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**A Meta-Analysis of Factors Related to Health Information Seeking: An Integration from
Six Theoretical Frameworks**

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Abstract

Prior studies have investigated the antecedents of Health Information Seeking (HIS) using different theoretical frameworks, whereas the inconsistencies in the reported findings warrant a more comprehensive synthesis of this body of knowledge. This meta-analysis identified 12 major antecedents of HIS from six widely used information seeking models examining HIS, developed an organizing framework that segmented current antecedents into cognitive, affective, sociocultural, and information carrier categories, and compared their associations with HIS by meta-analyzing 89 empirical studies ($N = 62,957$). Results showed that seeking-related subjective norms and information utility yielded the strongest associations with HIS, whereas cognitive and affective factors demonstrated weaker associations with HIS. Illness types, information-seeking channels, and sampling methods significantly moderated the associations between some predictors and HIS. Implications and directions for future research were discussed.

Keywords: Health information seeking, meta-analysis, effect sizes, subgroup analysis

A Meta-Analysis of Factors Related to Health Information Seeking: An Integration from Six Theoretical Frameworks

Health information seeking (HIS) is a common behavior. Though the definition varies across study purposes and contexts, HIS is generally defined as purposefully searching for or asking pre-planned questions regarding health, using either online or offline sources (e.g., Lambert & Loiselle, 2007; Warner & Procaccino, 2004). As a prevalent phenomenon and a classic issue in the subfield of health communication and information studies, HIS has been the subject of numerous empirical studies since the introduction of this term (Lambert & Loiselle, 2007), with most of them exploring the antecedents of HIS using different theoretical frameworks. Previous theory-guided empirical research offered a diverse array of perspectives in examining HIS, but a holistic and comprehensive review of these studies is lacking.

Prior research examined the antecedents of HIS using different theoretical models that highlighted either the psychological factors (e.g., the risk perception attitude framework; Rimal, 2003), information carrier factors (e.g., the comprehensive model of information seeking; Johnson & Meischke, 1993), or sociocultural factors (e.g., social support theory; House, 1981). However, they offered disparate sets of HIS antecedents and did not provide an integrative framework that could combine these fragmented categories of factors. Scholars argued that information-seeking studies (i.e., HIS studies) need to develop models of information behavior that explicate how different sets of factors jointly influence information seeking (e.g., Talja et al., 1999; Wilson, 1999), thus offering a more comprehensive examination of information seeking behavior. As HIS is a complex behavior affected by various factors (e.g., the psychological, socio-cultural, and instrumental factors; Leckie et al., 2010), it

is important to investigate how different categories of factors systematically function together as a whole, rather than focusing solely on a single set of factors (e.g., psychological factors) to explain HIS. In addition, existing empirical examinations of the associations between HIS and its theory-derived antecedents often demonstrate mixed results (e.g., uncertainty discrepancy; Kuang & Wilson, 2017), whereas little research has statistically synthesized or compared the overall associations between these factors and HIS. Furthermore, although the associations between some antecedents (e.g., uncertainty discrepancy) and HIS vary significantly across studies (e.g., Kuang & Wilson, 2017), it is unclear what contextual or methodological elements could account for such variations.

Several meta-analytic studies have examined the overall relations between some variables and online HIS (Wang et al., 2020) or the associations between specific models and general information seeking behavior (e.g., Kuang & Wilson, 2020; Yang et al., 2010) (see Table 1). Yet, these meta-analyses were less comprehensive or holistic. Wang et al. (2020) performed a meta-analysis of the antecedents of online HIS behaviors without considering the HIS behaviors occurring on other important channels (e.g., mass media or social relations). A meta-analysis by Yang et al. (2014) studied the role of the risk information seeking and processing model (RISP) in predicting people's information seeking behavior, but it did not examine the predictive power of variables from other frequently employed theories (e.g., the CMIS). Thus, our meta-analysis seeks to extend previous meta-analyses by engaging a more extensive meta-analytic database of HIS research, compiling various categories of factors related to HIS, and providing a more holistic meta-analytic review of current HIS literature.

This meta-analysis has three aims. First, by systematically synthesizing HIS literature, it attempts to propose an integrated organizing framework that incorporates different antecedents from major theories predicting HIS and organizes them into four categories: cognitive, affective, sociocultural, and information carrier factors. Second, this study aims to quantify and compare the overall associations between HIS antecedents. Third, this study also seeks to explore the potential sources of the inconsistencies in the associations between current antecedents and HIS by estimating the moderating roles of some potential contextual or methodological elements.

Theoretical Frameworks Predicting Health Information Seeking

Previous research has reflected different lenses from which researchers view and investigate HIS, including the cognitive, affective, sociocultural, and instrumental lens. Currently, a diverse array of theoretical frameworks were employed to examine HIS, while six theoretical models, derived from communication, information science, and psychology, emerged as the major theories predicting HIS (See Table 1).

Comprehensive Model of Information Seeking (CMIS)

As one of the widely utilized models that draw the links between health-related factors, information carrier factors, and HIS, the CMIS posits that individuals' demographics (e.g., age, gender, and socioeconomic status), direct health experience, perceived salience (i.e., perceived risk of specific diseases), efficacy beliefs (i.e., people's perceptions about the effectiveness of information seeking), and information characteristics (i.e., the attributes of information carriers) can predict their HIS behavior through the mediation of information utility (i.e., the usefulness of information carriers) (Johnson & Meischke, 1993). The CMIS has received many empirical

tests across different contexts, most of which demonstrated good fit and similar findings (e.g., Johnson & Meischke, 1993; Lee & Kim, 2015). However, regarding the effects of some model construct (i.e., perceived utility) on HIS, results from empirical studies were inconsistent, with some studies revealing the good predictive power of perceived utility in predicting HIS (e.g., Johnson & Meischke, 1993) while others not (e.g., Hartoonian et al., 2014). In light of the current incongruent results of the empirical research on CMIS, a meta-analysis would help to synthesize and compare the overall effects of CMIS factors on HIS.

