $M = 1.92$, $SD = .92$).

6-item Measure. The 6-item measure of unwantedness expanded upon the 2-item measure in a different way. Namely, it was aimed to capture a broader set of possible unwanted pieces of information. The 6-item measure represented the 2-item measure applied to three specific types of information: 1) one's risk for disease generally (Table 3, items 1 and 4), 2) bad news about one's risk for disease (Table 3, items 2 and 5), and 3) high-risk for disease (Table 3, items 3 and 6). I included items for each type of unwantedness with the idea that unwantedness may arise from expecting high-risk feedback, expecting bad news (regardless of valance), simply not wanting to know the information, or a combination of these. Example items include "Right now, I would rather not know *bad news* about my risk for [disease]", "Right now, I would rather not know *if I am at high risk* for [disease]", and "Right now, I would rather not know my risk for [disease]" (1 = *strongly disagree*, 5 = *strongly agree*). I averaged across all items to create the 6-item index of unwantedness of disease-risk feedback ($\alpha = .94$; $M = 1.98$, $SD = .91$).

Health Information Avoidance Behavior

To distinguish between unwantedness of information and health information avoidance behavior, participants responded to four items from a cancer information avoidance scale (Chae et al., 2020). Specifically, the items were adapted to measure avoidance of information about the disease for which participants completed a risk calculator. Participants indicated how well statements such as "I avoid talking about [disease] with my primary health care provider" and "I avoid reading things about [disease] on the internet" described them (1 = *not at all*, 5 = *completely*). I averaged across the items to create an index of health information avoidance behavior (α = .93; M = 1.56, SD = 1.01).

Analyses

I conducted my analyses in six steps. First, to assess the reliability of the three measures of unwantedness, I examined Cronbach's alpha and inter-item correlations for each of the three potential measures. Second, to assess the predictive validity of the measures, I conducted three logistic regression tests predicting avoidance of disease-risk feedback with each measure of unwantedness. Third, to determine whether any one measure of unwantedness explained significantly more variance in avoidance behavior than the other measures, I compared the effect sizes of each of the predictors in the three logistic regression models. Fourth, I examined the correlations between my measure of unwantedness and a measure of health information avoidance behavior from past research (Chae et al., 2020). Fifth, I conducted three logistic regression models predicting avoidance of disease-risk feedback with my measures of unwantedness and the measure of health information avoidance behavior from past research. Finally, I conducted confirmatory factor analyses with the items from my measures of unwantedness and the measure of health information avoidance behavior from past research to ensure that my items were, indeed, capturing unwantedness and not behavioral avoidance. All analyses were conducted with SPSS 27 except the factor analyses, which were conducted with AMOS 4.0 (Arbuckle, 2011).

Study 1 Results

Reliability of the Measures

Interitem correlations for the measures of unwantedness are presented in Tables 2 and 3. Prior to analysis, I reverse-coded negatively worded items so that higher scores on all items represented greater unwantedness. Items from the 2-item measure were significantly positively correlated, r = .71, $CI_{95\%}$ [.69, .74], p < .001. Items from the 4-item measure demonstrated good reliability (α = .93) and were all significantly positively correlated $rs \geq .69$, ps < .001. Items from the 6-item measure also demonstrated good reliability (α = .94) and were all significantly positively correlated, $rs \geq .63$, ps < .001.

Table 2.
Inter-item correlations for the 4-item measure of unwantedness in Study 1

Items	1	2	3
		r [95% CI]	
1. Right now, I would rather not know my risk for [disease].*	-		
2. Right now, I would avoid learning my risk for [disease].	**.90 [.89, .91]**	-	
3. Even if it will upset me, I want to know my risk for [disease] right now. (R)	**.69 [.67, .72]**	**.69 [.67, .72]**	-
4. I want to know my risk for [disease] immediately. (R)*	**.71 [.69, .74]**	**.72 [.70, .74]**	**.85 [.83, .86]**

Note: bold items denote significance at *p* < .001; *items that are also included in the 2-item measure of unwantedness.

Table 3
Inter-item correlations for the 6-item measure of unwantedness of information in Study 1.

Items	1	2	3	4	5
			r [95% CI]		
1. Right now, I would rather not know my risk for [disease].	-				
2. Right now, I would rather not know bad news about my risk for [disease].	**.81 [.79, .82]**	-			
3. Right now, I would rather not know if I'm at high risk for [disease].	**.81 [.79, .82]**	**.78 [.76, .80]**	-		
4. I want to know my risk for [disease] immediately. (R)	**.71 [.69, .74]**	**.69 [.66, .71]**	**.64 [.61, .67]**	-	
5. I want to know bad news about my risk for [disease] immediately. (R)	**.67 [.65, .70]**	**.68 [.66, .71]**	**.64 [.61, .67]**	**.84 [.82, .85]**	-
6. I want to know if I am at high risk for [disease] immediately. (R)	**.66 [.63, .68]**	**.64 [.61, .67]**	**.63 [.60, .66]**	**.83 [.82, .85]**	**.81 [.79, .82]**

Note: bold items denote significance at *p* < .001

Predictive Validity of the Measures

Overall, 10.7% of participants avoided learning their comparative risk for disease. Tables 4 and 5 present the frequency of information avoidance and unwantedness of information as a function of risk calculator.

All three measures of unwantedness predicted avoidance of disease-risk feedback. Specifically, to the extent that participants reported unwantedness of disease-risk

feedback, they showed an increased likelihood of avoiding their comparative disease-risk feedback, on the 2-item measure ($OR = 5.56$, $X^2 = 395.44$, $p < .001$, $CI_{95\%}$ [4.49, 6.89]), 4-item measure ($OR = 6.31$, $X^2 = 418.72$, $p < .001$, $CI_{95\%}$ [5.02, 7.95]), and 6-item measure ($OR = 6.39$, $X^2 = 405.63$, $p < .001$, $CI_{95\%}$ [5.06, 8.06]).

Comparison of the Measures

To compare the effect sizes of the three measures, I converted the odds ratio values from each of the logistic regression models into Pearson's r values. Next, I used the Fisher z-test to examine whether the r values significantly differed from one another. The results revealed that none of the effect sizes differed significantly, 2- vs 4-item: $z = .88$, $p = .19$; 2- vs 6-item: $z = .95$, $p = .17$; 4- vs 6-item: $z = .07$, $p = .47$.

Relationship to Health Information Avoidance Behavior

I examined the correlation of each scale with a measure of behavioral avoidance from past research (Chae et al., 2020). As expected, all versions of the were significantly positively correlated with health information avoidance behavior, 2-item: $r(1600) = .24$, $CI_{95\%}$ [.20, .29], $p < .001$; 4-item: $r(1600) = .25$, $CI_{95\%}$ [.20, .30], $p < .001$; 6-item: $r(1607) = .26$, $CI_{95\%}$ [.22, .31], $p < .001$. Although significant, the correlations between the measures of unwantedness and the measure of behavioral avoidance were small, providing initial support that the measures of unwantedness were, indeed, tapping a construct separate from avoidance behavior.

Next, I examined whether the unwantedness scale would predict risk-feedback avoidance behavior beyond the scale of information avoidance behavior. When entered into a logistic regression model alone, the measure of health information avoidance behavior significantly predicted the decision to avoid disease-risk feedback, $OR = 1.47$, $p < .001$, $CI_{95\%}$ [1.30, 1.67]. When I entered both the previous measure of behavioral avoidance and my measures of unwantedness into a logistic regression model predicting decision to avoid disease-risk feedback, unwantedness significantly predicted decisions to avoid (2-item: $OR = 5.48$, $p < .001$, $CI_{95\%}$ [4.40, 6.82]; 4-item: $OR = 6.30$, $p < .001$, $CI_{95\%}$ [4.97, 7.98]; 6-item: $OR = 6.40$, $p < .001$, $CI_{95\%}$ [5.03, 8.14]), but behavioral avoidance did not (2-item model: $OR = 1.05$, $p = .58$, $CI_{95\%}$ [.88, 1.25]; 4-item model: $OR = 1.01$, $p = .92$, $CI_{95\%}$ [.84, 1.21]; 6-item model: $OR = 0.99$, $p = .94$, $CI_{95\%}$ [0.83, 1.19]).

Finally, I conducted confirmatory factor analyses to determine whether the items from the measure of behavioral avoidance and the measures of unwantedness reflected two separate latent factors. Standardized effect estimates are displayed in Figures 1 through 6. To compare the models, I assessed the comparative fit index (CFI) and Tucker-Lewis index (TLI) values of each model, where higher values indicate better fit (Bentler, 1990). I also compared the root mean square error of approximation (RMSEA) and the Akaike information criterion (AIC) values of each model, where smaller values indicate better fit (Bentler, 1990).

The results suggested that a model with all of the items from the measure of behavioral avoidance and the 2-item measure of unwantedness loaded onto two latent factors ($\chi^2 = 302.66$, $df = 8$, $p < .001$, CFI = .96, TLI = .89, RMSEA = .15, AIC = 340.66) had significantly better fit than a model with all of the items loaded onto a single latent factor ($\Delta\chi^2 = -1065.68$, $\Delta df = 1$, $p < .001$, ΔCFI = .15, ΔTLI = .34, ΔRMSEA = -.15, ΔAIC = -1063.68, $p < .001$).

A model with all of the items from the measure of behavioral avoidance and the 4-item measure of unwantedness loaded onto two latent factors (χ^2 = 1150.38, df = 19, p < .001, CFI = .91, TLI = .82, RMSEA = .19, AIC = 1200.38) also showed significantly better fit than a model with all of the items loaded onto a single latent facto ($\Delta\chi^2$ = -4844.18, Δdf = 1, p < .001, ΔCFI = .41, ΔTLI = .73, ΔRMSEA = -.24, ΔAIC = -4842.18, p < .001).

Consistently, a model with all of the items from the measure of behavioral avoidance and the 6-item measure of unwantedness loaded onto two latent factors (χ^2 = 1539.59, df = 34, p < .001, CFI = .90, TLI = .84, RMSEA = .16, AIC = 1601.59) had significantly better fit than a model with all of the items loaded onto a single latent factor ($\Delta\chi^2$ = -5200.29, Δdf = 1, p < .001, ΔCFI = .35, ΔTLI = .54, ΔRMSEA = -.18, ΔAIC = -5197.8, p < .001).
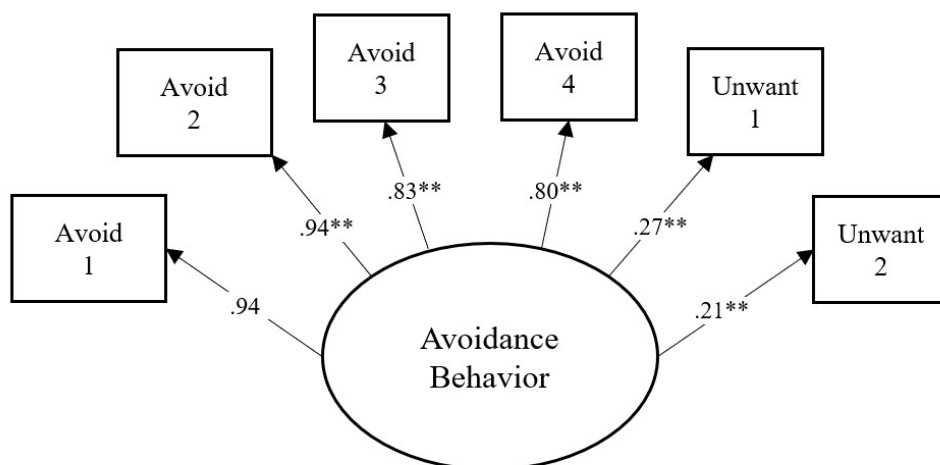
Figure 1.

Factor loadings from a confirmatory factor analysis with the items from the behavioral avoidance measure and the 2-item measure of unwantedness loaded onto a single latent factor. Avoid1-4: four items measuring health information avoidance behavior; Unwant1-2: two items measuring unwantedness of disease-risk feedback. **p < .001.
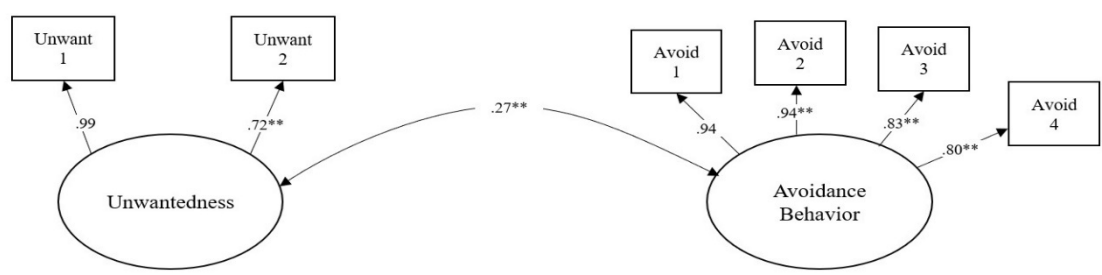
Figure 2.

Factor loadings from a confirmatory factor analysis with the items from the behavioral avoidance measure and the 2-item measure of unwantedness loaded onto two latent factors. Unwant1-2: two items measuring unwantedness of disease-risk feedback; Avoid1-4: four items measuring health information avoidance behavior. **$p < .001$.

Figure 3.

Factor loadings from a confirmatory factor analysis with the items from the behavioral avoidance measure and the 4-item measure of unwantedness loaded onto a single latent factor. Avoid1-4: four items measuring health information avoidance behavior; Unwant1-4: four items measuring unwantedness of disease-risk feedback. **$p < .001$.

Figure 4.

Factor loadings from a confirmatory factor analysis with the items from the behavioral avoidance measure and the 4-item measure of unwantedness loaded onto two latent factors. Avoid1-4: four items measuring health information avoidance behavior; Unwant1-4: four items measuring unwantedness of disease-risk feedback. **$p < .001$.

Figure 5.

