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# Applying the Modified Comprehensive Model of Information Seeking to Online Health Information Seeking in the Context of India

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This study extends the Comprehensive Model of Information Seeking (CMIS) to online health information seeking in the context of India. This study considers the Internet (i.e., media) use an antecedent factor and the personal relevance factor salience is separated into two dimensions – susceptibility and severity. Structural equation modeling analysis ($N$ = 990) tested the associations between health-related antecedents, information-carrier factors, and their direct effects on online information seeking. The results among online health information seekers in India showed significant relationships between length and frequency of media use and self-efficacy to engage in preventive behavior to the information carrier utility. As predicted, demographics have no significant relationship with utility of the Internet, and direct experience with illness resulted in negative relationship with the Internet utility. Contrary to expectations, susceptibility and severity produced negative relationships with the Internet utility. Result shows that both information-carrier factors – characteristics related to trust and utility related to perceived usefulness and relevance of information – directly affect online health-information-seeking behavior. Unlike the original CMIS that primarily focused on specific illnesses, the current modified CMIS can be adapted and tailored to general online health-information-seeking behavior.

Health information seeking is the purposeful acquisition of information from selected information carriers to fill a gap in specific health information needs (Lambert & Loiselle, 2007). Purposeful information seeking is often triggered by an event that threatens one's health or health of a loved one (Galarce, Ramanadhan, & Viswanath, 2011). Past research demonstrated that purposeful health information seeking may lead to better health outcomes by improving the individual's sense of control over his or her own health (Lee, Hwang, Hawkins, & Pingree, 2008; Manafo & Wong, 2012). For instance, acquiring adequate health knowledge has been associated with better patient participation in physician–patient interactions and improved adherence to treatment, thereby speeding recovery (Gray, Klein, Noyce, Sesselberg, & Cantrill, 2005). Similarly, previous studies performed by the Pew Research Center have found that online health information seekers report significant benefits to their health and well-being (Bjarndottir, Millery, Fleck, & Bakken, 2016). For example, online health information seeking has been found to improve provider–patient communication (Stevenson, Kerr, Murray, & Nazareth, 2007).

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Rains (2008) suggests that perceptions of one's Internet self-efficacy may play a key role in the information-seeking process. Individuals with high levels of perceived self-efficacy are expected to seek solutions through positive emotions and motivations (St. Hilaire, 2016). In India, the context of the present study, cultural factors such as religious affiliation, masculinity, and uncertainty avoidance were found to have a significant impact on self-efficacy beliefs (Engelhard & Garg, 2018). In fact, online health information seeking has been becoming increasingly popular in recent years (World Bank, 2014). It is the second online market with over 460 million Internet users and with predictions of growth to 511.89 million by 2020 (see www.statista.com). Internet penetration rate in India has increased rapidly during the past decades. In 2010, only 10% of the Indian population accessed the Internet, but this increased to 28% in 2016 (Lee & Lin, 2016). Overall, India presents a unique context in which to explore online health information seeking and to investigate the application of Comprehensive Model of Information Seeking (CMIS).

In general, health-information-seeking behavior has been examined in terms of the types of health information sought (i.e., treatment, disease management), the strategies used to obtain the information (i.e., asking, reading), or the source of the information (i.e., doctors, family, Internet) (Galarce et al., 2011; Lambert & Loiselle, 2007). This study focuses

on information source, in particular seeking health information from the Internet. The Internet has become one of the most popular health information source (Lee & Kim, 2015; Tustin, 2010) and is increasingly becoming integrated into our health-care system (Hartoonian, Ormseth, Hanson, Bantum, & Owen, 2014). An important benefit of online health information seeking is accessibility to a variety of health information (Cline & Haynes, 2001). Another significant benefit is that the Internet gives individuals more control over their own health care and knowledge about their conditions (Hartoonian et al., 2014). Further, Bjarndottir, Millery, Fleck, and Bakken (2016) note that online health information seeking can help with health-related decision-making, inform conversations with doctors, or motivate individuals to seek a second opinion and change behaviors and approaches to health care. Despite the benefits of seeking health information, Johnson's (2014) study found that many people engaged in avoidance and denial when confronting with health issues, resulting in lower levels of health-information-seeking behavior. Given the inconsistency of the degree to which people are willing to, able to, and actually seek health information, the purpose of this study is to investigate factors predicting online health information seeking in the context of India.