Risk Information Seeking and Processing Model (RISP)

Drawing upon the concepts from risk research (Johnson & Tversky, 1983), communication studies (Kosicki & McLeod, 1990), and the heuristic-systematic model (Eagly & Chaiken, 1993), the RISP (Griffin et al., 1999) model has guided much empirical research on HIS. The RISP proposes that individuals' cognitive risk judgments, affective risk responses, and informational subjective norms can influence their self-perceived information insufficiency (Griffin et al., 2004), which will, in turn, determine their information-seeking behaviors. The relationship between information insufficiency and information-seeking can be moderated by individual channel beliefs and information-seeking capability. The RISP model has been commonly applied to predict HIS across different studies (e.g., Kahlor, 2010; Yang et al., 2014). Yet, the relationships between some constructs of the RISP and HIS were inconsistent (Yang et al., 2014). For example, the factor of information insufficiency, which refers to the gaps between individuals' perception of what they already knew and what they need to know (Griffin et al., 1999), demonstrated positive relations with HIS in some examinations of the RISP model (e.g.,

Hovick et al., 2014). However, this factor serves as a significant predictor of information avoidance rather than information seeking in other studies (e.g., Yang & Kahlor, 2013).

Planned Risk Information Seeking Model (PRISM)

The planned risk information seeking model (PRISM) (Kahlor, 2010) incorporates factors from the theory of planned behavior (Ajzen, 1991) and the RISP model (Griffin et al., 1999) and draws associations among them. According to the PRISM, attitudes, perceived seeking control, and seeking-related subjective norms can predict information seeking intention either directly or through the mediation of perceived information insufficiency. Simultaneously, risk perception can affect relevant affective responses, which in turn influences information seeking intention. Since it was first introduced, the PRISM model has accounted for around 60% of variances in HIS intentions (Kahlor, 2010). Though this model has received strong support across studies on various contexts such as climate change (Ho et al., 2014), cancer-related information seeking (Hovick et al., 2014), and general health problems (Ahn & Kahlor, 2020), the effect sizes of some constructs on HIS were not consistent. For example, some studies documented the positive influences of risk perception and attitudes on information seeking (e.g., Zhao & Cai, 2009), while others did not found the significant effects of these two factors on HIS behaviors (e.g., Kessler & Zillich, 2019).

Risk Perception Attitude (RPA) Framework

The RPA framework postulates that risk perception (including the dimensions of perceived severity and perceived susceptibility) and efficacy beliefs (including the dimensions of perceived self-efficacy and perceived response efficacy) can cooperatively affect individuals' self-protective behavioral intentions and actual behaviors. That is, how people cope with the

risks can be potentially influenced by their efficacy beliefs. The RPA framework has been widely employed in predicting individuals' HIS behavior in various illness contexts, including diabetes (Turner et al., 2006), skin cancer (Rimal, 2003), and lung cancer (Zhao & Cai, 2009). However, not all studies yielded supportive results. For example, experiments by Turner et al. (2006) and Wong (2012) showed that perceived risk is positively associated with subsequent behavioral intentions (e.g., health-protective motivations and health information-seeking intentions) when it is combined with a high level of efficacy beliefs. Conversely, the study by Pask and Rawlins (2016) did not support the assumption of the RPA framework that efficacy beliefs moderate the relationship between risk perceptions and self-protective behaviors.

Theory of Motivated Information Management (TMIM)

The theory of motivated information management (Afifi & Weiner, 2004) is another theoretical model commonly applied to examine HIS. The TMIM postulates that individuals will undergo three phases (i.e., interpretation phase, evaluation phase, and decision phase) before making decisions on information seeking. In the first phase (i.e., interpretation phase), individuals will evaluate the magnitudes of uncertainty discrepancy and emotional responses (i.e., anxiety) aroused from uncertainty (Afifi & Weiner, 2004). In the second phase (i.e., evaluation phase), individuals will evaluate the positive or negative outcomes of info-seeking behavior and hold different efficacy beliefs regarding this behavior (Afifi & Afifi, 2009). In the last phase (i.e., evaluation phase), individuals will make decisions on different information management behaviors, including the behavior of information seeking, information avoidance, or uncertainty re-evaluation to manage uncertainty-related anxiety (Afifi & Weiner, 2004). The TMIM has been widely applied to HIS studies (e.g., Afifi & Weiner, 2004; Dillow & Labelle,

2014; Wong, 2014). However, empirical results on the associations between some TMIM constructs and HIS were mixed (Kuang & Wilson, 2017). Wong (2014) found that people's uncertainty discrepancy about human papillomavirus vaccination (HPV) was positively related to their intentions to seek HPV information, whereas Rquscher and Hesse (2014) did not find any significant associations between uncertainty discrepancy about family health history and HIS.

Social Support Theory

As another theory frequently employed for HIS prediction in extant HIS research, social support theory in the health context mainly suggests that support from social networks could help people combat health-risk situations by promoting adaptive appraisal and coping (Albrecht & Goldsmith, 2003). As a multidimensional concept which consists of varying dimensions across studies, social support were categorized into four dimensions (i.e., informational, emotional, appraisal, and instrumental support) by House (1981), whereas Cutrona and Suhr (1992) classified social support into five dimensions (i.e., emotional, network, esteem, tangible, and informational support). Though most previous studies on HIS revealed that social support could serve as an essential source for people to acquire health knowledge and contribute significantly to HIS (e.g., Chlebowy & Garvin, 2006; Deng & Liu, 2017), the impacts of different dimensions of social support on HIS still varies significantly. Deng and Liu (2017) found that tangible support, appraisal support, and esteem support were positively related to individuals' HIS intention, while emotional support did not yield any significant associations with HIS. Given such inconsistencies, a meta-analysis would be helpful to aggregate the overall associations between social support and HIS.

Organizing Framework for Meta-Analysis

Drawing on the above six theoretical frameworks, this study identified 12 theoretical constructs and segmented them into four categories—cognitive, affective, sociocultural, and information carrier factors—to provide a comprehensive organizing framework for this meta-analysis (see Figure 1 in the Supplemental material).