Factor loadings from a confirmatory factor analysis with the items from the behavioral avoidance measure and the 6-item measure of unwantedness loaded onto a single latent factor. Avoid1-4: four items measuring health information avoidance behavior; Unwant1-6: six items measuring unwantedness of disease-risk feedback. **$p < .001$.
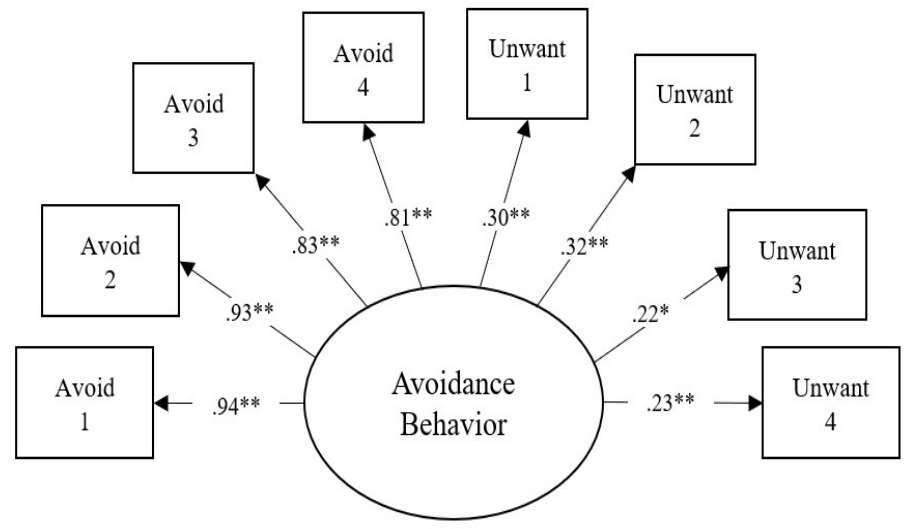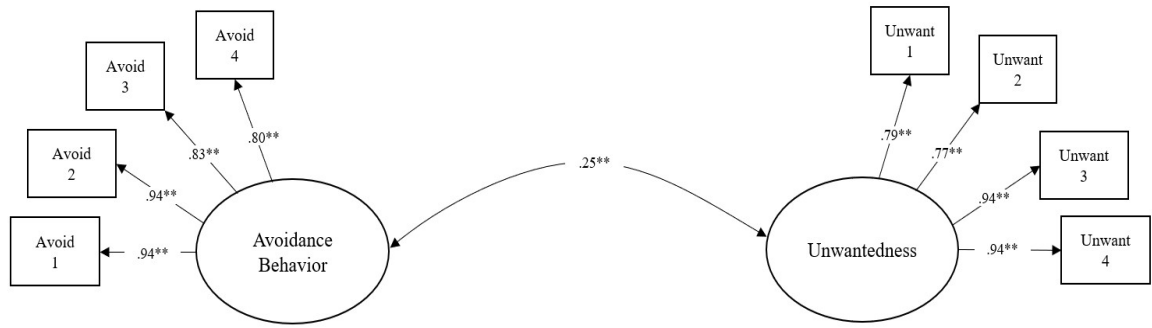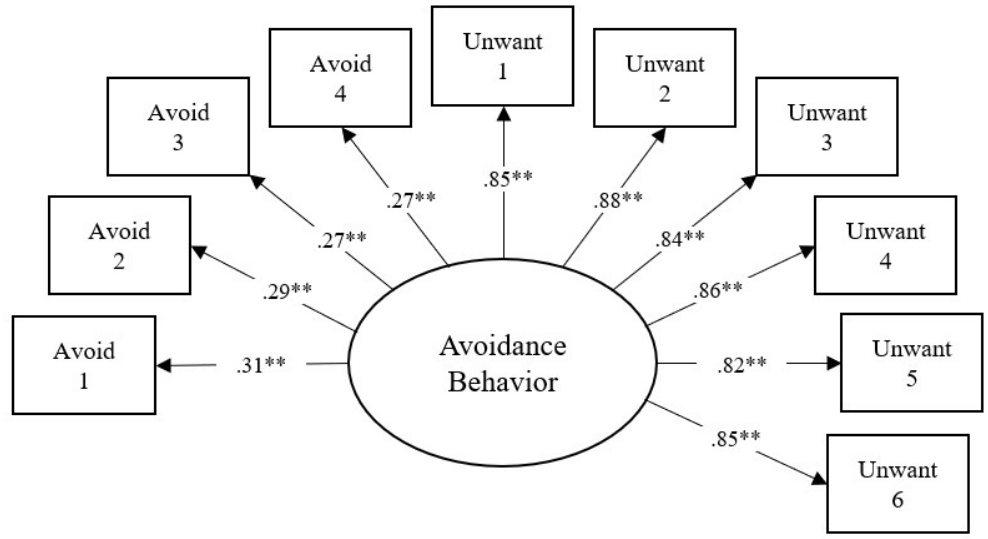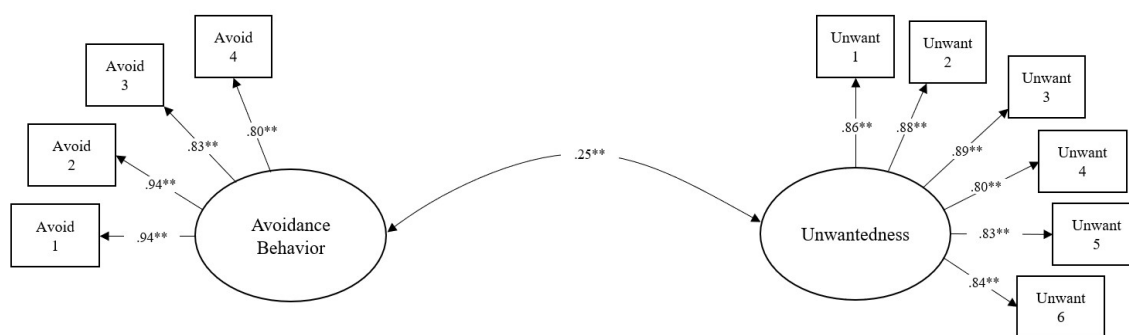
Figure 6.

Factor loadings from a confirmatory factor analysis with the items from the behavioral avoidance measure and the 6-item measure of unwantedness loaded onto two latent factors. Avoid1-4: four items measuring health information avoidance behavior; Unwant1-6: six items measuring unwantedness of disease-risk feedback. **$p < .001$.

Risk Calculator Condition

Table 4 presents the frequency of information avoidance as a function of risk calculator condition. The frequency of avoidance did not significantly differ as a function of risk calculator, $X^2(5) = 5.16$ $p = .40$, *OR* Range: min = 0.92, $CI_{95\%} = [0.51, 1.64]$, max = 1.30 [0.76, 2.22].

Surprisingly, unwantedness of information did differ significantly as a function of risk calculator, 2-item measure: $F(5, 1597) = 3.64$, $p = .003$; 4-item measure: $F(5, 1597) = 3.31$, $p = .006$; 6-item measure: $F(5, 1605) = 3.78$, $p = .002$. Table 5 shows the means of unwantedness in each risk calculator condition. Unwantedness was greatest for stroke, followed by prediabetes, diabetes, melanoma skin cancer, lung cancer, and osteoporosis. No one condition differed from all others. Across all three measures, stroke feedback was significantly more unwanted than melanoma skin cancer, lung cancer, and osteoporosis feedback. Osteoporosis feedback was significantly less unwanted than stroke, prediabetes, and diabetes feedback. No other differences emerged as significant.

Because unwantedness differed as a function of risk calculator condition, I entered risk calculator condition, and the interaction between risk calculator condition and unwantedness as a predictor of avoidance in a logistic regression analysis. Categorical comparisons were set to "helmert" and the categories were arranged in order from most to least unwanted—as such every calculator was compared to the mean of those below it in order. There was no main effect of risk calculator condition on avoidance. X^2s (5) < 2.54, $p > .77$, *OR* Range: min = 0.58, $CI_{95\%} = [0.20, 1.65]$, max = 1.31 [0.41, 4.19] nor did risk calculator condition moderate the effect of unwantedness on avoidance, X^2s (5) < 6.84, $p > .23$, *OR* Range: min = 0.61, $CI_{95\%} = [0.28, 1.35]$, max = 1.97 [0.86, 4.53].

Table 4.

Frequency of information avoidance as a function of risk calculator/condition across all studies.

Disease Risk Calculator/Condition	Total N	% Avoidance
Study 1		
Diabetes	259	10.5%
Lung Cancer	276	9.5%
Melanoma Skin Cancer	277	8.8%
Osteoporosis	289	9.8%
Prediabetes	260	13.2%
Stroke	290	13.2%
Total	1651	10.8%
Study 2		
Diabetes	52	7.7%
Lung Cancer	48	8.3%
Melanoma Skin Cancer	60	11.7%
Prediabetes	50	16.0%
Stroke	56	10.7%
Total	266	10.9%
Study 3		
Behavioral Obligation	148	65.5%
Untreatable	146	9.6%
Control	154	14.3%
Total	448	29.7%

Table 5.

Unwantedness of information as a function of condition in Study 1.

Measure	Stroke	Prediabetes	Diabetes	Melanoma Skin Cancer	Lung Cancer	Osteoporosis
			M (SD)			
2-item Unwantedness	2.11 (.97)[abc]	1.99 (1.05)[d]	1.98 (.94)[e]	1.91 (.92)[a]	1.89 (.93)[c]	1.79 (.86)[bde]
4-item Unwantedness	2.07 (.94)[abc]	1.96 (1.01)[d]	1.95 (.91)[e]	1.87 (.88)[b]	1.87 (.91)[a]	1.78 (.85)[cde]
6-item Unwantedness	2.14 (.95)[abc]	2.04 (.98)[d]	2.02 (.90)[e]	1.94 (.87)[b]	1.92 (.89)[a]	1.84 (.83)[cde]

Note. Means with the same superscript in the same row are significantly different from each other at the $p < .05$ level.

Study 1 Discussion

The results from Study 1 suggested that people were more likely to avoid learning their risk for disease to the extent that they did not want to know such information. Additionally, a 2-item measure of unwantedness of information demonstrated good reliability, predictive validity, and captured as much variance in avoidance behavior as did 4- and 6-item measures of unwantedness.

Study 1 also compared the measures of unwantedness to a previously established measure of health information avoidance behavior. The measures of unwantedness had a significant, but small, correlation with the previous measure of health information avoidance behavior, suggesting that it was tapping a construct distinct from, but related to avoidance. Further, logistic regression tests suggested that unwantedness predicted a greater likelihood of deciding to avoid one's risk for disease even while controlling for individual differences in health information behavior. Finally, a comparison of several confirmatory factor models indicated the items from the unwantedness measures and the behavioral avoidance measure reflected two distinct latent factors. In sum, these findings provide initial support for the construct validity of all of the measures of unwantedness and demonstrate the distinction between one's desire not to know information and their behavior of avoiding it.

Considering the evidence on the whole, I believe the study supports the efficacy of the 2-item measure. Specifically, given that it preforms nearly identically to the longer measures, using the 2-itme measure will help capture variance while minimizing participant burden (e.g., Jackson et al., 2008). Of course, we would be remiss if we did not note that measures with multiple items are typically more reliable in assessing constructs and are less prone to error. Thus, even though the development of the 2-item measure of unwantedness represented an important initial step in measuring and examining one's desire not to know information, future research can examine whether the addition of items aside from the ones tested here might improve the measure.

One unexpected finding emerged in this study: unwantedness of disease-risk feedback significantly differed between the disease risk calculators though avoidance behavior did not. Perhaps this suggests that the measures of unwantedness were more sensitive to detect small differences in desire to avoid risk feedback for certain diseases than was the dichotomous measure of avoidance behavior. This provides some initial, albeit tentative, support for the benefit of measuring information unwantedness in future research on avoidance of disease-risk feedback. Relatedly, although avoidance of disease-risk feedback did not significantly differ between the risk calculators, frequency of avoidance ranged from 8.8%-13.2% of participants (a 50% difference in frequency of avoidance between the conditions with the most and least avoidance). Thus, perhaps significant differences in avoidance between these conditions might emerge with larger samples or in circumstances where people are more likely to avoid risk feedback.

Study 2

Study 1 established a link between unwantedness of information and information avoidance and identified a reliable 2-item measure of unwantedness of information. Nevertheless, further research is needed to examine the convergent and discriminant validity of this measure and to determine whether disutility and (lack of) resources

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predict avoidance indirectly via unwantedness. Thus, Study 2 aimed to replicate the relationship between unwantedness and avoidance observed in Study 1 and to examine the convergent and discriminant validity of the 2-item measure of unwantedness developed in Study 1.

To demonstrate the convergent and discriminant validity of the 2-item measure, I examined correlations between unwantedness of information and three categories of predictors: 1) information-related predictors, 2) health-related predictors, and 3) personality predictors.

Measures Supporting Convergent Validity

Information-Related Predictors

I examined the relationship between the 2-item measure of unwantedness and two measures of information-related predictors: 1) perceived psychological threat of information, and 2) perceived probability of receiving unwanted information. I expected that both of these factors would positively predict unwantedness of information.

Perceived psychological threat has been linked to avoidance behavior in past research, which generally finds that people are more likely to avoid information to the extent that they perceive the information is threatening (Howell et al., 2018). Perceived probability of receiving unwanted information, has not been extensively studied. However, it is likely that people will report greater unwantedness of information if they expect that they have a high probability of learning something that will, indeed, be unwanted. Some support for this idea comes from a review of the information seeking literature which suggests that a significant barrier for information seeking is risk of exposure to unwanted information and that having a high perceived risk of receiving unwanted information can result in avoidance (Savolainen, 2016). Moreover, a study with medical students found that nearly half of students who were not interested in personal genome testing reported concerns that they would receive unwanted information (Ormond et al., 2011).

Health-Related Predictors

I examined one individual difference in health-orientation that should relate to unwantedness of information: dispositional health-regulatory focus. Research on health regulatory focus suggests that health prevention focus—the motivation to prevent negative health outcomes—is positively related to avoidance whereas health promotion focus—the motivation to promote positive health outcomes—is negatively related to avoidance (Ferrer et al., 2017). Consistently, promotion focus is associated with better ability to cope with stressors (Woltin et al., 2018) as well as health information seeking (Zhang et al., 2019). By contrast, some evidence suggests that prevention focus is positively associated with avoidant coping (e.g., escapism; Li et al., 2019). Thus, I predicted that health prevention focus would relate to greater unwantedness of disease-risk feedback and that health promotion focus would relate to less unwantedness of disease-risk feedback.

Personality Predictors

I included five personality measures that should relate to unwantedness of information: optimism, pessimism, self-esteem, neuroticism, and intolerance of uncertainty.