## Conceptual Framework

Johnson and Meischke (1993) proposed the CMIS which postulates that health-related factors (antecedents) determine information carrier factors (characteristics and utility), which in turn determine information-seeking actions (Johnson & Meischke, 1993). Antecedent factors determine individual predisposition to search for information from particular information carriers (Johnson, Donohue, Atkin, & Johnson, 1995). Thus, in CMIS, antecedent factors (demographics, direct experiences, salience, and beliefs) are considered to be the underlying imperative for an individual to seek information. Information carrier factors, characteristic, and utility are a person's information channel selection and usage (Johnson & Meischke, 1993). Information carrier factors thus shape the nature of the intentions to seek information from a particular medium. Both information carrier factors are predicted to affect the information-seeking actions taken by an individual. Information-seeking actions reflect the nature and outcome of information search (Johnson & Meischke, 1993). Figure 1 illustrates the original CMIS.

Three important gaps remain in the literature on CMIS. First, a large proportion of prior research has focused on information seeking within specific health contexts. Researchers have suggested breaking out of a health-specific context to examine general patterns in seeking health-care information broadening the application of CMIS (Johnson & Case, 2012; Kahlor, 2010). Second, the original CMIS primarily includes health-related antecedent variables, ignoring factors at the media level. Johnson and Case (2012) stated that existing knowledge base is a key element of direct experience that could affect information seeking. One's prior media use increases users' knowledge and skills, which would influence their subsequent information-seeking behavior. In addition, the original CMIS treats salience as one antecedent variable. However, as suggested by the Health Belief Model (HBM), susceptibility and severity are different concepts and should be two distinct aspects of salience (Downing-Matibag & Geisinger, 2009). Third, Hartoonian et al. (2014) noted that CMIS has only recently been applied to the Internet, and such factors facilitating online health information seeking are not well understood. Furthermore, Johnson and Case (2012) highlighted the importance of the Internet as an omnibus information channel that offers unique interactive properties for health information seeking. To fill these three voids in the CMIS literature, the current study extended the original CMIS by adding media use as an antecedent and separating salience into two dimensions – susceptibility and severity – and examining more general online health-information-seeking behavior. The following sections discuss the key variables of this study and provide evidence for the proposed pathways.

### *Media Use*

In the original CMIS, antecedents relate only to health-related factors. In the current study's modified CMIS,

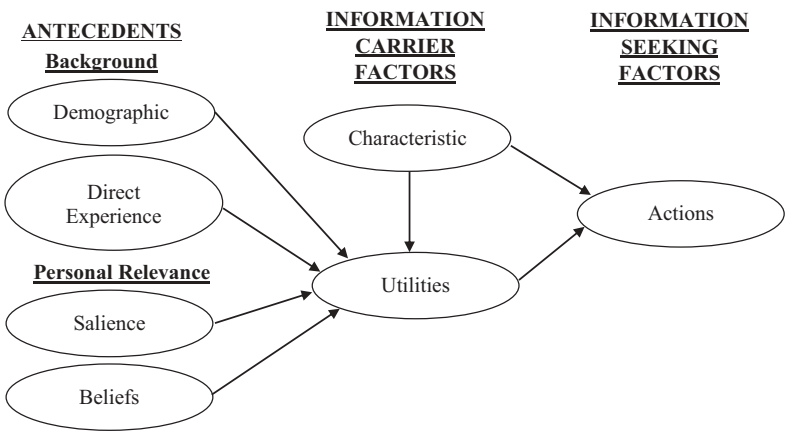


**Fig. 1.** Comprehensive model of health information seeking (Source: Johnson & Meischke, 1993, p. 345).

media use in terms of *length* and *frequency* of the Internet use has been added as antecedents. How often (i.e., frequency) an individual uses the Internet as well as how long (i.e., length) the individual has used the Internet may likely predispose the individual toward searching for information online. Prior media use could increase people's information base about the media and the topics. Length and frequency of the Internet use enable the information seeker to be familiar with the medium and heighten awareness such that the information seeker may be selective about the content. Thus, we argue that antecedent media use has the likelihood of ensuring selective information seeking through a familiar online context, which in turn facilitates the likelihood of finding relevant health information. In fact, Papacharissi and Rubin (2000) argued that information seeking suggests instrumental use of the medium (i.e., Internet) because individuals may be goal-directed in their behavior. Length and frequency of goal-directed Internet use are thus expected to relate positively with the information carrier characteristics and utility.

