HHS Public Access

Author manuscript

J Health Commun. Author manuscript; available in PMC 2021 November 11.

Published in final edited form as:

J Health Commun. 2014 April ; 19(4): 511–527. doi:10.1080/10810730.2013.821556.

Personal Cancer Knowledge and Information Seeking Through PRISM: The Planned Risk Information Seeking Model

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Abstract

This study retested PRISM, a model of risk information seeking, and found that it is applicable to the context of cancer risk communication. The study, which used an online sample of 928 U.S. adults, also tested the effect of additional variables on that model and found that the original model better fit the data. Among the strongest predictors of cancer information seeking were seeking-related subjective norms, attitude toward seeking, perceived knowledge insufficiency, and affective risk response. Furthermore, risk perception was a strong predictor of an affective risk response. The authors suggest that, given the robustness across studies, the path between seeking-related subjective norms and seeking intention is ready to be implemented in communication practice.

One out of four deaths in the United States is caused by cancer (American Cancer Society, 2011a). Yet, the incidence of and deaths from cancer could be decreased with more systematic efforts to increase cancer prevention and early-detection behaviors (American Cancer Society, 2011b). Two determinants of whether people act to reduce their risk are personal knowledge of cancer and seeking of cancer information (Rimal & Juon, 2010; Shim, Kelly, & Hornick, 2006), suggesting that increases in cancer risk knowledge and information seeking will improve prevention and early-detection behaviors. However, it is estimated that only 45% of Americans have sought information about cancer (Arora et al., 2007). As a result, many people likely remain unaware of the connections between lifestyle, behavior, and the risk of cancer (Viswanath, 2005).

A body of literature has evolved that provides theoretical guidance for studying health knowledge and motivators of information seeking. The present study uses Kahlor's (2010) Planned Risk Information Seeking Model (PRISM) to focus on motivators of information seeking regarding personal cancer risk. The model has been tested in the context of general health risks but not with any specific disease. To advance our theoretical understanding of

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PRISM, we also introduce and test three new variables: past information seeking, outcome expectancies for information seeking, and source-related beliefs.

Theoretical Framework

Planned Risk Information Seeking Model

PRISM (Kahlor, 2010) is an augmented version of the risk information seeking and processing model (RISP; Griffin, Dunwoody, & Neuwirth, 1999); it poses new relationships consistent with Ajzen's (1991) Theory of Planned Behavior, the Health Information Acquisition Model (Freimuth, Stein, & Kean, 1989), the Extended Parallel Processing Model (Witte, 1992), the Theory of Motivated Information Management (Afifi & Weiner, 2004), and the Comprehensive Model of Information Seeking (Johnson, 1997). PRISM maps predictors of information seeking intentions that are robust across these models.

PRISM proposes that intention to seek information is the result of an individual's perceptions of knowledge insufficiency, risk perceptions and responses, and attitudes and beliefs toward information seeking. Key PRISM variables include (a) perceived risk knowledge, (b) perceived knowledge insufficiency (perception that one currently has insufficient knowledge about a risk), (c) risk perception, (d) affective risk response (e.g., worry), (e) attitude toward information seeking, (f) perceived information seeking control (cognitive and physical ability to seek information), and (g) seeking-related subjective norms (others' expectations for one's information seeking), as shown in Figure 1. Each of these factors is theoretically related to an individual's intention to seek information about a particular risk.

When tested in the context of general health risks (Kahlor, 2010), PRISM outperformed the RISP and Theory of Planned Behavior models with all but one predicted relationship supported by the results.[1] Although PRISM has not been tested in the cancer context, its relationships are consistent with theoretical and empirical models that have predicted cancer information seeking (Beckjord, Rutten, Arora, Moser, & Hesse, 2008; Kaphingst, Lachance, & Condit, 2009; Matthews, Sellergren, Manfredi, & Williams, 2002; Miles, Voorwinden, Chapman, & Wardle, 2008; Rimal & Juon, 2010; Ross, Kohler, Grimley, Gree, & Anderson-Lewis, 2006; Shaw et al., 2008).

Expanding PRISM

Beyond testing PRISM in the cancer context, we expanded the model to include three new variables: past information seeking, seeking-related outcome expectancies, and information source beliefs (see Figure 2). Past theoretical and empirical work suggests that these variables are important predictors of attitudes and behaviors. We propose that they contribute on the front end of PRISM as predictors of attitudes toward seeking, perceived seeking control, and seeking-related subjective norms. These front end variables have not been

[1]Kahlor (2010) speculated that the lack of a relationship between knowledge insufficiency and information-seeking intention was due to the general context in which the model was tested (an individual's need for additional knowledge may not have been urgent in that context).

explored beyond the contributions they make to perceived knowledge insufficiency and seeking intention.

Past Seeking—To understand current behaviors, we must understand past behaviors (Weinstein, 2007). Furthermore, Weinstein (2007) argued that risk-aversion behaviors that are perceived as worthwhile are often behaviors performed successfully in the past, whereas risk-aversion behaviors that are perceived as not worthwhile are often behaviors not performed or performed unsuccessfully. This suggests that past behavior influences feelings of self-efficacy, which itself is a predictor of behavior. Researchers have found past behavior to significantly predict not only perceived control but also behavioral intentions, actual behaviors, attitudes and norms (Conner & Armitage, 1998; Ouellette & Wood, 1998). Millar and Shevlin (2003) also established a link between past and future information seeking behaviors. Consistent with these studies, we propose that persons with more information seeking experience will perceive greater knowledge, seeking control, seeking-related norms, and outcome expectancies (subsequently detailed), as well as more positive attitudes towards information seeking and stronger seeking intentions.