Cognitive Factors

Among current factors predicting HIS, cognitive factors refer to how individuals think about health-related risks or uncertainty, how they mentally process these factors, and therefore drive their HIS behaviors (Deline & Kahlor, 2019). The existing major theoretical models adopted to predict HIS primarily documented seven cognitive factors related to HIS. Specifically, the PRISM and the RISP both encompass the factors of perceived risk, attitudes, perceived seeking control, and channel beliefs in their theoretical propositions to predict HIS (Griffin et al., 2004; Kahlor, 2010). Likewise, the TMIM also includes the factors of perceived efficacy, uncertainty discrepancy, and outcome expectancy to examine information-seeking behaviors (Afifi & Weiner, 2004). There are three ways of conceptualizations of perceived efficacy in current aggregated HIS literature, namely (a) perceived efficacy (i.e., the combination of perceived response efficacy and perceived self-efficacy; Rimal & Joun, 2010), (b) perceived response efficacy, and (c) perceived self-efficacy (e.g., Rimal & Real, 2003). As the three ways of conceptualizations were all referred to as perceived efficacy in the included HIS literature (e.g., Rimal & Joun, 2010; Rimal & Real, 2003), this study merged all the three types of conceptualizations into the umbrella concept of perceived efficacy. Besides, similar to previous studies (Chang, 2014; So et al., 2019), the current meta-analysis treats the factor of

information insufficiency in the RISP model and the factor of uncertainty discrepancy in the TMIM model as equal, as both concepts refer to the gaps between individuals' perceptions of the gaps between what they already knew and what they need to know. Thus, this study aggregated seven cognitive factors related to HIS—perceived risk, perceived efficacy, uncertainty, attitudes toward HIS, perceived seeking control, outcome expectancy, and channel beliefs—from current models predicting HIS (see Figure 1 in Supplemental material). Table 2 provides the definitions of the seven cognitive factors. Regarding the associations between current cognitive factors and HIS, studies have reached different conclusions. For example, earlier studies demonstrated mixed results on the relations between risk perception and HIS, with some studies revealing positive relations (e.g., Noh et al., 2016) and others indicating negative associations (e.g., Yang et al., 2010). To provide an overall evaluation of the associations between current cognitive factors and HIS, we posit:

H1: (a) Perceived risk, (b) perceived efficacy, (c) uncertainty discrepancy, (d) attitudes toward HIS, (e) outcome expectancy, (f) perceived seeking control, and (g) channel beliefs are positively associated with HIS.

Affective Factors

Despite the importance of rational or cognitive thinking processes in risky situations, emotions can, to a large extent, determine how people ultimately respond to the risk (Slovic, 2004). Among current theories predicting HIS, affective factors serve as non-rational factors (Deline & Kahlor, 2019). Models such as the RISP, the PRISM, and the TMIM all encompass the affective responses as potential motivational factors underlying HIS. Thus, our meta-analysis included affective risk responses as the affective antecedents of HIS. Defined as the

subjective experience of feelings in response to a given risk (Griffin et al., 2004), affective risk responses were conceptualized as the negative valence of emotions, such as anxiety or worry, in current aggregated HIS literature (e.g., the RISP or PRISM; Griffin et al., 2004; Kahlor, 2010). Most scholars argue that risky health situations can often trigger people's emotional response toward the risk, which, in turn, spurs their information seeking behavior to alleviate that negative emotions (e.g., Griffin et al., 2004; Kahlor, 2010). Much of the HIS research to date has shown that negative emotions aroused from risk perceptions are positively related to HIS, whereas some studies revealed that negative affect might lead to risk-averse intentions (Lerner & Keltner, 2000), thus driving individuals to lessen their exposure to risks and avoiding seeking further information about the risk (Yang & Kahlor, 2013). Given the current inconsistent results regarding the effects of affective responses on HIS, this study seeks to provide an overall evaluation of such associations between affective risk responses and HIS. Thus, we posit:

H2: Affective risk responses are positively associated with HIS.

Sociocultural Factors

In addition to the cognitive or affective factors, extant HIS studies often encompass sociocultural factors (i.e., subjective norms and social support) as external antecedents that motivate individuals' HIS behaviors (e.g., Guillory et al., 2014; Hovick et al., 2014). Sociocultural factors highlight the roles played by social associations (e.g., with peers, relatives, or others) in affecting individuals' attitudes and behaviors (Bandura, 1997). Specific to HIS, several theoretical frameworks predicting HIS, such as the RISP, the PRISM, and social support theory, have documented sociocultural factors (seeking-related subjective norms and social support) as important constructs in their theoretical propositions. Specifically, the PRISM and RISP propose that seeking-

related subjective norms can serve as the social pressure to influence individuals' information-seeking behavior (Griffin et al., 2004; Yang et al., 2010). Besides, as a concept derived from social support theory, the role of social support has also been emphasized in extant HIS empirical studies (e.g., Guillory et al., 2014; McKinley & Wright, 2014). For instance, some studies found that informational support from one's social networks served as a crucial resource for health information (e.g., McKinley & Wright, 2014), while other studies suggested that affective social support encouraged information seeking and subsequently helped personal health management (e.g., Guillory et al., 2014). As the current aggregated HIS studies measured social support at the perceptual level (e.g., perceived social support), this study refers to social support as perceived social support. Drawing on the current literature on HIS, this meta-analysis aggregates two sociocultural factors related to HIS—seeking-related subjective norms and social support. Table 2 provided the definitions of these two sociocultural factors. Many studies have revealed that individuals who received greater normative influences and stronger social support are more likely to engage in HIS (e.g., Deng & Liu, 2017; Kahlor, 2010), while other studies showed incongruent results (e.g., Shaw et al., 2008). To explore the overall associations between sociocultural factors and HIS, we posit:

H3: (a) Seeking-related subjective norms and (b) social support are positively associated with HIS.

Information Carrier Factors

Information carrier factors (i.e., information utility and information characteristics), derived from the CMIS, have also been the subject of extensive empirical investigation (e.g., Johnson & Meischke, 1993; Sheng & Simpson, 2015). According to CMIS, information carrier

factors can mix with psychological (e.g., perceived salience and perceived efficacy) and contextual factors (e.g., direct experiences with a specific disease) to predict information-seeking behaviors (Johnson & Meischke, 1993). This meta-analysis aggregates two information carrier factors related to HIS— information utility and information characteristics—from the CMIS. These two factors are defined in Table 2. Although many empirical tests have demonstrated strong associations between information carrier factors and HIS (e.g., Deng et al., 2015; Paek et al., 2017), others have not. For example, a study by Hartoonian et al. (2014) found non-significant effects of information-carrier factors on cancer-related information-seeking behaviors, in contrast to the theoretical proposition of the CMIS. Thus, to examine the overall associations between information carrier factors and HIS, we posit:

H4: (a) Information utility and (b) information characteristics are positively associated with HIS.