H1: Length and frequency of the Internet use are positively related to users' perceptions of characteristic and utility of the Internet.

### *Personal Background*

CMIS focuses on personal factors such as *demographics* and *direct exposure* relating to perception and use of health information sources (DeLorme, Huh, & Reid, 2011). Studies that examine general HISB have shown that age, gender, education, and income predict differential use of various health information resources (Han et al., 2010). However, demographic factors cease to matter once Internet access is provided (Brodie et al., 2000). Tustin (2010) argues that while demographic factors tell us who has access to the Internet and who does not, they are of limited value in predicting use of the Internet for health information seeking. Thus, in the modified CMIS, demographic variables are not expected to have any significant relationship with utility, i.e., relevancy and usefulness of the information found online to the individual's need.

H2: Demographic variables are not related to utility of the Internet.

In addition, direct exposure in CMIS is defined as the degree of direct experience with the disease personally or through one's personal network (DeLorme et al., 2011). Lin and Dutta (2017) found that, in India, the use of the Internet for general health information seeking was correlated with the uses of other channels such as family, friends, doctors, and newspapers. This is in line with research suggesting that individuals tend to choose between alternative health information sources depending on their perceptions of the media and the type of needs to be met (Lee & Lin, 2016; Lin & Dutta, 2017). In fact, Lee and Lin (2016) found that when people in India sought general health information and found one information source to be less effective in satisfying their specific needs (e.g., via the Internet), they turned to other sources (e.g., doctors) or vice versa. However, for disease-specific information search, we expect that people with direct experience are more likely to turn to their doctors for health information. According to a US-based national survey, when people had a strong need to get information about health or medical topics, more than 50% of them would go to doctors first (National Cancer Institute, 2014). In fact, health-care providers remain the most trusted channel for patients to get health information (Jiang & Street, 2017a).

H3: Direct experience with disease is negatively related to utility of the Internet.

### *Personal Relevance*

In CMIS, *salience* and *beliefs* are the two personal relevant factors that are expected to provide motivation for health information seeking. Salience, in the original CMIS, combines susceptibility and severity as proposed by the HBM. In CMIS, salience refers to the degree of perceived threat or personal significance regarding a health issue, and provides an underlying motive to seek information (Johnson & Meischke, 1993). In HBM, perceived susceptibility refers to one's subjective perception of the risk of contracting a condition (Downing-Matibag & Geisinger, 2009), while perceived severity refers to the subjective assessment of the severity (degree of seriousness) of a health problem and its potential consequence (Downing-Matibag & Geisinger, 2009).

When seeking health information online, we expect different search behaviors between perceived risk and perceived seriousness of the illness. Perceived susceptibility and perceived severity relate to the individual's perception of negative health outcomes (Carpenter, 2010) and in turn act as cues to action such as information seeking. For instance, those who consider the seriousness of their condition to be severe may search for information purposefully with certain search criteria in mind, while those who are at perceived risk may search for information less routinely as it is a subjective assessment of their own condition. Regardless of the search patterns and behaviors, in our modified CMIS, susceptibility and severity are expected to lead individuals to engage in health information seeking to reduce adverse health outcomes, and they are likely to find the information contained within the Internet to be relevant and useful to their health information needs.

H4a: Salience (susceptibility) is positively related to utility of the Internet.

H4b: Salience (severity) is positively related to utility of the Internet.

CMIS postulates that *belief* about self-efficacy is associated with health information seeking. Self-efficacy refers to the degree to which individuals believe that they are capable of implementing

preventive actions (Downing-Matibag & Geisinger, 2009). Johnson and Meischke (1993) note that information seeking is related to the extent to which individuals perceive they control the future or perceive that there are efficacious methods of prevention and control. Thus, this leads to seeking information that enables the individual to take preventive actions. In the modified CMIS, belief is the likelihood of an individual turning to the Internet and believing that it will provide relevant information to manage their risks of adverse health outcomes. Individuals' feelings of self-efficacy in searching for relevant information online have the likelihood of providing motivation for purposeful online health information seeking.