Regarding dispositional optimism and self-esteem, these factors have been

 proposed as reflecting psychological coping resources from which people can draw when they are faced with threat (Howell et al., 2014). Specifically, people who expect positive outcomes and have a strong sense of self-worth should be more open to potentially threatening information whereas those who expect negative outcomes should want to avoid potentially threatening information. Indeed, dispositional optimism has been found to be positively related to intentions to learn genomic sequencing results for disease risk (Taber et al., 2015) and people who report higher levels of optimism engage in more active coping (Carver et al., 2010). Similarly, people who have greater self-esteem tend to engage in more problem-focused coping (Mikula et al., 2018). Conversely, pessimism is related to greater anxiety about health threats (Hirsch et al., 2012). It is likely that people who are more optimistic (and less pessimistic) and who have higher self-esteem feel better-equipped to cope with potentially threatening information about their risk for disease which, subsequently, contributes to lowered unwantedness of such information. Thus, I expected that optimism and self-esteem would be negatively related to unwantedness of information and that pessimism would be positively related to unwantedness.

Related to the idea of threat, neuroticism should predict greater unwantedness of information. Findings from numerous studies suggest that people who are high in trait neuroticism (i.e., who are low in emotional stability) engage in more avoidant coping and are more anxious about their health overall (Aarstad et al., 2011; Sörensen et al., 2008). Past research also generally finds that neuroticism (i.e., emotional instability) positively predicts information avoidance (Howell & Shepperd, 2016). As such, people high in neuroticism may not want to learn potentially threatening information as it could create high levels of negative emotion. Thus, I predicted that neuroticism would be positively related to unwantedness of information.

Finally, individual differences in tolerance of uncertainty should be related to unwantedness of information. Past research suggests that people who are more tolerant of uncertainty report greater information avoidance (Howell & Shepperd, 2016) and people who are intolerant of uncertainty engage in more health information seeking (Rosen et al., 2007). The act of avoiding information maintains uncertainty about a piece of information, and to the extent that people do not desire to be uncertain, they should be more likely to want that information. Further, the positive relationship between intolerance of uncertainty and health information seeking might suggest that people who are intolerant of uncertainty want to know more information about their health than those who are tolerant. In the present research, I focused specifically on the prospective anxiety component of tolerance of uncertainty, which is based on fear of unpredicted future events (Carleton et al., 2007). I expected that prospective anxiety would be negatively related to unwantedness of health information because people who are inclined to reduce their uncertainty about future events will likely want to know information about their health in the present so that they can prevent unexpected news in the future.

Measures Supporting Discriminant Validity

Health-Related Predictors

I included two health-related predictors that I did not expect to relate to information unwantedness: perception of risk and self-rated health. Past research on risk perceptions and information avoidance has yielded mixed findings, with some studies

finding a positive relationship between disease risk perceptions and avoidance (e.g., Persoskie et al., 2013) and others finding the opposite (e.g., Marlow et al., 2018). I believe these mixed findings provide further support for the importance of accounting for information unwantedness in avoidance behavior: people who believe they are at low risk for disease may still not want to know about their risk because that information could disconfirm their beliefs and people who believe they are at high risk for disease may still want to know about their risk because that would allow them to take action to reduce their risk. Given the conflicting findings from past work on avoidance, and the fact that unwantedness is theoretically independent of people's expectations for feedback, I expected that comparative risk perceptions would not be related to unwantedness of information.

Few studies have examined the association between self-rated health and information avoidance. Existing research on this topic area generally suggest that worse self-reported health status predicts greater likelihood of information avoidance (e.g., Leyva et al., 2020). Nevertheless, I expected that self-rated health status would not relate to unwantedness of disease-risk feedback because one who believes that their health is poor may still want to know about their risk for disease in order to reduce their risk, and one who believes they are in good health may not want to know about their risk so as to protect their self-views. As such, the measure of unwantedness should not simply reflect one's current state of health, making this measure an ideal candidate for tapping discriminant validity.

Personality Predictors

I included five trait measures that should be unrelated to unwantedness of information: extraversion, agreeableness, conscientiousness, openness to experience, and the tendency to respond in a socially desirable way. Other than neuroticism, there is not a clear link between any of the Big-5 traits and information avoidance. As such, I do not have any theoretical foundation upon which to suspect that they should relate to unwantedness.

Extraversion is perhaps the strongest discriminant predictor: there is no theoretical reason why being outgoing and sociable should relate to unwantedness of information. When it comes to openness to experience, conscientiousness, and agreeableness, the picture is more complicated.

Openness to experience is generally associated with cognitive flexibility, curiosity, and self-reflection (McCrae & Sutin, 2009). All of these traits might indirectly predict lower unwantedness by reducing threat and increasing general openness to learning information.

Conscientiousness has long been linked to health-promoting and disease-preventative behavior (Bogg & Roberts, 2004). As such, people high in conscientiousness might be more likely to want information about their health. Nevertheless, I do not expect the correlations between these personality traits and unwantedness to be large enough to consider them convergent predictors.

Relatedly, it is unlikely that either agreeableness or socially desirable responding should correlate with the unwantedness measure. Some evidence suggests that people perceive health information avoiders more negatively than health information seekers (Heck & Meyer, 2019). However, one study which examined both of these factors and

avoidance found mixed results: there was no significant relationship between tendency to avoid health information and socially desirable responding but there was a significant relationship between agreeableness and information avoidance broadly (Howell & Shepperd, 2016). As with conscientiousness and extraversion, I did not suspect that tendency to produce socially desirable responses or agreeableness would correlate highly enough with unwantedness to suggest it as a convergent predictor.

In sum, other than extraversion, there is reason to suspect there might be some correlations between these personality traits and unwantedness. Nevertheless, I did not expect them to be large enough to consider them convergent items. Instead, I wanted to ensure that I explored these potentially theoretically meaningful relationships.

Participants and Procedure

Participants included 266 adults (M_{age} = 38.49 years, SD_{age} = 13.95 years; 65.0% Female, 34.2% Male, 0.8% Missing/Other; 79.7% White, 6.7% Hispanic/Latino/a/x, 4.7% Asian, 4.3% Black, 3.0% Multiracial, 1.6% Missing/Other) aged 18 years old and older who were recruited via Prolific.co. An a priori power analysis using a Monte Carlo simulation indicated that a sample of 250 participants was required to detect an indirect effect of (lack of) resources of r = .09 on avoidance via unwantedness with power set to $1\text{-}B$ = .80 and an alpha of .05 (Schoemann et al., 2017).

Participants took part in an online study where they were first randomly assigned to complete one of five[1] disease risk calculators (melanoma skin cancer, stroke, lung cancer, prediabetes, and diabetes; adapted from https://siteman.wustl.edu/prevention/ydr/ and https://www.cdc.gov/prediabetes/takethetest/) before receiving an opportunity to either learn or forego their comparative disease risk feedback. Next, participants completed measures of unwantedness of information, disutility, (lack of) resources, and then all measures for examining the convergent and discriminant validity of the 2-item measure of unwantedness. To reduce participant burden, I used a planned-missingness design in which participants were assigned to complete a random subset of eight of the ten possible measures for convergent and discriminant validity. The order of all of the measures was counterbalanced to ensure that the effects observed were not due to the order in which participants completed the measures in the online survey. The study took participants, on average, 8 minutes to complete and they were compensated with $1.22 for their time. All procedures were approved by the university's Institutional Review Board and the study was pre-registered at https://osf.io/nruk6/. A complete list of the measures is presented in Appendix B.

Measures

Unwantedness of Disease-risk feedback

To assess momentary unwantedness of disease-risk feedback, all participants completed the 2-item measure developed in Study 1. Specifically, participants indicated their agreement with the statements "Right now, I would rather not know my risk for [disease]" and "I want to know my risk for [disease] immediately" (1 = *strongly disagree*, 5 = *strongly agree*). I computed the mean of the two items to create an overall index of unwantedness of information (r = .67; M = 2.25, SD = 1.01).

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[1] To reduce participant burden, I opted to exclude the osteoporosis risk calculator from Study 2 as it had significantly more items (N = 17) than the diabetes (N = 7), lung cancer (N = 10), melanoma skin cancer (N = 9), prediabetes (N = 4), and stroke (N = 10) risk calculators.

Convergent and Discriminant Validity Measures

     A summary of all measures to examine convergent and discriminant validity appears in Table 6. This table contains information on the response scale, number of items, sample items, the number of participants who completed the measure, as well as reliability and descriptive statistics.

     I measured the following convergent-validity predictors: perceived psychological threat (Howell et al., 2014), perceived probability of receiving unwanted news about one's risk for disease (measure developed for this study), health prevention focus and health promotion focus from the Health Regulatory Focus Scale (HRFS; Ferrer et al., 2017), neuroticism (emotional instability) from the Ten-item personality inventory (TIPI; Ehrhart et al., 2009), optimism and pessimism (single-item measures added to the Ten-item Personality inventory; Ehrhart et al., 2009), Single-Item Self-Esteem (SISE; Robins et al., 2001), and the prospective anxiety subscale from the short form of the Intolerance of Uncertainty Scale (IUS-12; Carleton et al., 2007).

     I measured the following discriminant-validity predictors: comparative disease risk perceptions (item designed to exactly match the feedback participants received from the risk calculators), general self-rated health (DeSalvo et al., 2005) extraversion, agreeableness, conscientiousness, openness from the Ten-item personality inventory (TIPI; Ehrhart et al., 2009), and socially desirable responding from the short form of the Marlow Crowne Social Desirability Scale (Reynolds, 1982).

Table 6.

Summary of measures to examine convergent and discriminant validity in Study 2.

Measure	Example Item(s)	Response Scale	n	# Items	α/r	M (SD)
Information-Related Predictors						
Perceived Psychological Threat[a]	"Learning that I am at high risk for [disease] would be threatening"	1 = *strongly disagree* to 5 = *strongly agree*	196	4	.86	3.20 (.96)
Perceived Probability of Receiving Unwanted Information[a]	"If you received your risk calculator results right now, how likely do you think it is that you would learn something you would rather not know?" "If you received your risk calculator results right now, what do you think is the probability that you would learn something you would rather not know from 0-100%?"	1 = *not at all* to 5 = *extremely likely* 0-100% *on a sliding scale*	192	2	.71	0.00 (1.00)
Health-Related Predictors						
Comparative Risk Perception[b]	"Compared to the average person my age and gender, I believe that my risk for [disease] is…"	1 = *significantly lower* to 9 = *significantly higher*	193	1	-	4.90 (2.07)

			N		α	M (SD)
General Self-Rated Health[b]	"In general, would you say your health is…"	1 = *poor* to 5 = *excellent*	194	1	-	3.20 (.99)
Health Regulatory Focus[a]	*Prevention focus*: "I often worry that I am not doing the best I can to improve my health"	1 = *strongly disagree* to 5 = *strongly agree*	194	12	.90	3.30 (1.02)
	Promotion focus: "Doing healthy things gives me a sense of accomplishment"				.79	3.96 (.57)
Personality Predictors						
Big-5 Personality Traits	*"I see myself as…"*					
	Extraversion[b]: "extraverted, enthusiastic"				.62	2.59 (1.11)
	Conscientiousness[b]: "dependable, self-disciplined"	1 = *strongly disagree* to 5 = *strongly agree*	195	10	.33	4.00 (.91)
	Emotional Stability[a]: "calm, emotionally stable"				.58	3.43 (1.17
	Openness[b]: "open to new experiences, complex"				.72	3.78 (.87)
	Agreeableness[b]: "sympathetic, warm"				.38	3.87 (.85)
Optimism[a]	"I see myself as optimistic"	1 = *strongly disagree* to 5 = *strongly agree*	195	1	-	3.52 (1.14)
Pessimism[a]	"I see myself as pessimistic"	1 = *strongly disagree* to 5 = *strongly agree*	195	1	-	2.71 (1.19)
Self-Esteem[a]	"I have high self-esteem"	1 = *strongly disagree* to 5 = *strongly agree*	204	1	-	3.27 (1.16)
Socially Desirable Responding[b]	"I'm always willing to admit it when I make a mistake"	1 = *true* 0 = *false*	195	13	.78	5.47 (3.12) out of 13
Intolerance of Uncertainty[a] (Prospective Anxiety)	"Unforeseen events upset me greatly"	1 = *strongly disagree* to 5 = *strongly agree*	194	5	.86	3.14 (.86)

Note. [a]Convergent validity items. [b]Discriminant validity items.

Disutility of Learning Disease-risk feedback

To measure overall perceived disutility of learning disease-risk feedback, all participants responded to three items developed for the present study asking about the extent to which they feel learning about their disease risk might be useful or onerous to them. Participants indicated their agreement with statements such as "Learning my risk for [disease] could have many negative consequences" (1 = *strongly disagree*, 5 = *strongly agree*). I computed the mean of the items to create an overall index of disutility ($\alpha = .74$; $M = 1.97$, $SD = .79$).

(Lack of) Resources for Learning Disease-risk feedback

To measure perceived (lack of) resources for dealing with disutility of learning disease-risk feedback, all participants responded to four items developed for the present

study asking about the extent to which they feel they have sufficient material, personal-psychological, social, and informational resources to learn bad news about their risk for disease. For instance, participants indicated their agreement with statements such as "If I learn bad news about my risk for [disease], I would have enough material resources (e.g., money, health insurance) to effectively cope" (1 = *strongly disagree*, 5 = *strongly agree*). I computed the mean of the four items to create an overall index of lack of resources (α = .81; M = 2.07, SD = .80).

Decision to Avoid Disease-risk feedback

As in Study 1, all participants selected from one of two options in the online disease risk calculator: "Yes, please give me my risk for [disease]" (learning) or "No, I do not want to learn my risk for [disease]" (avoiding). To ensure that their response represented an active decision, the "Yes" option to learn risk results was pre-selected so participants had to actively change the response to avoid.

Analyses

The analyses consisted of bivariate correlations to examine the convergent and discriminant validity of the 2-item measure of unwantedness of information and path analyses comparing two structural equation models. Specifically, I examined correlations between unwantedness of disease risk information and: 1) perceived probability of receiving unwanted information, 2) psychological threat, 3) comparative disease risk perception, 4) socially desirable responding, 5) personality traits, 6) optimism/pessimism, 7) health regulatory focus, 8) self-esteem, 9) self-rated health, and 10) intolerance of uncertainty.

Next, I conducted two path analyses predicting decisions to avoid health information with unwantedness of information, perceived disutility of information, and perceived (lack of) resources for dealing with disutility of information. I compared fit indices to determine whether a model which includes both indirect and direct effects of (lack of) resources and disutility on avoidance via unwantedness had better fit than a model with direct paths from (lack of) resources and disutility to avoidance. Both models were assessed using maximum likelihood estimation. Analyses were conducted with SPSS 27 and model estimations in the path analyses were conducted with AMOS 4.0 (Arbuckle, 2011).