Outcome Expectancies—Expected emotional or behavioral outcomes may motivate or blunt information seeking behaviors (Case et al., 2005). For this reason, we propose the integration of outcome expectancies into PRISM, on the basis of expectancy value models such as social cognitive theory (Bandura, 1998, 2004). These theories suggest that outcome expectancies (costs and benefits of health behaviors) are important determinants of behavior alongside knowledge and self-efficacy. This idea is consistent with the Theory of Motivated Information Management (Afifi & Weiner, 2004), which proposes that people estimate costs and benefits of an information search and are more likely to seek information when benefits outweigh barriers (Afifi & Weiner, 2004). The effect of outcome expectancies on information seeking, however, might be partially mediated by efficacy (Afifi & Morse, 2009). Although Theory of Motivated Information Management results have been mixed, outcome expectancies were negatively associated with information avoidance (Afifi, Dillow, & Morse, 2004). Research has also shown that positive outcome expectancies increase cancer communication (Liu, Mok, Wong, Xue, & Xu, 2007) and seeking intention (Matthews et al., 2002). Thus, we expected seeking-related outcome expectancies to be positively related to perceived seeking control and seeking intention.

Source Beliefs—Information source beliefs are personal beliefs about sources of information (whether it is easy to access, credible, and trustworthy). The variable tested here is a reconceptualization of the channel beliefs variable included in the RISP model (Griffin et al., 1999). Subsequent RISP-related research argued that beliefs about sources are inextricably linked to beliefs about (and attitudes toward) information seeking and suggested that future RISP iterations explore this relationship (Kahlor, 2007). Therefore, we predicted information source beliefs will be positively related to attitudes toward information seeking. This is consistent with the Comprehensive Model of Information Seeking (Johnson, 1997), which suggests perceived characteristics and utility of information channels directly affect cancer information seeking. Research also shows source characteristics are associated with

attitudes toward behavior, subjective norms, and behavioral intentions (O'Hara, Netemeyer, & Burton, 1991).

Hypotheses

The first aim of this study was to test PRISM in the context of cancer risk information seeking. Predictions (Hypotheses 1–14) are presented in Figure 1. Our second aim was to test an expanded PRISM to determine whether the inclusion of three additional variables improves model fit and explained variance. Additional hypotheses (Hypotheses 15–23) are presented in Figure 2. We expected all relationships to be positive, except the negative relationship between perceived risk knowledge and knowledge insufficiency.

Method

Study Participants

Participants were recruited from an online national research panel coordinated by Clear Voice Surveys. The company maintains access to more than 4 million panelists, recruited through its website and partner websites. Participants use their own computer and earn points for participating in surveys to be redeemed for gifts. Panelists with a verified e-mail account who fit the recruitment criteria for a particular study receive a generic invitation by e-mail.

Online panels offer several advantages over traditional survey methods including greater speed in data collection, avoidance of interviewer effects (social desirability), and convenience for participants (Duffy, Smith, Terhanian, & Bremer, 2005). Online panels have been used in studies examining PRISM and risk information–seeking behavior (Kahlor, 2007, 2010) and have provided results comparable to those that employed random samples (e.g., Griffin et al., 2008; Kahlor, Dunwoody, Griffin, & Neuwirth, 2006).

To overcome sampling issues common to online panel populations (oversampling of White participants and higher income individuals), we used a purposive sampling strategy on the basis of race and ethnicity (25% African American, 25% Hispanic, 50% non-Hispanic White) and income (25% with incomes US$20,000 or less). This strategy also enhances the value of the data to researchers interested in secondary analysis focusing on these subpopulations. However, because of our focus on testing cognitive variables within PRISM, we did not pose hypotheses on the basis of participant characteristics. PRISM does not account for participant characteristics including race or socioeconomic status, which is true for the majority of information seeking theories.[2]

In February 2011, 13,528 adult panel members who met our sampling criteria were invited to participate. Of those who received the initial recruitment e-mail, which invited them to

[2]One reason for their absence is the lack of consensus in the literature regarding the theoretical rationale for their inclusion in such models (Kahlor, 2007). While it is often assumed that structural factors, such as socioeconomic status, age, or gender, will affect health behaviors via behavior-related beliefs, this assumption is relatively untested (Godin et al., 2010). In addition, the contribution of demographic variables to the prediction of information seeking and knowledge is often small (e.g., Shim, 2008; Smith-McLallen, Fishbein, & Hornick, 2011) and studies suggest that minority and low-socioeconomic populations are motivated by factors contained in PRISM (Matthews et al., 2002).

participate in an online survey, 2,253 people opened the e-mail (16.7%) and 1,508 clicked on the survey link (11.1%). This response rate was low but acceptable given that the invitation was sent to large number of people as a recruitment tool. Respondents who clicked on the link were taken to the survey, which began with an informed consent page describing the study's purpose to examine perceptions of cancer and information seeking. Among eligible persons who clicked on the survey link, 1,007 completed the survey (a completion rate of 67%). Subgroup response rates are not known.