H5: Belief is positively related to utility of the Internet.

### *Information Carrier Factors*

CMIS posits a relationship between the information carrier factors and information-seeking actions (Johnson et al., 1995). CMIS identifies two factors related to information carrier: *characteristics* and *utility*. According to Johnson and Meischke (1993), characteristics primarily relate to message content attributes such as editorial tone (perceived credibility and intentions of the source) and communication potential (style and comprehensibility of the source). However, within CMIS, trust in an information source is expected to influence HISB (Ruppel, 2016). In fact, trust in the Internet has been found to be positively associated with using the Internet as a health information source (Selsky, Luta, Noone, Huerta, & Mandelblatt, 2013). In the modified CMIS, *characteristic* refers to the degree to which the Internet is considered a trustworthy source of information. The greater the trust of the medium, the more likely individuals will engage in online health information seeking.

H6: Characteristic of the Internet is positively related to online health information seeking.

While characteristic is an evaluation of a particular medium, *utility* is defined as the perceived usefulness of the information provided by the medium for a specific health situation (Johnson & Meischke, 1993). The higher the evaluation of trust of the medium, the greater will be an individual's perception of the utility of the medium (Johnson & Meischke, 1993). In the modified CMIS, the information obtained through the Internet is expected to relate directly to the needs of the individual. The final dimension of CMIS identifies utility as the readiness of the individual to engage in information seeking, and is expected to relate positively with health information seeking actions (Johnson & Meischke, 1993). In the modified CMIS, information-seeking actions reflects active online information seeking.

H7: Utility of the Internet is positively related to online health information seeking (Figure 2).