Study 2 Results

Decision to Avoid Disease-risk feedback

Overall, 10.9% of participants avoided learning their comparative risk for disease. Table 4 presents the frequency of information avoidance as a function of risk calculator. Frequency of avoidance, ORs = .69-1.59, $p \geq$ .42, CI$_{95\%}$ lower limit = .18-.51, CI$_{95\%}$ upper limit = 2.61-4.94, did not significantly differ as a function of risk calculator. As expected and unlike in Study 1, unwantedness of information—diabetes (M = 2.23, SD = .95), lung cancer (M = 2.24, SD = .74), melanoma skin cancer (M = 2.18, SD = .97), prediabetes (M = 2.26, SD = 1.19), stroke (M = 2.33, SD = 1.15)—did not significantly differ as a function of risk calculator.

Convergent and Discriminant Validity

Results from the bivariate correlation test are presented in Table 7. As predicted, unwantedness of disease-risk feedback was positively correlated with perceived psychological threat, perceived probability of receiving unwanted information, and

 pessimism. Also in line with my predictions, unwantedness of information was negatively correlated with health promotion focus, optimism, self-esteem, and emotional stability, and it was not significantly related to comparative disease risk perceptions, self-rated health, extraversion, or openness.

Table 7.
Convergent and discriminant validity of the 2-item measure of unwantedness.

Predictor	Unwantedness
	r [95% CI]
Information-Related Predictors	
Perceived Probability of Unwanted News[a]	**.42 [.30, .53]**
Psychological Threat[a]	**.27 [.14, .40]**
Health-Related Predictors	
Risk Perception[b]	.09 [-.05, .23]
General Self-Rated Health[b]	-.07 [-.21, .07]
Health Promotion Focus[a]	**-.35 [-.46, -.21]**
Health Prevention Focus[a]	.11 [-.04, .24]
Personality Predictors	
Extraversion[b]	.03 [-.11, .17]
Agreeableness[b]	**-.22 [-.35, -.08]**
Conscientiousness[b]	**-.29 [-.41, -.15]**
Emotional Stability[a]	**-.23 [-.36, -.09]**
Openness[b]	-.07 [-.21, .07]
Optimism[a]	**-.25 [-.38, -.11]**
Pessimism[a]	**.25 [.12, .38]**
Self-Esteem[a]	**-.16 [-.29, -.03]**
Intolerance of Uncertainty[a]	.05 [-.09, .19]
Socially Desirable Responding[b]	**-.16 [-.29, -.02]**

Note. Bold items denote significance at $p < .05$. [a]Convergent validity items. [b]Discriminant validity items.

The Indirect Effect of Unwantedness of Information

Standardized estimates of effects in the alternate (direct effect) path model are presented in Figure 1. In the alternate model, direct effect estimates ranged from -.08 from (lack of) resources to unwantedness of information to .42 from unwantedness of information to information avoidance. All estimates were significant at the $p < .001$ level, with the exception of the estimate from (lack of) resources to unwantedness of information, which was not significant ($p = .22$).

Standardized estimates of effects in the hypothesized path model are presented in Figure 2. In the hypothesized model, estimates ranged from -.11 between (lack of) resources to unwantedness of information to .47 from disutility to unwantedness of information. All direct effect estimates were significant at the $p \leq .01$ level with the exception of the estimate from (lack of) resources to information avoidance, which was not significant ($p = .18$). The indirect effect estimates of disutility ($b = .20$) and (lack of) resources ($b = .12$) were also significant ($p = .01$).

To examine whether the hypothesized model fit the data better than did the

alternate model, I assessed the comparative fit index (CFI) and Tucker-Lewis index (TLI) values, where higher values indicate better fit and desired fit is $\geq$ .90 (Bentler, 1990). I also compared the root mean square error of approximation (RMSEA) and the Akaike information criterion (AIC) values, where smaller values indicate better fit (Bentler, 1990). As compared to the alternate model with direct paths from disutility and (lack of) resources to avoidance (χ^2 = 170.40, df = 32, p < .001, CFI = .86, TLI = .80, RMSEA = .13, AIC = 236.39) the hypothesized model which included both direct and indirect paths from disutility and (lack of) resources to avoidance via unwantedness (χ^2 = 85.62, df = 30, p < .001, CFI = .94, TLI = .91, RMSEA = .08, AIC = 135.62) fit the data better according to every metric ($\Delta\chi^2$ = -84.78, Δdf = 2, p < .001, ΔCFI = .08, ΔTLI = .11, ΔRMSEA = -.05, ΔAIC = -100.77, p < .001).
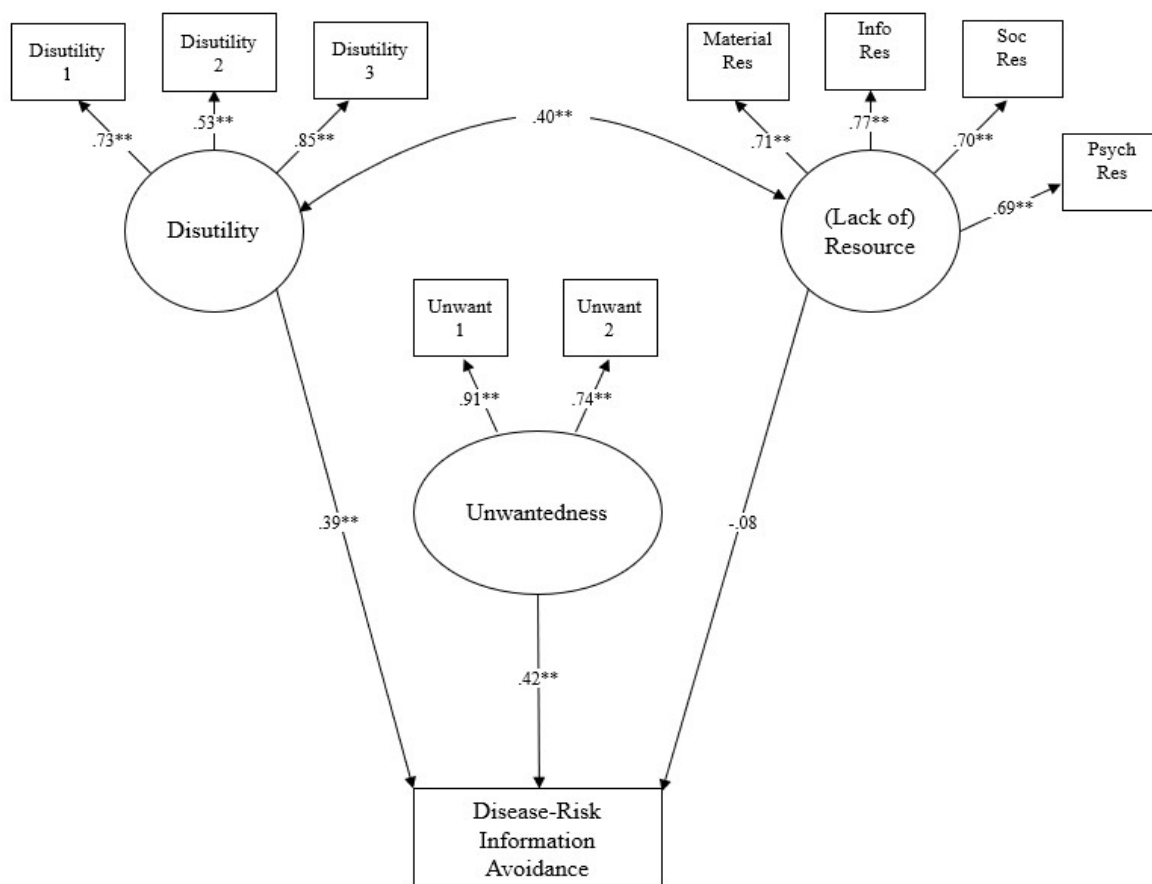
Figure 7.

Standardized effect estimates for the alternate (direct effects) path model. Disutility1-3: three items measuring perceived disutility of learning disease-risk feedback; Material res: item measuring lack of material resources; Info res: item measuring lack of informational resources; Social res: item measuring lack of social support resources; Psych res: item measuring lack of personal psychological coping resources; Unwant1-2: two items measuring unwantedness of disease-risk feedback. **p < .001.
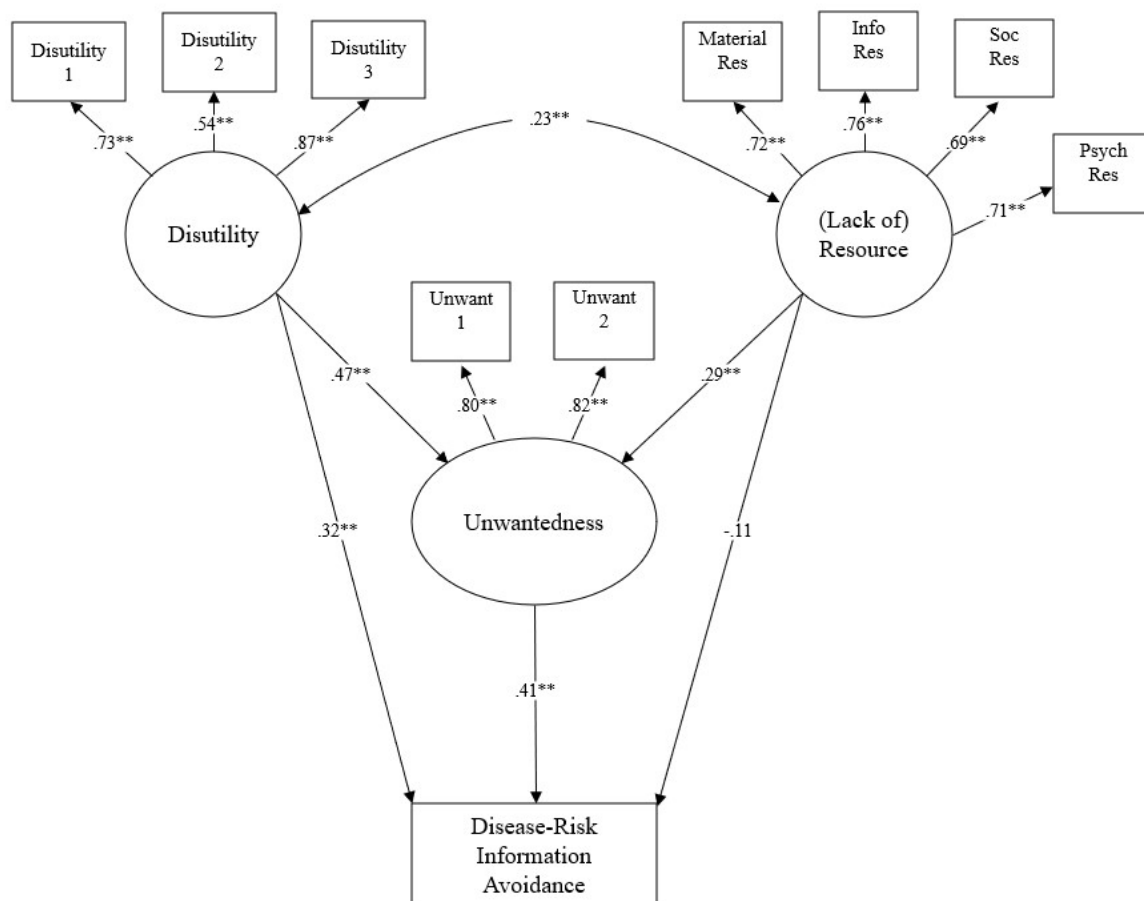
Figure 8.

Standardized effect estimates for the hypothesized (indirect and direct effects) path model. Disutility1-3: three items measuring perceived disutility of learning disease risk information; Material res: item measuring lack of material resources; Info res: item measuring lack of material resources; Social res: item measuring lack of social support resources; Psych res: item measuring lack of personal psychological coping resources; Unwant1-2: two items measuring unwantedness of disease risk information. **$p < .001$.

Study 2 Discussion

Taken together, the findings from Study 2 supported my predictions. A face-valid, 2-item measure of unwantedness of information generally showed expected convergent and discriminant validity, with some exceptions. Moreover, the hypothesized path model adding indirect paths to information avoidance from disutility and (lack of) resources via unwantedness had overall better fit than an alternate model with only direct paths. In the hypothesized model, disutility from learning one's risk for disease and (lack of) resources for dealing with the disutility of learning one's risk for disease was positively associated with unwantedness of disease-risk feedback. In turn, unwantedness of disease-risk feedback was positively associated with disease-risk feedback avoidance. These results indicate that unwantedness of information likely does, indeed, represent a variable through which disutility and resource factors relate to avoidance of disease-risk feedback. Notably, the relationships examined here were correlational and the measures of perceived disutility and (lack of) resources were developed for the present study as there are no validated measures of these constructs in the literature. Thus, experimental work which utilizes established measures of disutility and (lack of) resources is needed to confirm these findings.

Although perceived disutility had a significant indirect effect on avoidance via unwantedness as expected, the direct effect of disutility on avoidance was still significant, indicating that unwantedness only partially mediated this relationship. Perhaps this implicates the presence of other factors in the relationship between disutility and information avoidance that were not accounted for in the present study. For instance, some research suggests that people who expect information to be unpleasant are more likely to avoid such news (Sweeny et al., 2010). Unwantedness of information is theoretically independent of these expectations, as some people may want to know information that is unpleasant (e.g., their risk for disease) or not want to know information that is pleasant (e.g., the happy ending to a book they are reading). Therefore, it is possible that the prevailing direct effect of disutility on avoidance in the present study reflected a combination of perceived disutility of unpleasant news and expectations for receiving unpleasant news which positively predicted avoid behavior, regardless of the (un)wantedness of that information.

Some unexpected findings emerged in the relationships between the 2-item measure of unwantedness and the measures for examining convergent and discriminant validity. First, unwantedness of disease-risk feedback was not related to health prevention focus. Health prevention focus represents an orientation toward health goals that is motivated by preventing negative health consequences (Ferrer et al., 2017) and knowing information about one's risk for disease is a potential strategy for preventing future negative health consequences. However, health prevention focus is also characterized by worry and anxiety (Ferrer et al., 2017)—both of which are linked to greater information avoidance (Chae, 2016; Persoskie et al., 2013). Thus, it is possible health prevention-focus pulls people in two competing directions regarding unwantedness: toward wanting to know their risk for disease because of their motivation to avoid negative health outcomes and trying to avoid the anxiety that will come when faced with their risk for disease.