Survey respondents ranged in age from 18 to 89 years (M = 44.70, SD = 14.38). Nearly 62% were female (n = 620), nearly 38% had a household income below $30,000 ($n$ = 380), and 74% had more than a high school education (n = 750). The sample was 49% non-Hispanic White, 26% African American, and 25% Hispanic. More than 76% reported good health (n = 761), 65% were overweight or obese (n = 655), and 30% used tobacco (n = 301). Slightly more than 50% of participants (n = 567) reported a family history of cancer, and 40% had undergone cancer screening in the past year. Because of our focus on cancer prevention, respondents who were previously diagnosed with cancer (7.2%; n = 73) were not included in the analyses.

Measures

Measures were based on previous studies using population-based samples (Kahlor et al., 2006) and online survey panels (Kahlor, 2010). We pilot-tested measures with a student population before fielding the larger survey. Descriptive statistics and correlations between model variables are reported in Table 1.

Attitude Toward Seeking—Attitude toward seeking items measured instrumental and experiential evaluations of behavior (Ajzen, 2002). We instructed respondents to "Consider words that can be used to describe information seeking about your risk for cancer" and used the following seven 10-point semantic differential pairs: worthless/valuable, bad/good, harmful/beneficial, not helpful/helpful, unproductive/productive, foolish/wise, and not useful/useful (Cronbach's α = .98).

Subjective Norms—Seeking-related subjective norms items were based on work by Ajzen (2002) and Kahlor (2010). Five items were measured on a 7-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Four items measured injunctive norms: (a) "It is expected of me that I seek information about my cancer risks," (b) "Most people who are important to me think that I should seek information about my cancer risks," (c) "Others expect me to seek information about my cancer risks," and (d) "My family expects me to seek information about my cancer risks." The fifth item measured descriptive norms: "People in my life whose opinions I value seek information about their own cancer risks" (Cronbach's α = .92).

Perceived Seeking Control—Five items measuring perceived seeking control, based on Ajzen (2002) and Kahlor (2010), captured internal control (physical and cognitive ability to seek cancer risk information) and external control (access to cancer risk information generally, not through a specific source). The following items were measured on the same

1–7 scale as were the previous items: (a) “I know where to look for information about my own cancer risks”; (b) “I know how to search for information about my cancer risks”; (c) “When it comes to information about my cancer risk, I know how to separate fact from fiction”; (d) “I can readily access all the information about my cancer risks that I need”; and (e) “When it comes to finding information about my cancer risks, I know where to go” (Cronbach’s α = .90).

Risk Perception—Cancer risk perception was measured with three items. Two assessed cancer susceptibility (e.g., “How likely is it that you will get cancer in your lifetime?”). The third item measured cancer severity (“If you were to get cancer in your lifetime, how serious would it be?”). All items were measured on a scale ranging from 0 (*not at all likely/serious*) to 100 (*very likely/serious*) scale, which was rescaled to 1–10 for consistency with other measures (Cronbach’s α = .81).

Affective Risk Response—We instructed participants: “Think about your feelings about cancer.” Measured on a scale ranging from 1 (*none of this feeling*) to 10 (*a lot of this feeling*), three items assessed the extent to which they felt worried, scared, or overwhelmed (Cronbach’s α = .92).

Perceived Risk Knowledge—Consistent with Kahlor (2010), one item was used to assess perceived knowledge of cancer risk. Participants were asked to indicate how much they currently knew about their risk of getting cancer on a scale from 0 to 100. For consistency with other measures, this item was rescaled to a 0–10 scale.

Perceived Knowledge Insufficiency—Knowledge insufficiency was conceptualized as the gap between knowledge held and knowledge needed. Consistent with previous work (Griffin, Neuwirth, Dunwoody, & Giese, 2004), it was operationalized by entering perceived risk knowledge into the structural equation model adjacent to risk knowledge needed. Unlike calculating difference scores, this technique accounts for the relationship between knowledge held and needed while calculating the contribution of knowledge needed in the model, and avoids potential reliability issues and ceiling effects (Cohen, Cohen, West, & Aiken, 2003). Consistent with past research, knowledge needed was measured with the following question: “How much do you need to know about your risk of getting cancer?” The item was rescaled from a 1–100 scale to a 0–10 scale.

Seeking Intention—Information seeking intention was measured with five items on a scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*) (Kahlor, 2010): (a) “I plan to seek information about my cancer risks in the near future,” (b) “I intend to look for information about my cancer risks in the near future,” (c) “I will try and seek information about my cancer risks in the near future,” (d) “I will look for information related to my cancer risks in the near future,” and (e) “I intend to find more information about my cancer risks soon” (Cronbach’s α = .97).

Past Seeking—Measures of past seeking were modified from Weinstein (2007). Participants stated their level of agreement with five items on a 7-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*): (a) “I have sought information about my cancer risk

in the past"; (b) "I have tried to seek information about my cancer risk in the past"; (c) "I have found information about my cancer risk in the past"; (d) "I have looked for information about my cancer risk in the past"; and (e) In the past, I have sought information about my own cancer risk" (Cronbach's α = .96).

Source Beliefs—We used 11 semantic differential pairs to assess participants' beliefs about cancer risk information sources (not specific sources or channels), which were reported on a 10-point scale. The pairs, which were based loosely on the studies by Griffin and colleagues (1999), Flanagin and Metzger (2000), Preister and Petty (1995), and Rains (2007), were as follows: accurate/inaccurate, credible/not credible, objective/not objective, up-to-date/not up-to-date, good enough/not good enough, understandable/not understandable, useful/not useful, factual/not factual, complete/incomplete, unbiased/biased, and consistent/inconsistent (Cronbach's α = .97).