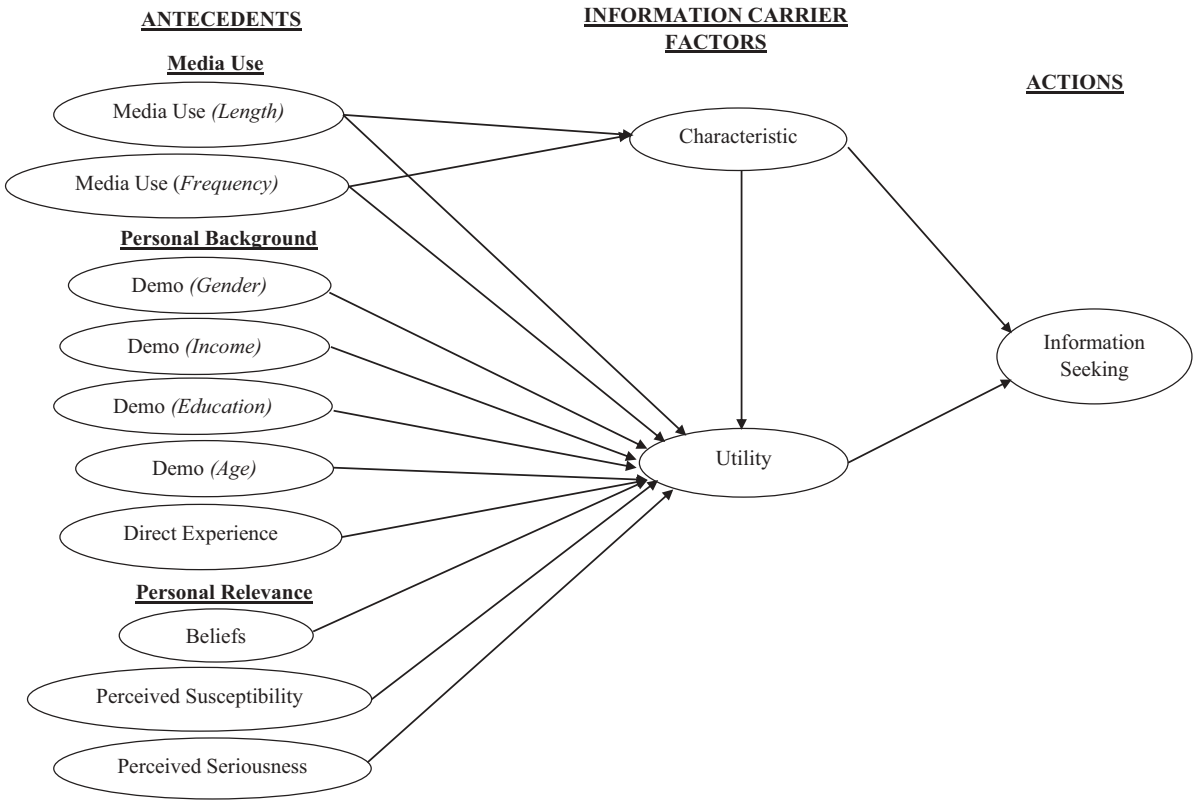


**Fig. 2.** Modified comprehensive model of online health information seeking.

## Method

Commercial marketing research firm recruited participants. Three inclusion criteria were set for the participants in India: first, they had to be Internet users; second, they had to be fluent in English; and third, they had to reside in India. With their technical skills, the company set up the online survey to filter the Internet protocol addresses to allow only Internet users who resided in India to see the invitation to participate. Thus, no survey panels or purchased list of names was used for the study. Any individual who went online in India had an equal chance of participating until we reached our target of 1000 respondents. In addition, the company transferred 10 Singapore dollars to participants once the survey was completed. The study received approval from the host institution's review board. The participants were asked to fill out an online participant information sheet and consent form. After discarding incomplete responses, we obtained a sample size of 990. Of the 990 valid responses, 686 (69.1%) were males and 307 (30.9%) were females. They ranged in age from 18 to 65 years, with a mean age of 29.2 years (*Mdn* = 27, *SD* = 8.2). The gender ratio in our sample fits with the larger male-dominated (71% male and 29% female) group of Indian Internet users (see www.statista.com). Similarly, the young age of respondents in this study is also generally in line with the general Indian population. More than 50% of the Indian population are below the age of 25 and more than 65% are below 35. It is expected that in 2020 the Indian population's average age will be 29 years (Shivakumar, 2013).

### *Antecedent Factors*

Media use was measured in terms of the *length* and *frequency* of the Internet use. Respondents answered, "how frequently do you access the Internet" on a 5-point scale ("1 = never, less than once a month, monthly, weekly, 5 = daily" at each of the seven locations [home, work, school, friends, family, neighbor, café]). A cumulative of all the different locations indicated overall frequency of the Internet use. Participants rated length of the Internet use on a 5-point Likert scale by responding to the question "how long have you been using the Internet" (1 = less than 12 months, 2 = 1 to 3 years, 3 = 3 to 5 years, 4 = 5 to 7 years, 5 = 7 years or more).

Personal background measurements included *demographic* indicators such as age, gender, education (1 = completed high school (12th grade), 2 = post-high school/12th grade training (vocational or technical), 3 = college graduate (baccalaureate level), 4 = postgraduate (graduate level)), and income in Indian rupees (1 = 10,000 and below; 2 = 10,001–20,000; 3 = 20,001–30,000; 4 = 30,001–40,000; 5 = 40,001–50,000; 6 = 50,001–60,000; 7 = 60,001–70,000; 8 = 70,001–80,000; 9 = 80,001–90,000; 10 = 90,001–100,000, 11 = more than 1 lakh). Respondents answered no (= 1) or yes (= 2) to whether they are "currently living with any forms of illnesses, diseases, or sickness" to indicate their *direct experience* with illness.

Personal relevance of illness indicated respondents' *personal beliefs* in illness management, *perceived susceptibility* of illness, and *perceived severity* of illness. The three indicators were all measured on a 5-point Likert-type scale (1 = strongly disagree and 5 = strongly agree). Personal beliefs in the disease were measured with seven items that asked the participants the extent to which they agreed with the statements saying they can "handle themselves," "accomplish their goals," and "manage the illness well" ($\alpha = 0.94$).

For perceived susceptibility, measurement of threat to current and future health used in prior CMIS studies (e.g., Hartoonian et al., 2014) was utilized and measured with four items that asked respondents to rate their perceived "chances of getting illnesses in the future" and whether their "physical health condition" or "family history" increase the chances of getting the illness (Cronbach's $\alpha = 0.87$). To measure perceived severity, participants indicated their agreement to three items (e.g., that their "whole life would change" and that it would be impossible to "handle the daily routine changes in life" if they had gotten some form of illnesses) ($\alpha = 0.85$).