Also unexpectedly, unwantedness of disease-risk feedback was negatively

 correlated with agreeableness, conscientiousness, and socially desirable responding. Past research suggests that conscientiousness predicts improved health and longevity, particularly by engendering health promoting behavior (Friedman et al., 1995; Kern & Friedman, 2008). As such, it is perhaps not surprising that it relates negatively to unwantedness, even though I did not include it as a convergent predictor.

Additionally, it is perhaps unsurprising that unwantedness of information was negatively correlated with socially desirable responding and positively correlated with agreeableness. Agreeableness has been linked to greater empathy and prosocial behavior (e.g., Butrus & Witenberg, 2013). As such, it is possible that people who are higher in agreeableness have more interpersonal resources and, thus, lowered unwantedness of information. Further, participants' tendencies to produce socially desirable and socially positive responses to surveys is well-documented in psychological research and has been demonstrated to be present with other health-related measures (Krumpal, 2013). Nevertheless, researchers wishing to measure unwantedness absent agreeableness and social desirability should consider whether it makes sense to develop an indirect or implicit measure of unwantedness. A related measure has been used in past research (Howell et al., 2016). Specifically, researchers have once used a speeded-self-report measure of people's information avoidance preferences. The measure requires participants to rapidly indicate how positively they find items that flash on the screen (Ranganath et al., 2008). Items such as "learning my risk for diabetes" could be adapted and researchers might ask participants to rapidly indicate how wanted or unwanted people find various types of information.

Finally, unwantedness of disease-risk feedback was not related to intolerance of uncertainty. Although past research suggests that people who are intolerant of uncertainty engage in more health information seeking (Rosen et al., 2007) and less avoiding (Howell & Shepperd, 2016), some evidence suggests that people who are intolerant of uncertainty are also more prone to anxiety (Gentes & Ruscio, 2011). As such, this lack of relationship might suggest that some people who are intolerant of uncertainty do not want to know their risk for disease because knowing could produce anxiety (e.g., about mortality). At the same time, some people who are intolerant of uncertainty might want to know their risk for disease because knowing could reduce their uncertainty.

Despite the unexpected findings, I believe that the 2-measure of unwantedness of information still demonstrates reasonable convergent and discriminant validity. Consistent with recommendations from previous research on construct validity, the majority of measures that were used for examining the convergent and discriminant validity represented previously established constructs (Piedmont, 2014). Furthermore, past research suggests that an important criteria for determining discriminant validity is that correlations with scores on discriminant measures are noticeably lower than correlations with scores on convergent measures (e.g., Hubley, 2014). Indeed, the correlations for discriminant validity in the current study ranged from .03 between extraversion and unwantedness to -.29 between conscientiousness and unwantedness. By contrast, the correlations for convergent validity ranged from .16 between intolerance of uncertainty and unwantedness to .42 between perceived probability of receiving unwanted news and unwantedness.

Study 3

Study 2 found that a 2-item measure of unwantedness of information demonstrated reasonable convergent and discriminant validity. Furthermore, disutility and (lack of) resources predicted greater unwantedness of information, which then predicted avoidance of disease-risk feedback.

In Study 3, I tested the efficacy of two manipulations in increasing unwantedness of health information and examined the causal link between unwantedness of disease-risk feedback and information avoidance. Specifically, I developed two manipulations targeting unwantedness of learning disease-risk feedback.

For my first manipulation, I chose to emphasize the lack of treatment for a disease. Indeed, research suggests that when people perceive they lack control over disease outcomes, they are more likely to avoid learning their risk for disease (Katavić et al., 2016; Melnyk & Shepperd, 2012). Relatedly, research consistently demonstrates that people are more likely to avoid learning their risk when a disease is described as untreatable versus treatable (Dawson et al., 2006; Howell & Shepperd, 2013). This research also suggests that people do so because describing a disease as untreatable (rather than treatable) increases the perceived value of avoidance and decreases the perceived value of learning information—a process I believe represents a change in the unwantedness of learning that information (Howell & Shepperd, 2013). As such, I predicted that a manipulation to emphasize lack of treatment for disease would spur unwantedness of disease-risk feedback.

For my second manipulation, I chose to create an obligation for behavior. Evidence suggests that people are more likely to avoid learning about their risk for disease when doing so might necessitate onerous or unwanted behavior such as receiving an unpleasant exam or taking long-term medication (Howell & Shepperd, 2013e). Importantly, a qualitative study found that some people do not want to know information about their health when they believed it might require them to seek medical attention and impede their normal activities (e.g., playing sports while injured; Barbour et al., 2012). Thus, I predicted that increasing the obligation associated with learning that one is at high-risk should similarly increase unwantedness of such information.

In Study 3, my primary aim was to examine whether these two manipulations—of treatability and behavioral obligation—that have been previously tied to health information avoidance—would influence unwantedness and thereby indirectly influence information avoidance. I also changed the measure of information avoidance in Study 3, as it is possible that the measures of avoidance in Studies 1 and 2 assessed unwantedness of information. Specifically, I previously characterized those participants who selected the option, "No, I *do not want* to learn my risk for [disease]," as avoiding. However, upon reflection, I realized this language might capture unwantedness of disease-risk feedback in addition to avoidance, artificially inflating the relationship between unwantedness and avoidance. Thus, I opted to change the language in my measure of avoidance for Study 3.

In this study, I also aimed to ensure that the effects of unwantedness on avoidance were not due to measurement order. Specifically, it is possible that measuring unwantedness before avoidance might prompt people to avoid (or not) to maintain consistency with their prior self-reports. Similarly, measuring unwantedness after avoidance might prompt people to report unwantedness based on their prior behavior. As

such, I randomized the order of the measures of avoidance and unwantedness to ensure that the relationships observed were not influenced by the order in which the measures appeared relative to one another. Put another way, counterbalancing the order of the unwantedness and avoidance measures allowed me to observe direct effects of the experimental conditions on unwantedness and avoidance absent of effects of the other measure.

Participants and Procedure

Participants included 448 adults who were 18 years old or older (M_{age} = 41.83 years, SD_{age} = 15.45 years; 63.3% Female, 33.9% Male, 2.8% Missing/Other; 76.6% White, 6.5% Hispanic/Latino/a/x, 5.1% East Asian, 4.9% Black, 1.1% South Asian, 5.8% Missing/Other) recruited via Prolific.co to participate in an 8-minute online study in exchange for $1.00. Because my aims were to test the indirect effect of condition on avoidance via unwantedness, the direct effect of condition on avoidance, as well as the potential interaction between the order of the measures and condition, I conducted three power analyses. For the indirect effect of condition on avoidance via unwantedness, an priori power analysis using a Monte Carlo simulation indicated that a sample of 50 participants per condition was required to detect the indirect effect of r = .12 with power set to 1-B = .80 and an alpha of .05 (Schoemann et al., 2017). For the direct effect of condition on avoidance, an a priori power analysis suggested that a sample of 96 participants per condition was required to detect a difference of .20 between two independent proportions with power set to .80 and an alpha of .05. For the direct effect of measure order and condition on unwantedness, an a priori power analysis suggested that a sample of 129 participants per condition was needed to detect an effect of f = .14 with power set to .80 and alpha of .05. Given these results from the power analyses, I decided to collect data from 450 participants to ensure power to detect all effects.

After providing informed consent, participants were randomly assigned to one of three conditions: *untreatable, behavioral obligation*, or *control* before watching an informational video about a novel (fictitious) disease known as thioamine acetylase (TAA) deficiency (Jemmott et al., 1986). I included a single control condition to which both experimental conditions could be compared to optimize the expense of resources, consistent with optimal design principles (see McClelland, 1997). I opted to use a fictitious disease in this study to ensure that the effects I observed were not due to other factors such as family history or prior knowledge of disease. Indeed, researchers have successfully used the TAA deficiency paradigm to examine avoidance of health information in past work (e.g., Howell & Shepperd, 2012, 2013a).

Participants in the *untreatable* condition watched a video which emphasized the lack of treatment for TAA deficiency (https://youtu.be/H5rckl1HRrA) while participants in the *control* and *behavioral obligation* conditions watched a video which emphasized the availability of treatment for TAA deficiency (https://youtu.be/P9z1TK6mjQc). Scripts for both videos appear in Appendix C. To ensure that participants paid attention to the key manipulation in the video, they first read a warning that a video would be played and were asked to confirm that they were ready to watch a video with sound. Once proceeding to the next screen, the video auto-played. The video included subtitles and participants had the option to access and view the entire video transcript as the video played. Before they could proceed, they had to answer three factual questions about the

video (i.e., regarding the prevalence of TAA deficiency, the symptoms of TAA deficiency, and whether TAA deficiency was treatable). If they answered any of these questions incorrectly, they were directed back to the video with the video transcript automatically displayed (though they could minimize it), told which answers were incorrect, and asked to watch the video again to obtain the correct answer. This process repeated once more. Participants who did not provide the correct answers the third time would have been kicked from the study for not paying attention; this did not happen to any of our participants.

Next, all participants completed a (fictitious) risk calculator for TAA deficiency and were faced with a decision to either view or forego their comparative risk for this disease. Just prior to the decision, participants in the *behavioral obligation* condition were told that if they responded "yes" to learning their risk for TAA deficiency, they would be required to provide a date and time which they would be available to speak with a doctor and that they were highly recommended to actually book an appointment if they tested at high risk. In contrast, participants in the *untreatable* and *control* conditions were told that if they responded "yes" to learning their risk for TAA deficiency, they would be highly recommended to think about (but not required to provide) a date and time they are available to speak with a doctor if they tested at high risk. These manipulations also included a screenshot of what their decision to avoid would look like, emphasizing the appointment calendar in the obligation condition. To confirm that participants detected the obligation manipulation, those in the *behavioral obligation* condition were asked to indicate whether the statement "If I choose to receive my risk, I will be asked to provide a date and time for a potential appointment" was "True" or "False." If they indicated "False," they would have been redirected to a page reinforcing the manipulation. However, no participant selected "False," and this page was never shown.

Next, participants completed, in a counterbalanced order, the decision to avoid and the two-item measure of unwantedness. Figures 5 and 6 provide screenshots of the decision question for each of the conditions. Afterward, all participants completed additional demographic questions and were fully debriefed. All procedures were approved by the university's Institutional Review Board and the study was pre-registered at https://osf.io/nruk6/. A complete list of measures is presented in Appendix C.

Figure 9.
Information avoidance decision question for participants in the control and untreatable conditions.

Figure 10
Information avoidance decision question for participants in the behavioral obligation condition.

Measures

Unwantedness of Disease-risk feedback (Manipulation Check)

As in Studies 1 and 2, participants completed the 2-item measure of unwantedness of disease-risk feedback. Specifically, participants indicated their agreement with the statements "Right now, I would rather not know my risk for TAA deficiency" and "I want to know my risk for TAA deficiency immediately" (1 = *strongly disagree*, 5 = *strongly agree*). I computed the mean of the two items to create an overall index of unwantedness ($r = .79$; $M = 2.33$, $SD = 1.21$).

Decision to Avoid Disease-risk feedback

To measure avoidance, participants selected from one of two options in the online disease risk calculator: "Yes, please show me my risk for TAA deficiency" (learning) or "No, please do not show me my risk for TAA deficiency" (avoiding). To ensure that their response represented an active decision, the "Yes" option to learn risk results was pre-selected so participants had to actively change the response to avoid.

Analyses

Consistent with my preregistration, I excluded data for 15 participants who failed an attention check at the end of the study asking them to indicate whether treatment was available for TAA deficiency. The final sample consisted of 448 participants. To examine the effect of the manipulations on unwantedness of disease-risk feedback, I conducted two independent-samples t-tests comparing unwantedness between: 1) the *untreatable* and *control* conditions, and 2) the *behavioral obligation* and *control* conditions. To determine whether information avoidance differed as a function of condition, I conducted two chi-square tests examining differences in proportion of avoidance between the: 1) *untreatable* and *control* conditions, and 2) *behavioral obligation* and *control* conditions. I predicted that participants in the *untreatable* and *behavioral obligation* conditions would report significantly greater unwantedness of their risk for TAA deficiency and avoid learning their risk for TAA deficiency more often than would participants in the *control* condition. Additionally, using Hayes' PROCESS Macro (Model 4) for SPSS (version 3.5.2; Hayes, 2012), I examined the indirect effect of condition on avoidance via unwantedness. All analyses were conducted with SPSS version 27.

Study 3 Results

Unwantedness of Disease-risk feedback

As predicted, participants in the *behavioral obligation* condition reported significantly greater unwantedness of disease-risk feedback ($M = 2.97$, $SD = 1.28$) than did those in the *control* condition ($M = 2.09$, $SD = 1.09$), $t(1, 298) = -6.41$, $p < .001$, $d = -.74$, CI$_{95\%}$ [-.97, -.51]. However, there was no significant difference in unwantedness between participants in the *untreatable* ($M = 1.97$, $SD = 1.00$) and *control* conditions ($M = 2.09$, $SD = 1.09$), $t(1, 298) = 1.03$, $p = .30$, $d = .12$, CI$_{95\%}$ [-.11, .35]. Neither of these effects were moderated by order of presentation of the avoidance and unwantedness measures, obligation: $F(1,296) = 0.36$, $p = .55$, $_{partial}\eta^2 = .001$; treatability: $F(1,301) = 0.01$, $p = .94$, $_{partial}\eta^2 = .000$.

Disease-risk feedback Avoidance Across Conditions

Overall, 29.7% of participants avoided learning their risk for TAA deficiency. As predicted, participants in the *behavioral obligation* condition avoided learning their risk for TAA deficiency significantly more often (65.5%) than participants in the *control*

condition (14.3%), $X^2 = 83.04$, $p < .001$, $\varphi = .52$, CI$_{95\%}$ [.44, .60]. Contrary to my predictions, participants in the *untreatable* condition (9.6%) and the *control* conditions (14.3%) did not differ in avoidance, $X^2 = 1.57$, $p = .21$, $\varphi = -.07$, CI$_{95\%}$ [-.18, .04]. Neither of these effects were moderated by order of presentation of the avoidance and unwantedness measures, obligation: $b = 0.36$, $p = .13$, $OR = 2.55$, CI$_{95\%}$ [0.77, 7.79]; treatability: $b = 0.67$, $p = .36$, $OR = 1.96$, CI$_{95\%}$ [0.46, 8.30].