Outcome Expectancies—We used four items to measure outcome expectancies and "result-based expectancies" related to the information seeking (Afifi & Weiner, 2004, p. 177). Participants were asked whether future information seeking would sadden, confuse, worry, or frighten them. Participants reported responses on a 7-point scale ranging from 1 (*strongly agree*) to 7 (*strongly disagree*) (Cronbach's α = .87). Our survey contained items intended to measure positive expectancies, but the items proved unstable in reliability and confirmatory factor analyses and were dropped from analyses.

Results

We tested both models using latent-variable structural equation modeling in Mplus 6.11 (Muthén & Muthén, 2011). A hybrid model was testedthat consisted of measurement (relationships between scale items and latent constructs) and structural components (the hypothesized relationships in the model) (Stephenson & Holbert, 2003). We used two-step modeling to verify a measurement model before adding proposed paths to test the structural model (Anderson & Gerbing, 1988; Kline, 2005). A maximum likelihood method of estimation was used. Indicators of model fit included chi-square, root mean square error approximation (RMSEA; values lower than .08), comparative fit index (CFI; values close to or greater than .95), and standardized root mean residual (SRMR; values lower than .08) (Brown & Cudeck, 1993; L. Hu & Bentler, 1999). Because of the increased statistical power due to the large sample size, several model fit indicators supplemented the chi-square goodness-of-fit test (L. Hu & Bentler, 1999).

PRISM

The measurement model included six first-order factors and 28 indicators. The unstandardized loading of the first indicator was set to 1.0, and the factors were allowed to correlate (Kline, 2005). The fit of the measurement model was good: $\chi^2(335) = 1619.432$ ($p < .01$), RMSEA = .064 (90% CI [.061, .067]), CFI = .953, SRMR=.042. All standardized factor loadings were greater than or equal to .56.

Proposed structural paths were then added to test Hypotheses 1–14. PRISM fit the data well: $\chi^2(390) = 1981.265$ ($p < .01$), RMSEA = .066 (90% CI [.063, .069]), CFI = .943,

SRMR = .095. Although SRMR was high, other fit indices were reasonable. Standardized path coefficients are reported in Figure 3. All hypotheses were supported ($p < .01$) except the relationships between perceived seeking control and knowledge insufficiency (Hypothesis 6), seeking control and seeking intention (Hypothesis 10), and attitude toward seeking and perceived risk knowledge (Hypothesis 3). PRISM explained 64% of the variance in seeking intention, 25% of the variance in perceived knowledge insufficiency, and 20% of the variance each in perceived risk knowledge and affective risk response.[3]

Expanded PRISM

To assess the expanded PRISM, a second measurement model was tested with 12 first-order factors and 47 indicators. The measurement model fit the data fairly well: $\chi^2(1,044) = 4190.335$ ($p < .01$), RMSEA = .057 (90% CI [.055, .059]), CFI = .934, SRMR = .044. All standardized factor loadings were greater than or equal to .56. Therefore, proposed structural paths were added to the model (Hypotheses 1–23). The model marginally fit the data: $\chi^2(1,151) = 5063.143$ ($p < .01$), RMSEA = .061 (90% CI [.059, .062]), CFI = .919, SRMR = .104. Path coefficients are reported in Figure 4. R^2 values for observed and latent dependent variables indicated 65% of the variance in seeking intention was accounted for by the expanded PRISM (1% increase over PRISM), 25% of the variance in perceived knowledge insufficiency (no change), 26% of the variance in perceived risk knowledge (a 6% increase), and 20% of the variance in affective risk response (no change). We used a difference chi-square test to compare the fit of PRISM versus the expanded PRISM. We subtracted the chi-square value of PRISM from the chi-square value of the comparison model (expanded PRISM) and used the resulting difference in chi-square and degrees of freedom to test whether the addition of variables improved PRISM fit (Bryant & Satorra, 2012; Kline, 2005). The unexpanded PRISM provided a significantly better fit to the data: $\Delta\chi^2(761) = 3081.87$, $p < .01$. The models were also compared using Akaike's Information Criterion (AIC); the value for PRISM (AIC = 90951.995) was smaller than that for expanded PRISM (AIC = 150301.493), indicating that PRISM fit the data better (Kline, 2005).

Discussion

To understand intentions to seek cancer risk information, we tested PRISM in the context of personal cancer risk information seeking and compared its fit with an expanded version. Our results showed PRISM to be an effective framework for predicting intention to seek cancer information; all but three hypotheses were supported by the model. In addition, PRISM provided a better fit to the data than did the expanded version. Model fit statistics showed the expanded PRISM fit the data only marginally well, whereas PRISM provided a good fit. In addition, the inclusion of new variables in the PRISM framework increased variance explained in seeking intention by only 1%. Thus, despite theoretical evidence supporting an expanded PRISM, our results support a more parsimonious model of planned risk information seeking and offer theoretical and empirical insights into the factors that influence intentions to seek cancer risk information.

[3]The variance accounted for in cancer information seeking is comparable to the variance accounted for in general health information seeking in past research ($R^2 = .59$; Kahlor, 2010).