An exploratory factor analysis via maximum likelihood rotation with direct oblimin was carried out to check for convergent and discriminant validity of perceived susceptibility and severity from the seven measured items. A two-factor solution, explaining about 59.1% of variance for first factor and 74.7% of total variances for two factors, was extracted (Kaiser–Meyer–Olkin = .87, Bartlet's $\chi^2 = 3764.47$, $p < .001$). The factor-loading item score for the four-item *perceived susceptibility* ranged .76 to .82 with highest cross-loading item = .29, and three-item *perceived severity* ranged from .76 to .87 with highest cross-loading item = .39. An independent multiple regression analysis to check for multicollinearity between the two factors was then done. Results revealed the two factors reliably influenced variances in information carrier outcomes independently with very good tolerance and VIF scores of .65 and 1.51, respectively.

### *Information Carrier Factors*

For information carrier factors, perceived characteristic of the medium (i.e., trustworthiness) (Johnson & Meischke, 1993; Ruppel, 2016) was measured with respondents indicating on a 5-point scale (1 = very little and 5 = very much, "to what extent do you think the Internet as a trustworthy source about providing illness related information?"). Perceived utility of the Internet, as suggested by HINTS (Health Information National Trends Survey), was measured on a 7-point Likert scale (1 = very much and 7 = very little), with four items asking respondents to rate whether "it took a lot of effort to get illness-related information you needed from the Internet," "felt frustrated during your search for illness-related information from the Internet," "you were concerned about the quality of illness-related information you received from the Internet," and "illness-related information you received from the following source was hard to understand") ($\alpha = 0.78$).

### *Information Seeking*

Information seeking focused on actual behavior rather than their intention to seek health information online. Thus, participants' online health-information-seeking behavior was

**Table 1.** Correlation matrix of model variables ($N$ = 990)

| | (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) | (j) | (k) | (l) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (a) Media Use *(Length)* ($M$ = 3.94, $SD$ = 1.65) | 1.00 | | | | | | | | | | | |
| (b) Media Use *(Frequency)* ($M$ = 28.5, $SD$ = 8.25) | .19*** | 1.00 | | | | | | | | | | |
| (c) Gender | .05 | .16** | 1.00 | | | | | | | | | |
| (d) Education ($M$ = 3.10, $SD$ = .87) | .17** | .02 | .16** | 1.00 | | | | | | | | |
| (e) Income ($M$ = 3.07, $SD$ = 2.54) | .11** | .04 | −.04 | .20*** | 1.00 | | | | | | | |
| (f) Age ($M$ = 29.02, $SD$ = 8.20) | .14** | .18** | .13** | .08* | .17** | 1.00 | | | | | | |
| (g) Direct Experience | .03 | −.02 | .02 | .01 | −.01 | .02 | 1.00 | | | | | |
| (h) Perceived Susceptibility ($M$ = 2.27, $SD$ = 1.53) | .13** | .24*** | .01 | .05 | .04 | .12** | .01 | 1.00 | | | | |
| (i) Perceived Seriousness ($M$ = 2.09, $SD$ = 1.57) | .14** | .25*** | .06* | −.01 | .01 | .10** | −.01 | .44*** | 1.00 | | | |
| (i) Beliefs ($M$ = 3.16, $SD$ = 1.20) | −.12** | .01 | −.02 | .01 | −.03 | −.11** | .01 | .24*** | .16** | 1.00 | | |
| (j) Characteristics ($M$ = 3.50, $SD$ = 1.38) | .18*** | .06* | −.05* | −.03 | −.02 | −.09* | .01 | .05 | .06 | .07* | 1.00 | |
| (k) Utility ($M$ = 3.95, $SD$ = 1.58) | .23*** | .33*** | .03 | .10** | .04 | −.02 | −.05 | −.22*** | −.37*** | .15** | .11** | 1.00 |
| (m) Information Seeking | .19*** | .17*** | −.03 | .07* | .06 | −.06 | .01 | −.10** | −.08** | .15** | .39*** | .24*** |

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

measured by responding "yes" or "no" to the question, "the most recent time you looked for illness-related information, did you go to the Internet?" About 58% ($n$ = 573) of respondents said "yes" (= 2) and the rest indicated "no" (= 1).