Potential Moderators

Contextual Moderators

In addition to examining the overall associations between proposed factors and HIS, this study also examines whether potential contextual factors could moderate such associations. For example, samples from different countries might have varying worldview or culture values, contributing to the differences in their evaluations of information quality and thus affect their HIS behaviors (e.g., Cyr et al., 2005). Thus, countries may moderate the relationships between some proposed predictors and HIS. Besides, gender may also affect people's HIS behavior, with some studies demonstrating that females reported more active seeking of health-related information than did males (e.g., Ek, 2013). We therefore included gender as one potential

moderator. In addition, empirical studies have also suggested that younger adults are more likely to search for health information than the elderly, as they may have relatively high levels of digital health literacy (e.g., Pandey et al., 2003). Hence, age differences among samples could also moderate the associations between certain predictors and HIS. Moreover, information channels also differ in their characteristics and utility (Ruppel & Rains, 2012), which might influence people's assessments of the health information obtained through these channels as well as their HIS behaviors. Thus, the associations between some proposed factors and HIS may also differ depending on HIS channels. Finally, illness types might moderate the relations between variables as well. Some studies revealed that specific disease is more likely to raise people's risk perceptions of that disease and subsequently lead to HIS, in comparison to general/non-specific diseases (Kahlor, 2010; Yang et al., 2014). Accordingly, we coded five potential contextual moderators—country, average age, gender composition, HIS channels, and illness types—to examine their roles in moderating the associations between proposed predictors and HIS. Thus, we raise the following question:

RQ1: Do the associations between proposed predictors and HIS vary by (a) illness types, (b) HIS channels, (c) country of the sample, (d) averaged age of the sample, and (e) gender composition of the sample?

Methodological Moderators

Study methodologies, such as sampling methods, could influence the relationships between variables (Hunter & Schmidt, 2014). For example, whether studies using non-representative surveys or convenience samples would exaggerate the correlations between variables was frequently examined in previous meta-analytic studies (e.g., Yang et al., 2014). In

addition, because the experimental method may permit more causal inference and surveys may have greater ecological generalizability (Babbie, 2004), research methods (experiments versus surveys) may also act as a moderator to influence the proposed relations. Therefore, our meta-analysis investigated methodological moderators (i.e., research methods and sampling methods) in addition to contextual moderators. We coded these two methodological moderators to examine their roles in moderating the associations between proposed predictors and HIS. Thus, we raise the following question:

RQ2: Do the associations between proposed predictors and HIS vary by (a) sampling methods and (b) research methods?

Method

Identification of Empirical Research

Multiple electronic databases, including APA PsycArticles, APA PsycInfo, Communication & Mass Media, CINAHL, EBSCOhost, Global Health, Google Scholar, PubMed, and Web of Science Direct, were used to retrieve relevant English-language empirical studies examining HIS. Article titles, abstracts, and text of articles were searched using HIS-related terms in English, including (a) health information seeking/searching, (b) medical information seeking/searching, (c) seek/search for/find information on health, (d) seek/search for/find information on illness/disease, (e) health information seeking/searching intentions, and (f) health/illness-related information seeking/searching, combined with theory/model-related terms in English, including (a) theory, (b) model, (c) framework, and (d) theoretical framework. The search was continued until January 2021, yielding a total result of 6,797 articles. To avoid potential bias arising from including only data from published research (Rothstein et al., 2005),

11 authors of relevant unpublished manuscripts (including conference presentations and dissertations) were contacted, 4 of whom offered us the relevant data. We examined the entire texts of research articles to ensure that there were no duplicates.

Each paper was reviewed at least twice to examine whether it met the following inclusion criteria. First, only studies that examined HIS, which was conceptualized as actively searching for or asking pre-planned questions about health (e.g., Lambert & Loiselle, 2007), were included in the meta-analysis. Thus, studies that examined passive exposure to health-related information were excluded (e.g., Heath & Gay, 1997; Ruppel, 2016). Second, only quantitative empirical studies that contained the necessary statistical information (e.g., sample sizes, mean, standard deviation, correlation, odds ratio, and β coefficient) for the calculation of effect sizes were included. Thus, review or qualitative studies that did not report any statistics were excluded (e.g., Chavarria et al., 2016; Ellis et al., 2012). Third, studies focused on illness- or health-related issues (e.g., acute illness or chronic illness) were included, while studies that focused on non-health-related issues were excluded (e.g., Fetherston, 2019). Fourth, only theory-guided studies that measured one or more variables in the aforementioned six frequently-used theoretical frameworks were included. Studies that did not measure these theoretical constructs and did not report any index of relationships (e.g., mean, standard deviation, or Pearson's r) between these constructs and HIS were excluded (e.g., Lastres et al., 2018; Rimal, 2001). The filtering process is displayed in Figure 2 in the Supplemental material.

Coding

Two coders independently coded articles information including sample sizes, correlations, and measurement reliability. Seven potential moderators — illness types, HIS

channels, country of samples, mean age of samples, gender composition of samples, sampling method, and research method — were also coded. Specifically, we coded illness types as (1) general illnesses or (2) specific illnesses; HIS channels as (1) online channels, (2) offline channels, (3) both online and offline channels, or (4) non-specified channels; country of samples as (1) North America, (2) Europe, (3) Asia, (4) Australia, or (5) Africa; mean age of samples as (1) Millennial, (2) Generation X, or (3) Baby Boomer (Pew Research Center, 2019); gender composition as (1) Male > Female, (2) Male < Female, (3) Male = Female, or (4) not specified; sampling methods as (1) representative/random sampling method, (2) non-representative/random sampling method, or (3) not specified; and research methods as (1) experiment or (2) survey. Intercoder reliability for each category of study information coded was at a good level, with a Cohen's k of 1.00 for country of samples, research methods, and gender composition of samples; 0.84 for sample sizes; 0.83 for sampling methods; 0.81 for illness types; 0.80 for HIS channels; and 0.79 for averaged age of the sample. Disagreements were resolved through discussion between the coders.

Analysis Procedure

Many included studies included in this meta-analysis reported the zero-order correlation coefficient (or Pearson's r) between proposed predictors and HIS (e.g., Deng & Liu, 2017; So et al., 2019). Other studies, however, reported only the β coefficient, unadjusted odds ratio, mean, or standard deviation to represent such relations (e.g., Pask & Rawlins, 2016; Zhao & Cai, 2009). To ensure that all the studies could be compared, we converted all reported statistics (i.e., β coefficients, odds ratio, mean, and standard deviation) to zero-order correlations as a

uniform metric for meta-analysis based on the recommendations and equations by Peterson and Brown (2005) and Rosenthal and DiMatteo (2001) (see the appendix).