PRISM variables accounted for 64% of the variance in seeking intention, which suggests PRISM is a comprehensive and predictive risk information model. Our results show that when accounting for perceived knowledge, perceived need for knowledge (i.e., knowledge insufficiency) is associated with intention to seek cancer risk information. A previous test of PRISM failed to support this relationship, which may have been due to testing the theory in the absence of a specific risk situation (Kahlor, 2010). Thus, our findings suggest that information seeking about a specific health risk may differ from information seeking on health risks more generally. More research is needed to determine whether (a) PRISM relationships hold across a variety of specific risks and (b) model performance varies based on the level of seriousness and risk associated with a particular disease. In the case of cancer, future tests of PRISM should look at differences across cancer types as each has its own unique set of features and risk factors (American Cancer Society, 2012).

We found a significant relationship between risk perception and affective risk response, which was associated with knowledge insufficiency and seeking intention. These findings illustrate that emotional responses are powerful drivers of information needs and seeking intentions (Hay, Buckley, & Ostroff, 2005; Rimal & Juon, 2010; Shim et al., 2006). However, we examined only negative affective responses. More exploration is needed to determine how various affective responses and emotions arising from risk affect health decision making (Afifi & Morse, 2009).

In addition to affect, several other variables were associated with perceived knowledge insufficiency and seeking intention. First, attitude toward seeking was positively associated with perceived knowledge insufficiency and seeking intention; the relationship between attitude toward seeking and perceived risk knowledge was not significant. This suggests that attitudes are more strongly related to one’s perceived need for information and one’s future seeking than to perceived knowledge. This begs the question of how attitudes come about if they are not related to current knowledge. One clue is suggested by expanded PRISM results, showing past seeking to be significantly associated (albeit weakly) with attitude toward seeking, as are source beliefs.

Another important model variable, perceived seeking control, was associated with perceived risk knowledge, but not directly with perceived knowledge insufficiency or seeking intention. This suggests that the effect of seeking control on behavioral intention is mediated by other factors. That is, one’s perceived efficacy and ability to obtain information about his or her cancer risks primarily affects perceived knowledge about cancer that, in turn, affects one’s need for more information. This finding supports past research showing behavioral control to be a weak or insignificant predictor of information seeking (Huurne & Gutteling, 2008; Millar & Shevlin, 2003; Smith-McLallen, Fishbein, & Hornik, 2011). Confidence in one’s ability to find cancer information is also associated with cancer knowledge (Viswanath et al., 2006). Thus, increasing access and efficacy may not immediately increase seeking intention, but may influence one’s perception of how informed he or she currently is—and, indirectly, whether future seeking might be fruitful. There is still more to learn about the impact of perceived seeking control on PRISM concepts. A more rigorous focus on seeking control and efficacy is needed to understand their role in information seeking.

Another key concept, seeking-related subjective norms, was associated with perceived risk knowledge, knowledge insufficiency, and seeking intention. Subjective norms surfaced as the strongest predictor of seeking intention. It is not surprising that subjective norms have been the most consistent predictor of information seeking intention within the PRISM and RISP frameworks (Kahlor, 2007, 2010; Kahlor et al., 2006). Our findings support research showing social health influences to be positively associated with information seeking regarding personal health risks (Hay et al., 2012). Future research must build on our understanding of factors that contribute to these norms, as well as how norms are communicated and through what channels (e.g., social networks). One's amount of social capital might also affect the important relationship between subjective norms and information seeking such that perceived norms for seeking are higher among those with more extensive social networks, particularly when those networks are health conscious (Dutta-Bergman, 2004). In addition, the degree to which subjective norms are inflated, and whether others' seeking behaviors actually match those perceptions, is an important area for research (Kahlor, 2010; Rimal, Lapinski, Cook, & Real, 2005; Rimal & Real, 2005).

Regardless of whether they are real or inflated, subjective norms appear to be a powerful pathway of influence for increasing cancer information seeking behavior. The robustness of this finding suggests the concept is ready for implementation and subsequent evaluation of its impact on actual seeking behavior. Messages that highlight perceived pressure from others may motivate people to become more active information seekers. For example, reminding men older than 50 years of age that family members assume they are aware of their risk for colorectal cancer might motivate these men to become more informed about screening.

In addition to testing PRISM, we explored whether past seeking, outcome expectancies, and source beliefs increased the variance explained by the model. Although our results confirmed all new hypotheses except for one, their addition did not improve model fit or variance explained in seeking intention. Thus, the contribution of these new variables to cancer information seeking intention appears to be minimal.

Still, our results suggest that people's beliefs about the information available to them (e.g., whether it is credible or complete) are related to their attitudes toward seeking and, in turn, their seeking intention. These findings reveal a potential mechanism—attitudes—through which beliefs about sources of information affect seeking intention that is currently not accounted for in models such as the Comprehensive Model of Information Seeking, which proposes that the perceived utility of information channels influences information seeking behavior (Johnson, 1997).

Because past research suggested that reliance on multiple sources leads to higher quality information (Kahlor & Rosenthal, 2009), we examined cancer risk information sources generally rather than specific sources of information. Future research should assess whether attitudes toward seeking differs by source, although this task might be challenging because people might not interpret sources of information in the same way. For example, the source of information for a blog written by a doctor might be viewed as a doctor, a blog, or simply

the Internet (Y. Hu & Sundar, 2010).Thus, explorations of source perceptions should proceed carefully to maximize our understanding of each individual source.