## Results

A structural path analysis for estimating a linear structural equation modeling (SEM) with diagonally weighted least squares was done with Lavaan Package in R to test the posited modified CMIS model. Table 1 shows the correlations, means, and standard deviations between the variables tested in the model. The correlations and their respective strengths showed no strong concerns with multicollinearity. The strongest correlations were primarily amongst those indicants of similar latent traits (e.g., susceptibility, perceived seriousness, and personal beliefs).

A preliminary analysis of the normality of continuous data showed kurtosis and skewness not exceeding 2 (Curran, West, & Finch, 1996). We take a good model fit for the structural path analysis to have a root mean square error of approximation (RMSEA) ≤.06, a comparative fit index (CFI) ≥.95 standardized root mean square residual (SRMR) <.08 (Hu & Bentler, 1999). Results showed the model fitting the data very well – $\chi^2$ (17) = 34.68, $p$ = .007, RMSEA = .03, CFI = .97, TLI = .93, SRMR = .02, 95% CI (.045, .052). Figure 3 shows the standardized pathway coefficients and variable relationships in the model.

To summarize the results, media use (i.e., frequency and length of Internet use) is positively related with the perceived characteristic and utility of the Internet for health information. Similarly, personal relevance factors, susceptibility, perceived seriousness of illness, and personal beliefs are directly related to the perceived utility of the Internet. Susceptibility (i.e., perceived risk) and severity (i.e., perceived seriousness) are, however, negatively related to perceived utility of the Internet, suggesting that the more one feels that a certain illness is serious and likely to happen to oneself, the less he or she finds the Internet to be useful. When it comes to the relationship between personal background and perceived utility of the Internet, demographics (age, gender, education, and income), except for a small positive influence from education level, do not determine the perceived utility of the Internet for health information. Whereas the hypothesis that the more direct experience one has with a particular illness, the less he or she would find the Internet to be useful for general health information seeking was not supported. As predicted, information-carrier-related factors, perceived characteristics of the medium (i.e., trustworthiness of information), and perceived utility of the Internet are directly related to health-related information-seeking behaviors, with perceived trustworthiness of the information on the Internet being positively related to the utility of the Internet for illness-related information. Table 2 further shows the significant indirect relationships between antecedent factors and online health-information-seeking behavior.