The analysis was based on the current meta-analysis techniques adopting the random-effects model rather than the fixed-effect model, as the latter one assumes that there is only one true (population) effect size and that all differences across study effect sizes are due to sampling error (within-study variability), ignoring the between-study variability (Hunter & Schmidt, 2014). We estimated the summary correlation between each predictor and HIS by weighting each observed correlation based on sample sizes (Hunter & Schmidt, 2014). The measurement error of each study, which is a study artifact and attenuates effect sizes, was corrected using Hunter and Schmidt's (2014) methods. The reliability values reported in each study were used in the correction for measurement error. When a reliability value of a variable was not reported in a study, the averaged reliability values for this variable across all the studies were used to estimate its reliability (e.g., Kuang & Wilson, 2018). Because the existence of publication bias may hamper the accuracy of effect size estimation (Borenstein et al., 2009), Rosenthal's fail-safe N test was applied to test the publication bias (Hunter & Schmidt, 2014).

Moderator analysis was conducted to examine whether the observed variances in effect sizes across studies were due to potential moderators rather than sampling error. Moderators were detected on the basis of the Q statistic and I^2 value. A significant Q value and an I^2 value exceeding 75% indicated the need to conduct the moderator analysis to explain the variation in effect sizes (Huedo-Medina et al., 2006). As a common method in the test of moderation effects in meta-analyses, subgroup analysis was employed to examine the role of proposed moderators in moderating the effect sizes under the random-effects model (Hunter & Schmidt, 2014). The

significance of the moderator was assessed based on two metrics: the Q statistic between subgroups and 95% CI s. A significant Q_{between} value indicates that the variances of effect sizes across subgroups are significantly different, suggesting the significance of a moderator (Hedegs & Olkin, 1985). Data analyses were conducted using R software (*metafor* package).

Results

Overall Associations

A total of 89 studies with a combined sample size of 62,957 were included in this study, yielding 236 independent correlations. Table 3 and Table 4 presented the basic information and descriptive characteristics of the studies included in this meta-analysis. We used Cohen's guideline of effect size for social science (Cohen, 1992) to interpret the magnitudes of effect sizes.

All the aggregated cognitive factors were positively related to HIS, thus supporting H1(a) to H1(g). Specifically, perceived efficacy ($r = .22, p < .001$), attitudes toward HIS ($r = .22, p < .001$), perceived seeking control ($r = .22, p < .001$), channel beliefs ($r = .21, p < .001$), outcome expectancy ($r = .21, p < .001$), perceived risk ($r = .20, p < .001$), and uncertainty discrepancy ($r = .11, p < .001$) yielded small-level effects on HIS. Besides, as predicted by H2, affective risk responses were positively associated with HIS ($r = .18, p < .001$), yielding a small-level effect size. Furthermore, all the proposed sociocultural factors were positively associated with HIS, thereby supporting H3(a) and H3(b). In particular, seeking-related subjective norms exhibited the largest-level effect on HIS ($r = .45, p < .001$) among all the proposed predictors, while social support demonstrated a small-level effect on HIS ($r = .12, p < .05$). Finally, as is predicted by H4(a) and H4(b), all the aggregated information carrier factors were positively associated with HIS. Specifically, information utility yielded a large-level effect

on HIS ($r = .36, p < .001$) and information characteristics demonstrated a medium-level effect on HIS ($r = .24, p < .01$).

Table 5 summarizes the results of the overall correlations between the predictors and HIS. Rosenthal's fail-safe N, a metric of the number of null studies that must be added to attenuate the significant results of the meta-analysis, ranged from 384 to 31,632, suggesting that publication bias had a negligible effect on the results of this meta-analysis (see Table 5).

Moderation Results

The results of the heterogeneity test (Q statistics and I^2 value) revealed that the variation across the associations between the twelve predictors and HIS could be explained by potential moderators (see Table 5). As for RQ1(a), the random-effects model subgroup analysis showed that illness type was a significant moderator in the relationship between perceived risk and HIS ($Q_{\text{between}} = 6.56, p < .05$), and in the relationship between affective risk responses and HIS ($Q_{\text{between}} = 6.14, p < .05$). Specifically, the mean correlation between perceived risk and HIS was significantly stronger for studies focused on specific illnesses ($r = .23, 95\% CI [.17, .29], k = 29$) than for studies focused on general illnesses ($r = -.14, 95\% CI [-.52, .25], k = 5$). Besides, the mean correlation between affective risk responses and HIS was significantly stronger for studies focused on specific illnesses ($r = .17, 95\% CI [.11, .23], k = 32$) than for studies focused on general illnesses ($r = -.05, 95\% CI [-.31, .09], k = 5$) (see Table 6). No significant moderation effects were found for illness types on the relationships between other proposed predictors and HIS.

Regarding RQ1(b), the subgroup analysis showed that HIS channels significantly moderated the relationship between information utility and HIS ($Q_{\text{between}} = 20.39, p < .001$), as well as the relationship between information characteristics and HIS ($Q_{\text{between}} = 31.76, p < .001$).

Specifically, the mean correlation between information utility and HIS was significantly stronger for studies focused on HIS from both online and offline channels ($r = .53$, 95% *CI* [.21, .86], $k = 2$), in comparison to studies focused on HIS from online channels ($r = .37$, 95% *CI* [.12, .61], $k = 5$), offline channels ($r = .35$, 95% *CI* [-.13, .89], $k = 2$), and non-specific channels ($r = .28$, 95% *CI* [.12, .44], $k = 3$). Besides, the association between information characteristics and HIS was stronger for studies focused on HIS from offline channels ($r = .43$, 95% *CI* [.26, .56], $k = 5$) than for studies focused on HIS from online channels ($r = .24$, 95% *CI* [.19, .29], $k = 2$) and non-specific channels ($r = .08$, 95% *CI* [-.24, .53], $k = 2$) (see Table 7). No significant moderation effects were found for HIS channels on the relationships between other proposed predictors and HIS.

With respect to RQ2(a), the subgroup analysis showed that sampling method was a significant moderator in the relationship between perceived risk and HIS ($Q_{\text{between}} = 10.51$, $p < .01$), perceived efficacy and HIS ($Q_{\text{between}} = 23.34$, $p < .001$), uncertainty discrepancy and HIS ($Q_{\text{between}} = 11.64$, $p < .001$), outcome expectancy and HIS ($Q_{\text{between}} = 8.94$, $p < .01$), perceived seeking control and HIS ($Q_{\text{between}} = 9.17$, $p < .01$), channel beliefs and HIS ($Q_{\text{between}} = 82.47$, $p < .001$), and affective responses and HIS ($Q_{\text{between}} = 8.96$, $p < .05$). Specifically, the correlations between perceived risk and HIS, perceived efficacy and HIS, uncertainty discrepancy and HIS, outcome expectancy and HIS, perceived seeking control and HIS, channel beliefs and HIS, and affective responses and HIS were stronger for studies using non-representative/random sampling methods, in comparison to both studies that used representative/ random sampling methods and studies that did not specify sampling methods (see Table 8). No moderation effects were found for sampling methods on the relationships between other proposed predictors and HIS. As for RQ1(c), RQ1(d), RQ1(e), and

RQ2(b), the subgroup analysis showed that country, age of sample, gender composition of samples, and research methods were not significant moderators in the relationships between any of the proposed predictors and HIS.