Our results show past seeking is associated with more positive attitudes and greater perceived knowledge, subjective norms, and seeking control. Furthermore, although outcome expectancies were not significantly associated with seeking intention, our results suggest that the former might affect people's perceptions of their ability to seek information. We were surprised to find a negative relationship between past seeking and outcome expectancies: the more seeking individuals did, the more negative they expected their outcomes to be (i.e., it was more likely to increase feelings of sadness, confusion, worry, or fear). This finding suggests that past cancer information seeking experiences have either not been positive or that information seeking is viewed as something that might increase personal concern even when the act itself is viewed positively.

The role of individual characteristics on information seeking also deserves attention. Studies have shown gaps in cancer knowledge and information seeking based on factors such as race, education and income level (Kaphingst et al., 2009; Ramanadhan & Viswanath, 2006; Rutten, Squiers, & Hesse, 2006; Thompson, Cavazos-Rehg, Tate, & Gaier, 2008; Viswanath et al., 2006). PRISM currently does not account for personal characteristics, although they might affect front-end PRISM variables (e.g., perceived seeking control). Future research should explore these theoretical linkages carefully as multifaceted frameworks may be more predictive than social or cognitive frameworks alone (Pettigrew, Fidel, & Bruce, 2001), In addition, PRISM assumes that people look for information primarily for themselves. Because people also seek information for other people (Hesse et al., 2005; James et al., 2007), future research should explore differences that arise when people seek information for themselves versus others and their intentions to share this information.

Study Limitations

Our sample included individuals who were enrolled in a survey panel. Thus, we may have recruited from a more knowledgeable and viewpoint-orientated population (Duffy et al., 2005). Our purposive sampling strategy may also have constrained the generalizability of this study. Furthermore, our self-selected participants may have had more interest in cancer than the general population, and easier access to cancer information and higher computer literacy because of access to the Internet. However, recent data indicates that Internet penetration has reached 80% of all adult Americans (Pew Internet & American Life Project, 2012). Furthermore, theoretical linkages suggested by this study should not be diminished by sample limitations; many of the linkages have been supported in other research employing more generalizable samples (e.g., Griffin, Powell et al., 2004; Kahlor et al., 2006). Thus, we expected PRISM to operate in the same way for other population subgroups. Because this is a cross-sectional study, our focus was solely on information seeking intention. However, actual information seeking is also shown to be associated with subjective norms and perceived knowledge insufficiency (Kahlor et al., 2006).

Acknowledgments

The work was supported by the Kellogg Health Scholars Program, under grant P0117943 from the W.K. Kellogg Foundation to the Center for Advancing Health (Hovick) and The University of Texas at Austin, College of Communication, Junior Faculty Fellowship (Kahlor). Dr. Hovick was also supported in part by a cancer prevention fellowship (National Cancer Institute Grant R25T CA57730, Shine Chang, Ph.D., principal investigator) and by the National Institutes of Health through The University of Texas MD Anderson Cancer Center Support Grant CA016672.

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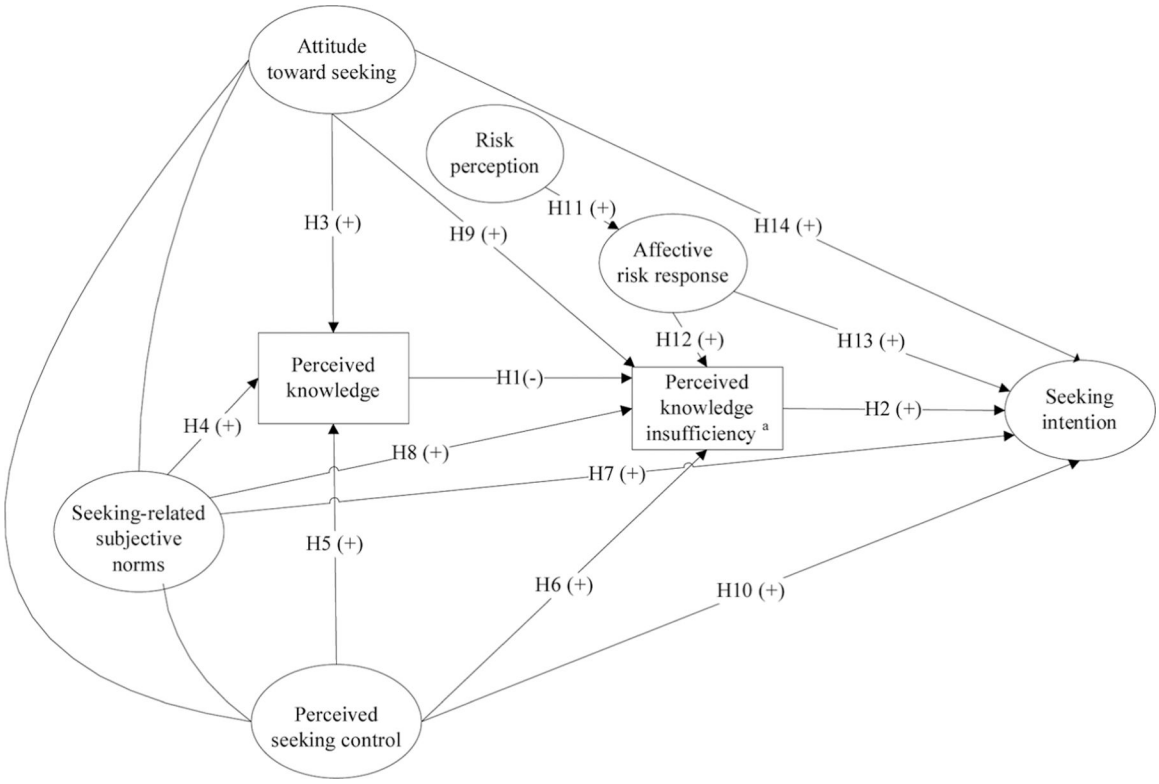

Figure 1.