Indirect effect of Condition on Avoidance via Unwantedness

Model estimation for the indirect effect included 5000 bootstrapped samples. As expected, the *behavioral obligation* condition increased unwantedness relative to the *control* condition, $b = 0.87$, CI$_{95\%}$ [.61, 1.14], $p < .001$, and this unwantedness related to increased avoidance, $b = 1.58$, CI$_{95\%}$ [1.20, 1.96], $p < .001$, suggesting a significant positive indirect effect of the *behavioral obligation* condition on avoidance via unwantedness, $b = 1.38$, Bootstrapped CI$_{95\%}$ [0.90, 2.05].

Given the lack of main effects it is perhaps unsurprising that there was no indirect effect of the *untreatable* condition on avoidance: untreatable→unwantedness: $b = -.13$ CI$_{95\%}$ [-0.36, 0.11], $p = .30$; indirect effect: $b = -.22$, Bootstrapped CI$_{95\%}$ [-0.70, 0.22], though there was a clear relationship between unwantedness and avoidance: $b = 1.79$, CI$_{95\%}$ [1.29, 2.28], $p < .001$.

Importantly, unwantedness related to avoidance in all conditions (Obligation: $r_{pb}(145) = .61$, CI$_{95\%}$ [.50, .70]; Untreatable: $r_{pb}(153) = .61$, CI$_{95\%}$ [.50, .70]; Control: $r_{pb}(150) = .56$, CI$_{95\%}$ [.44, .66] all $ps < .001$), suggesting that the relationship between unwantedness and avoidance observed in Studies 1 and 2 was not due to the fact that the avoidance measure might have been tapping unwantedness.

Study 3 Discussion

The results from Study 3 revealed that a behavioral obligation manipulation to increase unwantedness of disease-risk feedback was successful, such that participants who were required to provide a date and time for a (hypothetical, non-binding) appointment when they chose to learn their risk for TAA deficiency reported significantly greater unwantedness of that information and, in turn, avoided that information significantly more often than those who were not required to provide a date and time when they chose to learn their risk. This finding is in line with past work on behavioral obligation and avoidance, which suggests that people are more likely to avoid information to the extent that they believe it will necessitate undesired behavior (Howell & Shepperd, 2013e).

Contrary to my predictions, the non-treatability manipulation was not successful in increasing unwantedness of disease-risk feedback nor avoidance: participants who watched a video emphasizing lack of treatment for TAA deficiency did not differ from those in the control condition in their unwantedness of disease-risk feedback nor their avoidance of that information. This finding is contrary to several earlier studies implicating lack of controllability in avoidance (e.g., Dawson et al., 2006; Katavić et al., 2016; Melnyk & Shepperd, 2012; Ferrer et al., 2015; Yaniv et al., 2004). One possible reason the expected effect was not detected could be due to the inclusion of discussion regarding symptom management in the video for the *untreatable* condition. Specifically, although the video in the *untreatable* condition emphasized the lack of a treatment for TAA deficiency, it also stated that people who have TAA deficiency can "manage their

symptoms," even though it is not treatable. Participants may have felt that, because the symptoms of the disease were manageable, they still had some control over their disease outcomes, and thus did not differ in unwantedness nor avoidance as compared to participants in the *control* condition. As such, further research is needed to examine whether disease treatability affects unwantedness of disease-risk feedback and avoidance.

Finally, as with utility in Study 2, unwantedness only partially mediated the relationship between behavioral obligation of learning disease-risk feedback and avoidance of disease-risk feedback. This suggests that the manipulation likely influenced factors aside from unwantedness. For example, some research suggests that ease of obtaining information plays a role in avoidance behavior, such that people are more likely to avoid information to the extent that they feel it is difficult to obtain (Sweeny et al., 2010). In the present study, it is possible that the behavioral obligation manipulation increased perceptions of difficulty in obtaining information in addition to unwantedness of the information, thus leading to avoidance without changing the unwantedness of the information.

General Discussion

Three studies examined the role of unwantedness of information in decisions to avoid health information. First, findings from Study 1 suggested that a brief 2-item measure of unwantedness of information demonstrated good reliability and predictive validity. Moreover, the measure of unwantedness predicted decisions to avoid disease-risk feedback even while controlling for individual differences in health information avoidance behavior, providing initial evidence for the conceptual distinction between unwantedness of information and avoidance behavior itself. Findings from Study 2 further supported the brief 2-item measure demonstrating—with some exceptions—convergent and discriminant validity. Moreover, it showed that disutility and (lack of) resources both predict information avoidance indirectly via unwantedness of information. Finally, Study 3 tested the causal relationship between unwantedness and avoidance by testing the effect of two manipulations on unwantedness and subsequently on information avoidance. The results revealed that, compared to a control condition, when participants were obligated to provide a date and time at which they were available to speak to a doctor if they decided to learn their risk for disease, they reported significantly greater unwantedness of their disease-risk feedback, and, in turn, were more likely to avoid their feedback. An additional manipulation of treatability was unsuccessful at affecting either unwantedness or avoidance, though the relationship between unwantedness and avoidance persisted.

Taken together, the findings of these three studies support my prediction that unwantedness of information plays an important role in decisions to avoid health information. This is the first study to directly examine unwantedness as a factor in avoidance. Specifically, I proposed that a person's situational and personal factors work together to form an overarching sense of unwantedness of particular information. Consistently, a structural equation model with indirect paths from disutility and (lack of) resources to information avoidance via unwantedness showed better fit than a model with direct paths from disutility and (lack of) resources to avoidance. Further, Study 3 demonstrated that behavioral obligation influenced greater unwantedness of disease-risk feedback and, in turn, avoidance of disease-risk feedback.

The present work advances the literature on information avoidance and informs future research aimed at reducing avoidance. By providing a working definition and reliable measure of unwantedness of information that can be applied in future research on avoidance, the present work provides practical benefits for researchers in the topic area as well as a new potential focus for interventionists aiming to stem information avoidance. As demonstrated in Studies 1 and 2, the brief 2-item measure can be easily adapted to examine unwantedness of information regarding risk for numerous health conditions (e.g., stroke, lung cancer). Of course, further development of the measure might be warranted to identify additional items that might help to explain more of the variance in unwantedness and reduce the possibility of measurement error.

Importantly, the present work provides conceptual clarity between unwantedness of information and the behavior of avoiding information and points to the need for future research on health information avoidance to treat them as distinct constructs. Indeed, confirmatory factor analyses from Study 1 suggest that the unwantedness measures and the items from a past scale used to measure health information avoidance behavior reflected separate latent constructs. Nevertheless, the broad literature on information avoidance conflates unwantedness and avoidance. Multiple studies use measures of avoidance behavior which contain language that might capture (un)wantedness of information (e.g., "No, I *do not want* to know my risk… ;" e.g., Hua & Howell, 2020; Howell et al., 2016; Howell & Shepperd, 2017). The present endeavor suggests that unwantedness and avoidance behavior should be measured and considered separately. In so doing, it provides a framework to explain one critical psychological pathway by which situation and disposition relate to avoidance. At the same time, it highlights the distinction between not wanting to know something and choosing not to learn it and suggests that these differences are more than semantic.

Although the present research focused specifically on unwantedness of disease-risk feedback, unwantedness of information very likely plays a key role in decisions to avoid other types of health information. Indeed, research on avoidance of cancer information has alluded to the idea that unwantedness plays a role in avoidance in this domain as well. Several studies examining predictors of cancer information avoidance utilize a measure of avoidance which includes the item "I *do not want* any more information about cancer" (Chae, 2016; Lee & Shi, 2021; Miles et al., 2008). Thus, research in this topic area may also benefit from considering the difference between unwantedness and avoidance and examining whether the factors that have been identified as predictors of cancer information avoidance (e.g., cancer information overload; Chae, 2016) do so by influencing unwantedness of cancer information.

The present research also suggests a potential shift in the current approach to experimental work to reduce health information avoidance. Given that the majority of the literature has focused on individual situational factors, many studies have specifically been tailored to address these individual factors. Shifting the focus from these numerous specific situational and personal factors that influence avoidance toward the broader idea of unwantedness suggests alternative possibilities for reducing avoidance. Namely, rather than developing manipulations for multiple resource- and utility-related factors in several studies, researchers might seek to directly target unwantedness of information. To start, future research can determine what makes health information more *wanted*. Perhaps

offering incentives for people to learn their risk for disease may be one potential avenue for decreasing unwantedness of this information. Indeed, some evidence supports the efficacy of interventions which offer financial incentives for promoting healthy behavior change such as smoking cessation and increasing medication adherence (Kurti et al., 2016). Past interventions have offered incentives for participants to attend disease screenings, however, one review suggests that the majority of these interventions did not follow-up with participants after they attended the screening (Giles et al., 2014). As such, these participants may have attended screenings to gain incentives, but avoided their screening results nonetheless. Expanding upon these interventions to directly incentivize learning information about one's health, such as learning the results of one's disease risk screening, may help to reduce unwantedness and avoidance of such information.

Limitations and Future Directions

Although the present work represents a promising initial step to understanding the role of unwantedness of information in health information avoidance, there were some limitations that make for important future directions in research.

Some unexpected findings emerged that can be addressed. In Study 1, unwantedness of information differed between the disease risk calculators. Although there were no differences in unwantedness between the risk calculators in the smaller sample in Study 2 (i.e., a replication of Study 1), future research can seek to determine whether these results will replicate with risk information for other diseases that were not included, such as colon cancer or heart disease. In Study 2, unwantedness of information was negatively related to tendency to produce socially desirable responses. Some researchers argue that measures which correlate with social desirability scales should not be considered invalid and have criticized work which corrects scores for social desirability or excludes participants who score highly on social desirability (McCrae & Costa, 1983). Nevertheless, additional work can be done to identify unwantedness items or measures that do not correlate with socially desirable responding. For instance, others might consider developing and employing indirect measures—i.e., measures on which people cannot exert thoughtful control over their responses the way they can with traditional self-report. In Study 3, the manipulation to emphasize lack of treatment for disease did not increase unwantedness nor avoidance of disease-risk feedback. I predict that this lack of effect was due to the inclusion of a line in the script about symptom management in the video that participants viewed. Nevertheless, this finding is in contrast to several previous studies which link the lack of controllability to greater information avoidance (e.g., Katavić et al., 2016) and thus warrants further investigation and replication.

Results from the structural equation models in Study 2 as well as the mediation models in Study 3 indicate that although unwantedness predicts decisions to avoid health information, some variance in avoidance remains unaccounted for. In addition to suggesting that unwantedness is not the only predictor of avoidance behavior, it also suggests that there may be situational moderators of the relationship between unwantedness and avoidance. Indeed, past research finds that several social contextual factors can play a role in avoidance. For instance, one study found that people are more likely to avoid information to the extent that they perceive others could use that information to harm them (Lipsey & Shepperd, 2019). Thus, one can have a desire to

know their risk for disease, but ultimately avoid learning their risk because their employer might use that information to discriminate against them. Research also finds that families influence patients' medical decision-making (Ho, 2008). Thus, one might not desire to learn their risk for cancer at the doctor's office, but ultimately choose to learn due to social pressure from their family members. Another example of a situational moderator of the unwantedness-avoidance relationship is the ease of obtaining and/or interpreting information. Indeed, some studies suggest that people are more likely to avoid information when they feel it is difficult to obtain or understand (Sweeny et al., 2010). In this case, one can desire to know the information, but ultimately avoid due to unwantedness of the obstacles to learn it. For instance, someone may want to know the results of blood work, but find they do not know their password to access their records online. After unsuccessful efforts to retrieve or reset their password, they might decide not to work any longer receive the available information. In this case, avoidance behavior is driven by the barrier to receiving information, rather than their desire to (not) learn it. Future research can determine whether these situational factors moderate the relationship between unwantedness of information and information avoidance.

Another limitation of the present work is that the studies were conducted online with samples from participant recruitment platforms. The studies had strengths in that they included multiple different types of disease-risk feedback and three samples totaling nearly 2,400 participants. Further, the disease-risk calculators from Studies 1 and 2 were adapted from actual websites with publicly available disease-risk assessments. Nevertheless, future research can employ other ecologically valid designs (e.g., in primary care offices) or recruit patient samples who are at higher immediate risk for disease to examine relationships between unwantedness and avoidance.

To date, there are no validated measures of disutility of learning health information. Study 2 utilized a measure of disutility that was created for the purposes of the study. Moreover, the items from the measure assessed perceptions of overall disutility of learning disease-risk feedback as opposed to the specific hedonic and strategic disutility of learning. Although this measure of overall disutility of learning disease-risk feedback likely captured both types of disutility, research is needed to develop and validate a measure for this construct.

Study 3 examined unwantedness and avoidance of risk for TAA deficiency—a fictitious disease (Jemmott et al., 1986). The TAA deficiency paradigm has been successfully implemented in past work on health information avoidance (e.g., Howell & Shepperd, 2017) and using this paradigm ensured that the effect of unwantedness on avoidance was not confounded by other variables specific to disease, such as family history. Further, Studies 1 and 2 assessed unwantedness and avoidance of actual disease risk calculator results. Nevertheless, because the effect observed was with a fictitious disease, future research is necessary to replicate these findings to unwantedness of risk information for real diseases.

Finally, the present studies focused on momentary unwantedness of health information as well as decisions to avoid disease-risk feedback at a single time-point. However, it is likely that stable preferences to not know specific information also exist. These stable trends quite likely to affect health and future work may employ a longitudinal design to examine whether the immediate and cumulative effects of

unwantedness on avoidance might influence disease outcomes.

Conclusion

Given the numerous potential negative health implications of avoiding information about one's health such as one's risk for disease, it is important to understand the factors underlying this behavior. In the present endeavor, I proposed and tested a novel construct that mediates the relationship between a host of personal and situational factors and the decision to avoid health information: unwantedness of information—the extent to which a person does not desire information.

Studies 1 and 2 developed a brief 2-item measure of unwantedness of information, providing evidence of reliability and validity of the brief measure and applying it in multiple health domains. Study 2 offered an initial correlational demonstration that unwantedness of information mediates the relationship between both perceptions of disutility of learning health information and lack of resources for coping with the disutility of learning health information, and health information avoidance. This provided initial support for the idea that unwantedness represents a more proximal factor in decisions to avoid health information than individual factors identified in past work on avoidance. Finally, Study 3 found that a behavioral obligation manipulation increased unwantedness of information and, in turn, health information avoidance, establishing a causal link between unwantedness and avoidance. Future research aimed at understanding the factors that affect information avoidance should measure the effects of these factors on information unwantedness and interventionists interested in reducing health information avoidance should consider unwantedness of information as a potential target for intervention.