Discussion

This study provides a comprehensive synthesis of HIS literature by meta-analyzing research findings from 89 empirical studies. The results suggest that current aggregated cognitive, affective, sociocultural, and information carrier factors have positive but varying associations with HIS, and that such associations are moderated by certain contextual and methodological factors (e.g., illness types, HIS channels, and sampling methods). The findings not only suggest that sociocultural and information carrier factors play crucial roles in explaining HIS but also demonstrate that theoretical frameworks incorporating psychological, sociocultural, and information carrier factors might achieve a better understanding of HIS.

Associations Between Proposed Predictors and HIS

The results of weighted mean correlations show that seeking-related subjective norms yield the strongest associations with HIS, highlighting the relative importance of sociocultural factors in explaining HIS. Future studies could consider examining the predictive power of more sociocultural factors (e.g., descriptive and injunctive norms) and integrating them with psychological factors when investigating HIS. Such results also indicate that individuals' HIS behaviors could be largely shaped by their social networks or interactions. Because the effects of sociocultural factors may differ across cultural contexts (Johnson, 2007) and recent studies on HIS were conducted mainly in Western cultural contexts (e.g., the U.S.), it would be worthwhile for

future studies to investigate HIS among a broader variety of populations across different geographical and cultural contexts, especially in non-Western cultures.

Information carrier factors (i.e., information utility and information characteristics) also demonstrate medium-to-large level correlations with HIS, suggesting that they played a significant role in predicting HIS. These results are congruent with the conclusions of a recent meta-analysis, which suggested that instrumental factors (e.g., trustworthiness or credibility of information) have significant effects on online HIS (Wang et al., 2020). However, most theoretical frameworks used for investigating HIS, such as the TMIM, the PRISM, or the RISP, have yet to include information carrier factors in their theoretical propositions. Thus, incorporating information carrier elements into their theoretical propositions could also be a possible way to refine current theoretical frameworks of HIS.

Almost all of the aggregated psychological factors—risk perception, attitudes, perceived efficacy, channel beliefs, outcome expectancy, affective risk responses, perceived seeking control, and uncertainty—demonstrated small-level correlations with HIS. However, we cannot simply conclude that these factors are not crucial in explaining HIS. Despite the relatively small effects, these psychological predictors serve essential roles in major models predicting HIS (e.g., the RISP, TMIM, or PRISM) and account for significant variations in HIS behaviors in numerous studies (e.g., Hovick et al., 2014; Kahlor, 2010). For example, a recent meta-analysis (Kuang & Wilson, 2020) revealed that the TMIM performs well in predicting people's information-seeking behaviors across different contexts, including in health contexts, though this model encompasses solely psychological factors related to HIS.

The Moderating Roles of Illness Types, HIS Channels, and Sampling Methods

The moderator analysis suggests that the effects of perceived risk and affective risk responses on HIS are stronger for studies focused on the context of specific illnesses, in comparison to studies focused on general illness. That is, people may commonly perceive a higher-level of risk and have more negative feelings about specific illnesses in contrast to general illness. One possible explanation is that individuals tend to make judgments about health risks on the basis of heuristics to minimize their cognitive effort when processing health-related information (Chaiken & Ledgerwood, 2012; Tversky & Kahneman, 1974). When encountering non-specific/general illness that lack specific cues (e.g., the name of the disease), individuals tend to underestimate their risk. In contrast, when encountering specific diseases (e.g., cancer) with available name cues, individuals' risk perceptions and subsequent emotional responses toward that disease are likely to be engendered (Griffin et al., 2004; Kahlor, 2010). Consequently, as compared with non-specific/ general illnesses, specific illnesses are more likely to strengthen people's risk perceptions as well as their affective risk responses toward illnesses, ultimately leading to greater intention to engage in HIS.

We also found that the relation between information utility and HIS was stronger for studies focused on both online and offline channels, in comparison to studies focused on other channels (i.e., online-only, offline-only, and non-specified channels). This finding echoes the media complementarity framework (Dutta-Bergman, 2004), which proposes that information consumers tend to employ various media channels (e.g., both online and offline channels) to consume information in a complementary fashion so as to satisfy their various information needs. Thus, it is expected that individuals tend to be more satisfied with the health information

provided by multiple complementary channels (e.g., both online and offline) and thus are likely to use complementary channels to seek health information.

In addition, information characteristics demonstrated stronger associations with HIS for studies focused on offline channels than for studies on other channels. According to the CMIS, information characteristics are related mainly to certain information attributes, including editorial tone (i.e., perceived credibility and source intentions) and communication potential (i.e., style and source comprehensibility) (Johnson & Meischke, 1993). The CMIS proposes that the more credible or comprehensible the HIS channel is, the more likely people are to seek health information from that channel (Johnson & Meischke, 1993). In comparison with online channels, offline channels, which were represented mainly by individuals' social networks (e.g., health care providers or family members), can increase patients' comprehension of, as well as their trust in, health information (Peng et al., 2019). Thus, offline channels (e.g., interpersonal communication with health care providers) could be more related to a higher level of information credibility or comprehensibility and, therefore, may be more likely to spur people to seek health information from that channel.

Our meta-analysis also revealed that associations between most aggregated predictors and HIS are significantly stronger for studies using non-representative/random sampling methods than for studies using representative/random sampling methods. These findings suggest that studies based on convenient or non-representative samples may potentially inflate the relations between predictors and HIS. Future studies could adopt random/probability sampling methods or use representative samples to decrease the estimation errors generated by sampling methods. Lastly, we found that the country, age, gender composition, and research

methods did not moderate any of the relationships between proposed predictors and HIS.

However, we cannot simply infer that the associations between proposed predictors and HIS do not vary considerably across these moderators (Borenstein et al., 2009), as there are substantial imbalances in terms of the number of studies conducted in different countries (western countries vs. non- western countries), among different groups (youngsters vs. the elderly), and using different research methods (experiment vs. survey).