PRISM (Kahlor, 2010). [a]Perceived knowledge insufficiency is conceptualized as the gap between perceived knowledge and knowledge needed.

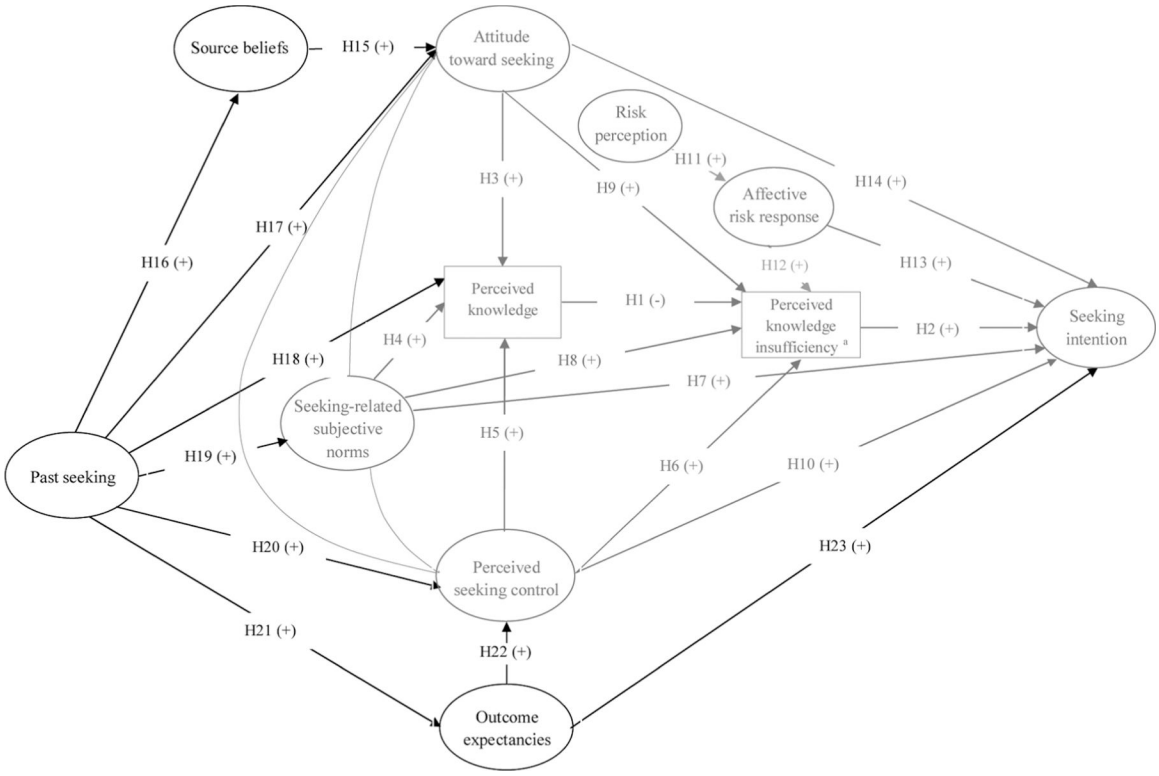

Figure 2.

Expanded PRISM. [a]Perceived knowledge insufficiency is conceptualized as the gap between perceived knowledge and knowledge needed.