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Appendix A
Risk Calculator Screening Items

	Item(s)	Response Scale
1	Have you ever been told that you have diabetes?	
2	Have you ever had a heart attack?	1 = *yes*, 2 = *no*
3	Have you ever had any type of cancer (except for basal or squamous cell skin cancer)?	
4	What sex were you assigned at birth?	1 = *male*, 2 = *female*
5	What is your age in years?	Open-ended response
6	How tall are you? (height in feet and inches)	Open-ended response
7	What is your weight in pounds?	Open-ended response
8	Do you smoke cigarettes?	1 = *yes*, 2 = n*o- never smoked*, 3 = *no- quit*
9	How many servings of alcohol do you have on a typical day? One serving is a can of beer, a glass of wine, or a shot of hard liquor.	1 = *0*, 2 = *½*, 3 = *1*, 4 = *2*, 5 = *3*, 6 = *4 or more*
10	What race best describes you?	1 = *White or Caucasian*, 2 = *Black or African American*, 3 = *Asian American*, 4 = *American Indian or Alaska Native*, 5 = *Native Hawaiian or Pacific Islander*, 6 = *Something Else/Other*
11	Do you consider yourself to be Hispanic or Latino?	1 = *yes*, 2 = *no*

Stroke Risk Calculator

	Item(s)	Response Scale
1	Have you ever had a stroke?	
2	Do you eat 5 or more servings of fruit and vegetables a day? (A serving is one medium apple, banana, or orange; 1 cup of raw leafy vegetable (like spinach or lettuce); ½ cup of cooked beans or peas; ½ cup of chopped, cooked, or canned fruit/vegetable; or ¾ cup of fruit/vegetable juice)	1 = *yes*, 2 = *no*
3	Do you eat 3 or more servings of whole grains per day (wheat bread, whole grain pasta, brown rice, oatmeal, whole grain breakfast cereal, bran, or popcorn)? (A serving is one slice of bread, 1 ounce of breakfast cereal or ½ cup of cooked cereal, pasta, or rice)	
4	Do you walk (or do other moderate activity) for at least 30 minutes on most days or at least 3 hours per week?	

5	Have you ever been told that you have high blood pressure (hypertension) or have you ever been given blood pressure medication?	
6	Have you been told that your cholesterol level is high?	
7	Has anyone in your immediate family (mother, father, sister, brother) had a heart attack or a stroke?	
8	What is your total cholesterol level?	1 = *170 or lower, 2 = 171-199, 3 = 200-239, 4 = 240-279, 5 = 280 or higher*
9	(if *male*) Approximately what is your waist size?	1 = *40 inches (102 cm) or smaller, 2 = Greater than 40 inches (102cm)*
10	(if *female*) Approximately what is your waist size?	1 = *35 inches (88 cm) or smaller, 2 = Greater than 35 inches (88 cm)*

Melanoma Skin Cancer Risk Calculator

	Item(s)	Response Scale
1	Has your brother, sister, or parent ever had melanoma skin cancer?	
2	Do you have naturally blonde or red hair?	
3	Do you have naturally blue, green, or hazel eyes?	
4	Do you have fair skin?	1 = *yes*, 2 = *no*
5	Did you have severe, repeated sunburns as a child?	
6	Have you ever taken immunosuppressive drugs? (Immunosuppressive drugs protect the body from infection after an organ transplant)	
7	Have you ever used a tanning bed or a sunlamp?	
8	(if *yes* to #7) How old were you when you first used a tanning bed or sunlamp?	1 = *under 35 years*, 2 = *35 years or older*
9	Looking at both of your arms between your shoulders and your wrists, how many moles do you have that are at least 3 mm across (½ the width of a pencil eraser)?	1 = *0*, 2 = *1-5*, 3 = *6-10*, 4 = *11 or more*

Lung Cancer Risk Calculator

	Item(s)	Response Scale
1	Has your brother, sister or parent ever had lung cancer?	1 = *yes,* 2 = *no*
2	Have you lived with a smoker most of your life?	
3	Have you smoked one or more cigars a day for the past year?	
4	Have you lived in or near a large city for at least 10 years of your life?	
5	Have you ever worked with asbestos without adequate protection?	
6	(if *yes* to #5)What's the total amount of time you worked with asbestos without protection?	1 = *under 5 years,* 2 = *5-20 years,* 3 = *over 20 years*
7	Have you ever worked with any of these chemicals without adequate protection?: Radon, Cadmium, Chromium, Beryllium, Aluminum, Silica, Sulfuric acid mist, Bis(chloromethyl) ether and chloromethyl ether, Coke, Mustard gas	1 = *yes,* 2 = *no*
8	(if *yes* to #7) What's the total amount of time you worked with the chemical(s) without protection?	1 = *under 5 years,* 2 = *5-20 years,* 3 = *over 20 years*
9	Have you ever been involved with any of the following processes without adequate protection?: Arsenic smelting, Coal gasification, Iron or steel founding	1 = *yes,* 2 = *no*
10	(if *yes* to #9) How long were you involved with the process(es) without protection?	1 = *under 5 years,* 2 = *5-20 years,* 3 = *over 20 years*

Osteoporosis Risk Calculator

	Item(s)	Response Scale
1	(if *female*) Have you gone through menopause?	1 = *no,* 2 = *yes, before I turned 55,* 3 = *yes, after I turned 55*
2	(if *yes* to #1) Are you currently taking menopausal hormone therapy?	1 = *yes,* 2 = *no*
3	Have you ever been told that you have rheumatoid arthritis?	
4	Have you ever had a bone mineral density (BMD) test (i.e. DEXA, DPA, SPA)?	

5	(if *yes* to #4) What did your most recent bone mineral density (BMD) test show?	1 = *normal BMD*, 2 = *low BMD*, 3 = osteoporosis, 4 = do not know
6	Do you take a multivitamin 4 or more days a week?	
7	Do you eat fortified breakfast cereal or an energy bar on most days? (Most popular breakfast cereals are fortified)	
8	Do you eat green leafy vegetables (kale, greens, spinach, broccoli, cabbage or lettuce) on most days?	
9	Do you take calcium supplements on most days?	1 = *yes*, 2 = *no*
10	Do you take vitamin D supplements or calcium + vitamin D supplements on most days (apart from a standard multivitamin)?	
11	Do you walk (or do other moderate activity) for at least 30 minutes on most days, or at least 3 hours per week?	
12	How many servings of milk or dairy products do you have on most days? (One serving is a cup of milk, a cup of yogurt, or about 1.5 ounces of cheese)	1 = *less than 1*, 2 = *1-2*, 3 = *3 or more*
13	Did your mother or father ever break a bone after the age of 50?	1 = *yes*, 2 = *no*
14	(if *yes* to #13) What bone(s) did your mother and/or father break?	1 = *hip*, 2 = *other bone(s)*, 3 = *both hip and other bone(s)*
15	(if age is greater than *49.99*) After age 50, did you ever have a spine (vertebral) fracture, or break a bone after a small accident, like tripping on a walk? Please select all that apply.	1 = *yes, between age 50 and 65*, 2 = *yes, after I turned 65*, 3 = *no*
16	Have you ever taken steroid pills for a medical condition for three or more months in a row?	1 = *yes*, 2 = *no*, 3 = *do not know*

Prediabetes Risk Calculator

	Item(s)	Response Scale
1	Have you ever been told that you have high blood pressure (hypertension) or have you ever been prescribed blood pressure medication?	
2	Do you have a brother, sister, or parent who has been diagnosed with diabetes?	1 = *yes*, 2 = *no*
3	Are you physically active?	
4	(if *female*) Have you been diagnosed with gestational diabetes?	

Diabetes Risk Calculator

	Item(s)	Response Scale
1	Has anyone in your immediate family (mother, father, sister, brother) had diabetes?	1 = *yes,* 2 = *no*
2	Do you eat more than 3 servings of refined starch per day (white bread, white rice, white pasta, white potatoes, or low fiber cereals like crispy rice and corn flakes)? (A serving is one slice of bread, 1 ounce of breakfast cereal or ½ cup of cooked cereal, pasta or rice)	
3	Do you eat 3 or more servings of whole grains per day (wheat bread, whole grain pasta, brown rice, oatmeal, whole grain breakfast cereal, bran or popcorn)? (A serving is one slice of bread, 1 ounce of breakfast cereal or ½ cup of cooked cereal, pasta or rice)	
4	Do you eat an oil-based salad dressing or use liquid vegetable oil for cooking on most days?	
5	Do you walk (or do other moderate activity) for at least 30 minutes on most days or at least 3 hours per week?	
6	(if *male*) What is your waist size?	1 = *40 inches (102 cm) or smaller,* 2 = *greater than 40 inches (102 cm)*
7	(if *female*) What is your waist size?	1 = *35 inches (88 cm) or smaller,* 2 = *greater than 35 inches (88 cm)*

2-Item Unwantedness of Information

	Item(s)	Response Scale
1	Right now, I would rather not know my risk for [disease].	1 = *strongly disagree,* 2 = *disagree,* 3 = *neither agree nor disagree,* 4 = *agree,* 5 = *strongly agree*
2	I want to know my risk for [disease] immediately.	

4-Item Unwantedness of Information

	Item(s)	Response Scale
1	Right now, I would rather not know my risk for [disease].	1 = *strongly disagree,* 2 = *disagree,* 3 = *neither agree nor disagree,* 4 = *agree,* 5 = *strongly agree*
2	Right now, I would avoid learning my risk for [disease].	
3	Even if it will upset me, I want to know my risk for [disease] right now.	
4	I want to know my risk for [disease] immediately.	

6-Item Unwantedness of Information

	Item(s)	Response Scale
1	Right now, I would rather not know my risk for [disease].	1 = *strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree*
2	Right now, I would rather not know bad news about my risk for [disease].	
3	Right now, I would rather not know if I'm at high risk for [disease].	
4	I want to know my risk for [disease] immediately.	
5	I want to know bad news about my risk for [disease] immediately.	
6	I want to know if I am at high risk for [disease] immediately.	

Avoidance of Disease-Risk Feedback

	Item(s)	Response Scale
1	Based on your responses to the questions we can give you your comparative risk for [disease] at the end of this survey. Your risk will indicate whether you are at higher, lower, or at equal risk compared to the average person your age and sex assigned at birth. Do you want to know your comparative risk?	1 = *yes, please give me my risk for [disease]*, 2 = *no, I do not want to learn my risk for [disease]*

Health Information Avoidance Behavior

	Item(s)	Response Scale
1	I avoid reading things about [disease] on the internet.	1 = *does not describe me*, 2 = *somewhat describes me*, 3 = *moderately describes me*, 4 = *mostly describes me*, 5 = *completely describes me*
2	I avoid reading things about [disease] from the mass media (e.g., TV, radio, newspapers, magazines).	
3	I avoid talking about [disease] with people who are important to me.	
4	I avoid talking about [disease] with my primary health care provider.	

Appendix B

Risk Calculator Screening Items

	Item(s)	Response Scale
1	Have you ever been told that you have diabetes?	
2	Have you ever had a heart attack?	1 = *yes*, 2 = *no*
3	Have you ever had any type of cancer (except for basal or squamous cell skin cancer)?	
4	What sex were you assigned at birth?	1 = *male*, 2 = *female*
5	What is your age in years?	Open-ended response
6	How tall are you? (height in feet and inches)	Open-ended response
7	What is your weight in pounds?	Open-ended response
8	Do you smoke cigarettes?	1 = *yes*, 2 = n*o- never smoked*, 3 = *no- quit*
9	How many servings of alcohol do you have on a typical day? One serving is a can of beer, a glass of wine, or a shot of hard liquor.	1 = *0*, 2 = *½*, 3 = *1*, 4 = *2*, 5 = *3*, 6 = *4 or more*
10	What race best describes you?	1 = *White or Caucasian*, 2 = *Black or African American*, 3 = *Asian American*, 4 = *American Indian or Alaska Native*, 5 = *Native Hawaiian or Pacific Islander*, 6 = *Something Else/Other*
11	Do you consider yourself to be Hispanic or Latino?	1 = *yes*, 2 = *no*

Stroke Risk Calculator

	Item(s)	Response Scale
1	Have you ever had a stroke?	
2	Do you eat 5 or more servings of fruit and vegetables a day? (A serving is one medium apple, banana, or orange; 1 cup of raw leafy vegetable (like spinach or lettuce); ½ cup of cooked beans or peas; ½ cup of chopped, cooked, or canned fruit/vegetable; or ¾ cup of fruit/vegetable juice)	1 = *yes*, 2 = *no*
3	Do you eat 3 or more servings of whole grains per day (wheat bread, whole grain pasta, brown rice, oatmeal, whole grain breakfast cereal, bran, or popcorn)? (A serving is one slice of bread, 1 ounce of breakfast cereal or ½ cup of cooked cereal, pasta, or rice)	

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4	Do you walk (or do other moderate activity) for at least 30 minutes on most days or at least 3 hours per week?	
5	Have you ever been told that you have high blood pressure (hypertension) or have you ever been given blood pressure medication?	
6	Have you been told that your cholesterol level is high?	
7	Has anyone in your immediate family (mother, father, sister, brother) had a heart attack or a stroke?	
8	What is your total cholesterol level?	*1 = 170 or lower, 2 = 171-199, 3 = 200-239, 4 = 240-279, 5 = 280 or higher*
9	(if *male*) Approximately what is your waist size?	*1 = 40 inches (102 cm) or smaller, 2 = Greater than 40 inches (102cm)*
10	(if *female*) Approximately what is your waist size?	*1 = 35 inches (88 cm) or smaller, 2 = Greater than 35 inches (88 cm)*

Melanoma Skin Cancer Risk Calculator

	Item(s)	Response Scale
1	Has your brother, sister, or parent ever had melanoma skin cancer?	
2	Do you have naturally blonde or red hair?	
3	Do you have naturally blue, green, or hazel eyes?	
4	Do you have fair skin?	
5	Did you have severe, repeated sunburns as a child?	*1 = yes, 2 = no*
6	Have you ever taken immunosuppressive drugs? (Immunosuppressive drugs protect the body from infection after an organ transplant)	
7	Have you ever used a tanning bed or a sunlamp?	
8	(if *yes* to #7) How old were you when you first used a tanning bed or sunlamp?	*1 = under 35 years, 2 = 35 years or older*
9	Looking at both of your arms between your shoulders and your wrists, how many moles do you have that are at least 3 mm across (½ the width of a pencil eraser)?	*1 = 0, 2 = 1-5, 3 = 6-10, 4 = 11 or more*

Lung Cancer Risk Calculator

	Item(s)	Response Scale
1	Has your brother, sister or parent ever had lung cancer?	
2	Have you lived with a smoker most of your life?	
3	Have you smoked one or more cigars a day for the past year?	
4	Have you lived in or near a large city for at least 10 years of your life?	1 = *yes,* 2 = *no*
5	Have you ever worked with asbestos without adequate protection?	
6	(if *yes* to #5)What's the total amount of time you worked with asbestos without protection?	1 = *under 5 years,* 2 = *5-20 years,* 3 = *over 20 years*
7	Have you ever worked with any of these chemicals without adequate protection?: Radon, Cadmium, Chromium, Beryllium, Aluminum, Silica, Sulfuric acid mist, Bis(chloromethyl) ether and chloromethyl ether, Coke, Mustard gas	1 = *yes,* 2 = *no*
8	(if *yes* to #7) What's the total amount of time you worked with the chemical(s) without protection?	1 = *under 5 years,* 2 = *5-20 years,* 3 = *over 20 years*
9	Have you ever been involved with any of the following processes without adequate protection?: Arsenic smelting, Coal gasification, Iron or steel founding	1 = *yes,* 2 = *no*
10	(if *yes* to #9) How long were you involved with the process(es) without protection?	1 = *under 5 years,* 2 = *5-20 years,* 3 = *over 20 years*

Prediabetes Risk Calculator

	Item(s)	Response Scale
1	Have you ever been told that you have high blood pressure (hypertension) or have you ever been prescribed blood pressure medication?	
2	Do you have a brother, sister, or parent who has been diagnosed with diabetes?	1 = *yes,* 2 = *no*
3	Are you physically active?	
4	(if *female*) Have you been diagnosed with gestational diabetes?	