Implications

This study makes several contributions to HIS research. Specifically, this meta-analysis represents one of the first to summarize multiple categories of HIS antecedents from current HIS literature and therefore, providing a comprehensive quantitative review of factors associated with HIS. The aggregated factors in this study are all positively related to HIS, suggesting that current HIS antecedents can be more complementary than competing in explaining HIS. It would be helpful for future HIS research to consider psychological, sociocultural, and information carrier factors in combination to gain a more comprehensive understanding of HIS. Specifically, we found that sociocultural and information carrier factors demonstrate the strongest associations with HIS. Hence, scholars working on specific theories (e.g., TMIM) that focus on one specific set of variables (e.g., psychological factors) should acknowledge other factors (e.g., information carrier factors, or sociocultural factors, etc.), especially those having large impacts on HIS. Thus, this meta-analysis may help to refine the current disparate theories or approaches in HIS studies.

Next, this study found that risk perceptions and affective risk responses have stronger associations with HIS for studies on specific illnesses versus general illnesses, underscoring the importance of considering the characteristics of disease types in future HIS research. That is,

whether the predictions of certain theoretical models or constructs (e.g., risk perception or affective responses) vary by disease type (e.g., acute versus chronic disease) could be a worthwhile direction for future empirical HIS investigations. In addition, information-seeking channels also significantly moderated the effects of information carrier factors on HIS behaviors, suggesting that perceptions of information utility and information characteristics (e.g., tones or comprehensibility) have much to do with the specific attributes of information channels.

Individuals who perceive a certain information channel as more useful and of high quality are more likely to search for health information on that channel. Future HIS studies could examine whether people's perceptions of information characteristics and utility significantly differ across information channels (e.g., online versus offline channels) and whether they exert different effects on HIS behavior. Furthermore, as the non-random/representative sampling method may influence the accuracy of the estimation of relationships, future empirical studies on HIS could endeavor to employ representative/probability sampling techniques. Lastly, because experimental methods were less used in current HIS studies included in our meta-analysis, and data were less obtained from non-western countries among older age groups, future HIS research could conduct more experimental studies in non-western countries among older age groups.

This meta-analysis also provides several practical implications. First, as seeking-related subjective norms exhibited the strongest correlation with HIS, pressure or expectations from social networks (e.g., family members or friends) could be designed as interventions to motivate people's HIS behaviors in campaigns. Second, information carrier factors, especially the factor of information utility, were also significantly related to HIS, so information providers or communication practitioners could offer multiple high-quality health information channels to

ensure people's accessibility to health information. Third, the moderator analysis indicated that specifying illness types could raise people's risk perceptions or awareness of specific illnesses, and thus motivate their HIS behavior. Thus, tailored messages or interventions could focus on specific illnesses rather than general ones to spur people's health-protective behaviors. Lastly, offline channels or interpersonal communication may strengthen the relationships between perceived information credibility/comprehensibility and HIS. Therefore, patients or the public should be given more opportunities for interpersonal communication with physicians or other health care providers, which, in turn, would encourage them to seek health information from health experts.

Limitations

Several limitations of this study need to be considered. First, this meta-analysis examined the theoretical constructs primarily from six major theories predicting HIS. Factors from other theories (e.g., social cognitive theory) were not included, as these theories were seldom employed to examine HIS in aggregated literature. Future meta-analytic studies could include additional predictors or theories examining HIS to conduct a more comprehensive meta-analysis. Second, this meta-analysis considered only moderators of interest. It would be worthwhile for future meta-analyses to investigate more moderators (e.g., sample roles) that could account for the variations in effect sizes. Third, this meta-analysis mainly encompassed peer-reviewed studies from journals, while lesser unpublished manuscripts from conferences or dissertations were included. Future studies should endeavor to include as many unpublished manuscripts as possible by making repeated attempts to contact the authors over a longer period of time. Fourth, this meta-analysis includes only articles written in English. Future research could include more

HIS articles written in other languages. Lastly, as experimental methods were not often used in HIS studies included in our meta-analysis, and lesser data was obtained from non-western countries and among older age groups, this meta-analysis mainly encompasses studies that used cross-sectional methods and were conducted among non-elderly in western countries. Future HIS research could conduct more experimental studies in non-western countries and among older age groups.

Conclusion

This study contributes to the HIS research by conducting a meta-analysis of 89 HIS empirical studies. Although HIS has been studied for about four decades, we believe our study to be one of the first to provide a holistic quantitative synthesis of this body of knowledge. Results from this meta-analysis demonstrate that seeking- related subjective norms and information utility exhibit the strongest associations with HIS, highlighting the importance of acknowledging sociocultural and information carrier factors in the future extension of theories on HIS. Illness types significantly moderated the associations between perceived risk and HIS. Thus, the specification of illness types may raise people's risk perceptions or awareness of illnesses and subsequently engage them in HIS behaviors. Furthermore, information-seeking channels also emerged as significant moderators in the relations between information carrier factors and HIS. Such results suggest that people's evaluations of the utility or quality of information carriers can be primarily affected by specific information channels, which, in turn, impact their HIS behaviors. To spur people's HIS behavior, further improvement of information facilities should focus on constructing more HIS information channels with high complementarity or diversity. Last but not least, as non-representative/random sampling

methods may hamper the accuracy of the estimation of effects, future HIS studies could strive to utilize representative/probability sampling methods.

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Tables and Figures

Table 1*Descriptive characteristics of studies included in meta-analysis*

Study characteristics	N(%)	Study characteristics	N(%)
Country	89	Experiment	5(5.6%)
America	68(76.4%)	Gender Composition	89
Asia	17(19.1%)	Male > Female	13(14.6%)
Europe	2(2.2%)	Male < Female	73(82.0%)
Australia	1(1.1%)	Male = Female	2 (2.2%)
Africa	1(1.1%)	Not specified	1(1.1%)
Age group	89	Theories used	89
Millennial	40(45.9%)	CMIS	14(15.7%)
Gen X	44(49.4%)	RISP	13(14.6%)
Baby Boomer	5(5.6%)	TMIM	11(12.6%)
Info-seeking Channel	89	SST	9(10.1%)
Online	37(41.6%)	PRISM	9(10.1%)
Offline	12(13.5%)	RPA framework	8(8.9%)
Online and offline	13(14.6%)	HBM	3(3.3%)
Others/Non-specified	27(29.3%)	EPPM	3(3.3)
Illness context	89	HSM	2(2.2%)
General illness	31(34.8%)	ELM	2(2.2%)
Specific Illness	58(65.2%)	TPB	2(2.2%)
Sampling method	89	WMIB	2(2.2%)
Representative/random	24(30.0%)	SCT	2(2.2%)
Non-representative/random	65(70.0%)	URT	2(2.2%)
Research method	89	Other theories	8(8.9%)
Survey	84(94.4%)		

Note. CMIS = comprehensive model of information seeking; EPPM = extended parallel processing model; HBM = health belief model; HSM = heuristic systematic model; PRISM = planned risk information seeking model; RISP = risk information seeking and processing model; RPA framework = risk perception attitude framework; SCT = social cognitive theory; SST = social support theory; TMIM = theory of motivated information management; TPB = theory of planned behavior; WMIB = Wilson's model of information behavior; URT = uncertainty reduction theory.