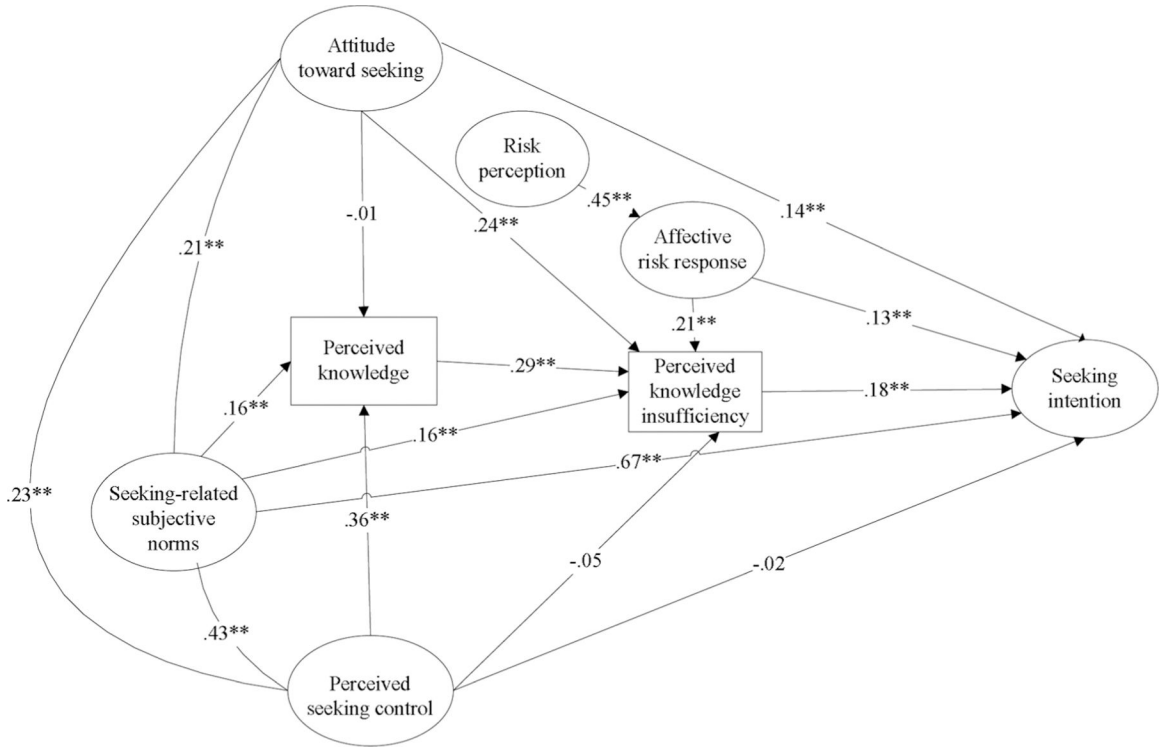

Figure 3.
PRISM standardized path coefficients. $^{**}p < .01$.

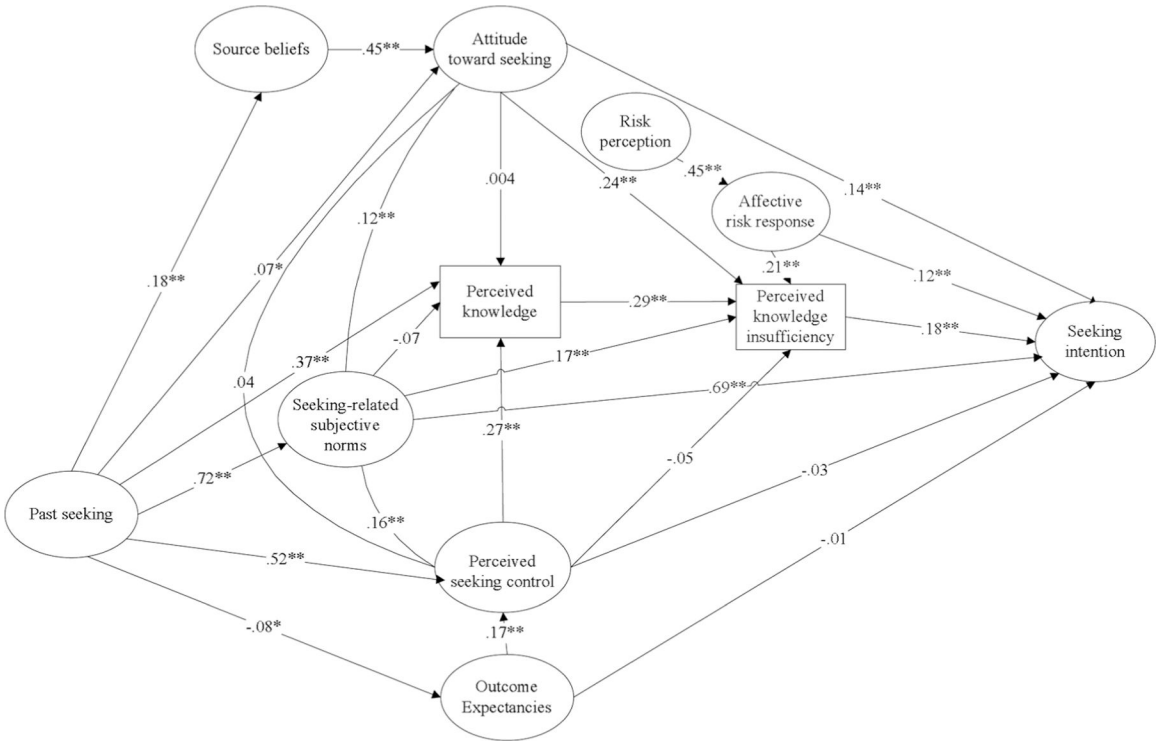

Figure 4.
Expanded PRISM standardized path coefficients. *$p < .05$. **$p < .01$.

Table 1.

Spearman correlations, means, and standard deviations for model variables

	1	2	3	4	5	6	7	8	9	10	*M*	*SD*
1. Attitude toward seeking	—										8.29	2.00
2. Subjective norms	.21**	—									4.13	1.54
3. Perceived seeking control	.24**	.43**	—								5.02	1.34
4. Risk perception	.11**	.26**	.10*	—							5.43	2.46
5. Affective risk response	.13**	.28**	−.05	.41**	—						5.72	2.87
6. Perceived risk knowledge	.10**	.33**	.43**	.33**	.07*	—					5.05	2.79
7. Perceived knowledge insufficiency	.36**	.32**	.18**	.30**	.28**	.31**	—				7.01	3.04
8. Seeking intention	.35**	.72**	.35**	.27**	.35**	.27**	.43**	—			4.61	1.60
9. Past seeking	.14**	.68**	.50**	.23**	.15**	.46**	.26**	.60**	—		4.03	1.80
10. Source beliefs	.49**	.21**	.40**	.08*	.07*	.18**	.22**	.23**	.16**	—	7.35	1.83
11. Outcome expectancies	.11**	−.20**	.12**	−.28**	−.51**	.01	−.08*	−.20**	−.07*	.15**	4.17	1.49

** $p < .01$.

* $p < .05$.

J Health Commun. Author manuscript; available in PMC 2021 November 11.