Diabetes Risk Calculator

	Item(s)	Response Scale
1	Has anyone in your immediate family (mother, father, sister, brother) had diabetes?	
2	Do you eat more than 3 servings of refined starch per day (white bread, white rice, white pasta, white potatoes, or low fiber cereals like crispy rice and corn flakes)? (A serving is one slice of bread, 1 ounce of breakfast cereal or ½ cup of cooked cereal, pasta or rice)	
3	Do you eat 3 or more servings of whole grains per day (wheat bread, whole grain pasta, brown rice, oatmeal, whole grain breakfast cereal, bran or popcorn)? (A serving is one slice of bread, 1 ounce of breakfast cereal or ½ cup of cooked cereal, pasta or rice)	*1 = yes, 2 = no*
4	Do you eat an oil-based salad dressing or use liquid vegetable oil for cooking on most days?	
5	Do you walk (or do other moderate activity) for at least 30 minutes on most days or at least 3 hours per week?	
6	(if *male*) What is your waist size?	*1 = 40 inches (102 cm) or smaller, 2 = greater than 40 inches (102 cm)*
7	(if *female*) What is your waist size?	*1 = 35 inches (88 cm) or smaller, 2 = greater than 35 inches (88 cm)*

Avoidance of Disease-Risk Feedback

	Item(s)	Response Scale
1	Based on your responses to the questions we can give you your comparative risk for [disease] at the end of this survey. Your risk will indicate whether you are at higher, lower, or at equal risk compared to the average person your age and sex assigned at birth. Do you want to know your comparative risk?	*1 = yes, please give me my risk for [disease]*, *2 = no, I do not want to learn my risk for [disease]*

Unwantedness of Disease-Risk Feedback

	Item(s)	Response Scale
1	Right now, I would rather not know my [disease] risk.	1 = *strongly disagree,* 2 = *disagree,* 3 = *neither agree nor disagree* , 4 = *agree* , 5 = *strongly agree*
2	I want to know my [disease] risk immediately.	

Disutility

	Item(s)	Response Scale
1	Learning my risk for [disease] has more pros than cons.	1 = *strongly disagree,* 2 = *disagree,* 3 = *neither agree nor disagree* , 4 = *agree* , 5 = *strongly agree*
2	Learning my risk for [disease] could have many negative consequences.	
3	Learning my risk for [disease] could be useful.	

(Lack of) Resources

	Item(s)	Response Scale
1	If I learn bad news about my risk for [disease], I would have enough material resources (e.g., money, health insurance) to effectively cope.	1 = *strongly disagree,* 2 = *disagree,* 3 = *neither agree nor disagree,* 4 = *agree,* 5 = *strongly agree*
2	If I learn bad news about my risk for [disease], I would be able to get all of the information I need to effectively cope.	
3	If I learn bad news about my risk for [disease], I would have enough social support resources (e.g., close friends whom I can turn to) to effectively cope.	
4	I feel confident in my ability to cope with learning bad news about my risk for [disease].	

Comparative Risk Perceptions

	Item(s)	Response Scale
1	Compared to the average person my age and gender, I believe that my risk for [disease] is:	1 = *significantly lower,* 2 = *moderately lower,* 3 = *somewhat lower,* 4 = *slightly lower,* 5 = *equal or similar,* 6 = *slightly higher,* 7 = *somewhat higher,* 8 = *moderately higher,* 9 = *significantly higher*

General Self-Rated Health

	Item(s)	
1	In general, would you say your health is...	1 = *poor,* 2 = *fair,* 3 = *good,* 4 = *very good,* 5 = *excellent*

Perceived Probability of Receiving Unwanted Information

	Item(s)	Response Scale
1	If you received your risk calculator results right now, how likely do you think it is that you would learn something you would rather not know?	1 = *not at all likely,* 2 = *slightly likely,* 3 = *somewhat likely,* 4 = *very likely,* 5 = *extremely likely*
2	If you received your risk calculator results right now, what do you think is the probability that you would learn something you would rather not know from 0-100%?	*0-100% chance I will learn something I would rather not know from the risk calculator*

Perceived Psychological Threat

	Item(s)	Response Scale
1	Learning that I am at high risk for [disease] would require a lot of time and energy to cope.	1 = *strongly disagree*, 2 = *disagree*, 3 = *neither agree nor disagree*, 4 = *agree*, 5 = *strongly agree*
2	Learning that I am at high risk for [disease] would put great demands on me.	
3	Learning that I am at high risk for [disease] would be threatening.	
4	Learning that I am at high risk for [disease] would be terrible news.	

Tendency to Avoid Health Information

	Item(s)	Response Scale
1	I would rather not know everything about my health.	1 = *strongly disagree*, 2 = *disagree*, 3 = *neither agree nor disagree*, 4 = *agree*, 5 = *strongly agree*
2	I want to know new information about my health immediately.	

Big-5 Personality Traits, Optimism, and Pessimism

	Directions: *Here are a number of personality traits that may or may not apply to you. Please indicate, with each statement, the extent to which you agree or disagree with that statement. You should rate the extent to which the pair of traits applies to you, even if one characteristic applies more strongly than the other.*	Response Scale
	Item(s)	
1	Extraverted, enthusiastic.	
2	Critical, quarrelsome.	
3	Dependable, self-disciplined.	
4	Anxious, easily upset.	
5	Open to new experiences, complex.	1 = *strongly disagree* , 2 = *disagree*, 3 = *neither agree nor disagree*, 4 = *agree*, 5 = *strongly agree*
6	Reserved, quiet.	
7	Sympathetic, warm.	
8	Disorganized, careless.	
9	Calm, emotionally stable.	
10	Conventional, uncreative.	
11	Optimistic	
12	Pessimistic	

Intolerance of Uncertainty (Prospective Anxiety Subscale)

	Directions: *Below you will find a series of statements that describe how people may react to the uncertainties of life. Please use the scale to describe to what extent each item is characteristic of you.*	Response Scale
	Item(s)	1 = *not at all characteristic of me*, 2 = *a little characteristic of me*, 3 = *somewhat characteristic of me*, 4 = *very characteristic of me*, 5 = *entirely characteristic of me*
1	Unforeseen events upset me greatly.	
2	It frustrates me not having all the information I need.	
3	One should always look ahead so as to avoid surprises.	
4	A small unforeseen event can spoil everything, even with the best of planning.	
5	I always want to know what the future has in store for me.	
6	I can't stand being taken by surprise.	
7	I should be able to organize everything in advance.	

Self-Esteem

	Item(s)	Response Scale
1	I have high self esteem.	1 = *strongly disagree*, 2 = *disagree*, 3 = *neither agree nor disagree* , 4 = *agree* , 5 = *strongly agree*

Social Desirability

	Directions: *Listed below are a number of statements concerning personal attitudes and traits. Read each item and decide whether the statement is true or false as it pertains to you.*	Response Scale
	Item(s)	1 = *true*, 2 = *false*
1	It is sometimes hard for me to go on with my work if I am not encouraged.	
2	I sometimes feel resentful when I don't get my own way.	
3	On a few occasions, I have given up doing something because I thought too little of my ability.	
4	There have been times when I felt like rebelling against people in authority even though I knew they were right.	
5	No matter who I'm talking to, I'm always a good listener.	
6	There have been occasions when I took advantage of someone.	

7	I'm always willing to admit it when I make a mistake.	
8	I sometimes try to get even, rather than forgive and forget.	
9	I am always courteous, even to people who are disagreeable.	
10	I have never been irked when people expressed ideas very different from my own.	
11	There have been times when I was quite jealous of the good fortune of others.	
12	I am sometimes irritated by people who ask favours of me.	
13	I have never deliberately said something that hurt someone's feelings.	

Health Regulatory Focus

	Item(s)	Response Scale
	Promotion Focus	
1	I frequently imagine how I can achieve a state of "ideal health."	
2	I think of good health as a key to a happy life.	
3	Doing healthy things gives me a sense of accomplishment.	
4	When I engage in healthy behaviors, I am pleased with myself.	
5	I would do anything to maintain a good, healthy body.	
6	I admire people who do things that make them very healthy.	
	Prevention Focus	1 = *strongly disagree,* 2 = *disagree,* 3 = *neither agree nor disagree ,* 4 = *agree ,* 5 = *strongly agree*
7	I often worry that I am not doing the best I can to improve my health.	
8	I often imagine myself being ill in the future.	
9	I am anxious that I am not following through on my obligations and being as responsible as I should about taking care of my health.	
10	When I see people who are very sick because they did not take care of their health, I get scared thinking that could be me in the future.	
11	I often worry about not feeling as healthy as I used to be.	
12	Thinking about my health usually makes me worry.	

Appendix C
TAA Deficiency (Fictitious) Risk Calculator

	Item(s)	Response Scale
1	What is your age?	Open-ended response
2	How many inches tall are you?	
3	What is your weight in pounds?	
4	What sex were you assigned at birth?	1 = *male*, 2 = *female*
5	Do you eat more than 3 servings of refined starch per day (white bread, white rice, white pasta, white potatoes or low fiber cereals like crispy rice and corn flakes)? A serving is one slice of bread, 1 ounce of breakfast cereal or ½ cup of cooked cereal, pasta or rice.	1 = *yes*, 2 = *no*
6	Do you eat 3 or more servings of whole grains per day (wheat bread, whole grain pasta, brown rice, oatmeal, whole grain breakfast cereal, bran or popcorn)? A serving is one slice of bread, 1 ounce of breakfast cereal or ½ cup of cooked cereal, pasta or rice.	
7	Do you usually eat butter, lard, red meat, cheese or whole milk 2 or more times per day?	
8	Do you eat oil-based salad dressing or use liquid vegetable oil for cooking on most days?	
9	How many servings of alcohol do you have on a typical day? One serving is a can of beer, a glass of wine or a shot of hard liquor.	1 = *0*, 2 = *1*, 3 = *2*, 4 = *3 or more*
10	Do you smoke cigarettes?	1 = *yes*, 2 = *no, I never smoked cigarettes*, 3 = *I used to smoke cigarettes, but I quit*
11	(if *yes* to #10) How many cigarettes do you smoke per day?	1 = *14 or fewer*, 2 = *between 15 and 25*, 3 = *more than 25*
12	Do you walk (or do other moderate activity) for at least 30 minutes on most days, or at least 3 hours per week?	1 = *yes*, 2 = *no*
13	Has anyone in your immediate family (mother, father, sister, brother) had TAA Deficiency?	

14	Which category best describes your race?	1 = *Black or African-American*, 2 = *Hispanic/Latino*, 3 = *South Asian*, 4 = *East Asian*, 5 = *American Indian/Alaskan Native*, 6 = *Native Hawaiian/Pacific Islander*, 7 = *White*, 8 = *other*

Avoidance of Disease-Risk Feedback

	Item(s)	Response Scale
1	Based on your responses to the risk calculator, we can give you your comparative risk for TAA deficiency at the end of this survey. Your risk will indicate whether you are at higher, lower, or at equal risk compared to the average person your age and sex assigned at birth.	1 = *yes, please show me my risk for TAA deficiency*, 2 = *no, please do not show me my risk for TAA deficiency*

2-Item Unwantedness of Information

	Item(s)	Response Scale
1	Right now, I would rather not know my risk for TAA risk.	1 = *strongly disagree*, 2 = *disagree*, 3 = *neither agree nor disagree*, 4 = *agree*, 5 = *strongly agree*
2	I want to know my risk for TAA deficiency immediately.	

Video Scripts
Untreatable Condition Video
This video is brought to you by UC Merced Health Services. Today we will be talking to you about a medical condition called Thioamine Acetylase deficiency, or TAA deficiency. TAA deficiency affects approximately 1 in 5 adults. Unfortunately, due to the recent extended media coverage of COVID-19, many are completely unaware about TAA deficiency and their risk for this condition. Because of this, Health Services is making an effort to educate students about TAA deficiency. What is TAA deficiency? People who have this condition have lower than normal levels of the Thioamine Acetylase enzyme production in their pancreas. TAA enzymes play an important role in our health. They help with breaking down fats, proteins, and carbohydrates—all of which are essential nutrients for cell growth and repair. TAA deficiency has serious consequences including reduced functioning of your immune system, significant loss of metabolism, heart problems, and deterioration of vital organs. Until recently, researchers had not linked low levels of the TAA enzyme to its outcomes, but now believe that it may be one of the

leading causes of serious health complications after age 35. For this reason, it is important to identify people with TAA deficiency early. Is TAA deficiency treatable? Unfortunately, at this time, there is no known cure for TAA deficiency. Scientists are trying to learn more about TAA deficiency and the only hope for people with this condition is to manage their symptoms. If you would like to learn more about TAA deficiency, please visit our website at health.ucmerced.edu or call 209-228-2273 for more information.

Behavioral Obligation Condition and Control Condition Video

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