Other theories include cognitive-social health information processing model, the operant model of acculturation, predicted outcome value theory, protection motivation theory, situational theory of problem solving, the situational theory of problem solving and uncertainty management theory.

Table 2*Summary of Overall Effect Sizes and Test for Publication Bias*

	Heterogeneity Test				Test for Publication Bias		
	<i>k</i>	<i>N</i>	<i>r</i>	95%CI	Homogeneity (<i>Q</i>)	<i>I</i> ²	Fail-safe <i>N</i>
Cognitive Factors							
Perceived Risk	34	24,092	0.20***	[0.10,0.30]	754.33***	95.37%	8,306
Perceived Efficacy	35	20,186	0.22***	[0.11,0.32]	575.17***	93.46%	16,948
Uncertainty Discrepancy	27	11,984	0.11***	[0.06,0.16]	208.22***	85.89%	14,06
Outcome Expectancy	13	5,359	0.21***	[0.11,0.32]	157.10***	90.07%	2,245
Attitudes Toward HIS	11	9,919	0.22***	[0.11,0.33]	318.33***	96.48%	2,111
Perceived Seeking Control	12	8,913	0.22***	[0.10,0.34]	330.68***	96.26%	2,016
Channel Beliefs	16	19,852	0.21***	[0.10,0.33]	878.78***	98.22%	6,835
Affective Factors							
Affective Risk Responses	37	21,392	0.18***	[0.11, 0.24]	614.98 ***	93.88%	6,488
Sociocultural Factors							
Subjective Norms	19	15,049	0.45***	[0.36,0.54]	862.59***	97.77%	31,632
Social Support	9	6,152	0.12*	[0.08,0.16]	90.90***	87.05%	384
Information Carrier Factors							
Information utility	12	10,745	0.36***	[0.23,0.50]	368.63***	96.42%	6,379
Information characteristics	9	9,938	0.24**	[0.06,0.39]	252.69***	96.82%	2,352

Note. *K* = number of studies; *N* = aggregated sample size; *r* = Weighted mean observed correlation; 95% CI: lower and upper limits of 95% CI for estimated effect sizes.

p* < .05, *p* < .01, ****p* < .001.

Table 3*Moderator (Subgroup) Analysis: Illness Types*

Proposed Relationship	<i>Q</i> between	Illness types	<i>k</i>	<i>r</i>	95% <i>CI</i>
Perceived risk → HIS	6.56*	Specific illness	29	0.23	0.17-0.29
		General illness	5	-0.14	-0.52-0.25
Affective risk responses → HIS	6.14*	Specific illness	32	0.17	0.11-0.23
		General illness	5	-0.06	-0.31-0.19

Note .*r* = Pearson's *r*; *k* = number of studies; 95%*CI* = lower and upper limits of 95% confidence interval for effect size.

p* < .05, *p* < .01, ****p* < .001.

Table 4*Moderator (Subgroup) Analysis: HIS Channels*

Proposed Relationship	<i>Q</i> between	HIS channels	<i>k</i>	<i>r</i>	95% <i>CI</i>
Information utility → HIS	20.39***	Online	5	0.37	0.12-0.61
		Offline	2	0.39	-0.13-0.89
		Online-and-offline	2	0.53	0.21-0.86
		Not specified	3	0.11	-0.31-0.54
Information characteristics → HIS	31.76***	Online	5	0.24	0.19-0.29
		Offline	2	0.43	0.26-0.56
		Online-and-offline	—	—	—
		Not specified	2	0.08	-0.34-0.63

Note. *r* = Pearson's *r*; *k* = number of studies; 95%*CI* = lower and upper limits of 95% confidence interval for effect size.

p* < .05, *p* < .01, ****p* < .001.

Table 5*Moderator (Subgroup) Analysis: Sampling Methods*

Proposed Relationship	<i>Q</i> between	Sampling methods	<i>k</i>	<i>r</i>	95% <i>CI</i>
Perceived risk→ HIS	10.51**	Non representative/random sampling	20	0.20	0.08-0.32
		Representative/random sampling	12	0.18	0.08-0.28
		Not specified	2	0.07	0.01-0.13
Perceived efficacy→ HIS	23.34***	Non representative/random sampling	26	0.35	0.27-0.44
		Representative/random sampling	6	0.15	0.09-0.20
		Not specified	3	0.32	-0.17-0.81
Uncertainty discrepancy→ HIS	11.64**	Non representative/random sampling	19	0.11	0.05-0.18
		Representative/random sampling	7	0.08	0.01-0.15
		Not specified	1	0.22	0.16-0.28
Outcome expectancy→ HIS	8.94**	Non representative/random sampling	12	0.32	0.21-0.45
		Representative/random sampling	1	0.07	-0.06-0.20
		Not specified	—	—	—
Perceived seeking control→ HIS	9.17**	Non representative/random sampling	7	0.28	0.11-0.45
		Representative/random sampling	4	0.15	-0.28-0.57
		Not specified	1	0.04	-0.03-0.11
Channel beliefs→ HIS	82.47***	Non representative/random sampling	10	0.43	0.46-0.59
		Representative/random sampling	4	0.09	-0.01-0.18
		Not specified	2	0.24	0.16-0.32
Affective risk responses→ HIS	8.96*	Non representative/random sampling	26	0.09	0.01-0.17
		Representative/random sampling	10	0.21	0.10-0.35
		Not specified	3	0.21	0.18-0.24

Note. *r* = Pearson's *r*; *k* = number of studies; 95%*CI* = lower and upper limits of 95% confidence interval for effect size.

p* < .05, *p* < .01, ****p* < .001.