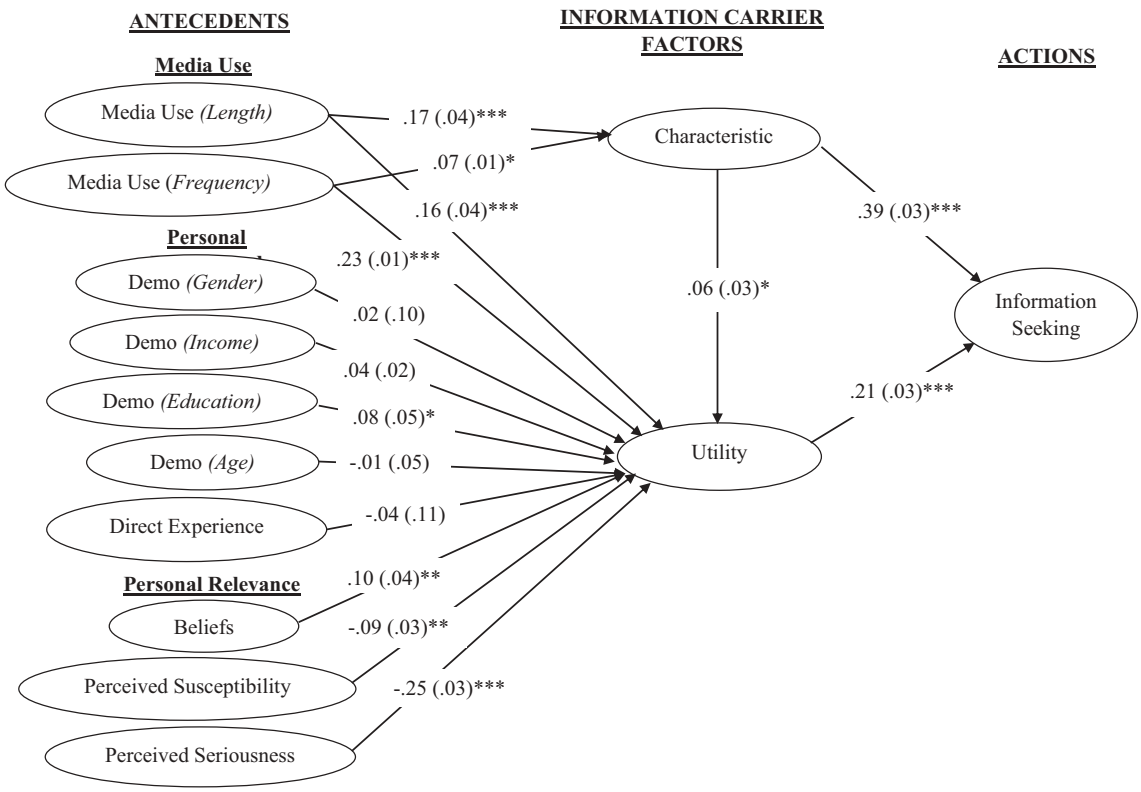


**Fig. 3.** Path analysis results ($N = 990$).
Note. Standardized regression outputs, SE in parentheses.
*$p < .05$, **$p < .01$, ***$p < .001$

**Table 2.** Significant indirect effects to online information seeking at 95% CI

| | Indirect effect | Lower CI | Upper CI |
|---|---|---|---|
| Media *(Length)* → Characteristic → Info seeking | .048 (.059) | .029 | .072 |
| Media *(Frequency)* → Characteristic → Info seeking | .128 (.151) | .165 | .093 |
| Education → Utility → Info seeking | .014 (.012) | .031 | .001 |
| Perceived susceptibility → Utility → Info seeking | −.012 (−.018) | −.014 | −.027 |
| Perceived seriousness → Utility → Info seeking | −.034 (−.042) | −.019 | −.054 |
| Beliefs → Utility → Info seeking | .014 (.016) | .031 | .012 |

Numbers in parentheses are standardized estimates. Path (bootstrapped at 5000 resamples).

## Discussion

This study sought to extend CMIS to general online health-information-seeking behavior. In doing so, the original model was adapted to the Internet by adding the antecedent variable *media use* – as well as drawing from the original HBM adapted salience, i.e., the personal relevance factor – to susceptibility and severity predicting likelihood of searching information online due to perceived risk and perceived seriousness of an illness. The findings revealed that length and frequency of Internet use led to the belief that the medium can be trustworthy, useful, and relevant. The longer and more frequently an individual uses the Internet, the more likely they are to be better at being selective with their information search. This ability to navigate familiar terrain and tailor the search can lead to greater probability that the information found is of value to the individual.

Contrary to the prediction that susceptibility and severity would be positively associated with the utility of the Internet, both factors were negatively related to the belief that the Internet is of use for health information. One possible reason for the inverse relationship may be because we asked about individuals' general HISB online rather than their illness-specific online search behavior. This suggests that perceived risk and severe chronic health condition may relate to differing patterns of search behavior than general online health information seeking. Prior research indicated that when thinking about seeking general health information, one's sense of need for additional knowledge may lack the urgency, while people with a specific health risk could be more proactive in seeking information about the specific health threat (Kahlor, 2010). Josefsson (2006) discussed four modes of information

seeking behavior: passive attention, passive search, active search, and ongoing search. People's search patterns could vary vastly depending on their specific health condition or the trajectory of their illness (Hartoonian et al., 2014). For example, at-risk patients may search for general information about prostate cancer from various sources (also suggested by channel complementarity theory; see Lin & Dutta, 2017) but the chances of engaging with primarily active offline information source are higher when the patient is diagnosed (Josefsson, 2006). However, Kahlor (2010) concluded that whether information-seeking patterns is consistent from one specific health context to the next remains unclear. Future studies can test the relationship between perceived susceptibility and severity with the utility of the Internet related to illness-specific search behavior.

Results show that, on the whole, antecedent personal background factors do not have much bearing on the utility of the Internet. This finding is in line with Tustin's (2010) argument and prior findings in HISB studies (Brodie et al., 2000; Han et al., 2010) that demographic factors can predict differential use of different health information sources but are of limited value in predicting use of the Internet for health information seeking. That said, the present study found that upon closer examination of specific demographic factors (age, gender, education, income), education can be positively related to utility of the Internet for illness-related information, albeit to a relatively small degree. Additionally, although previous studies supported the hypothesis that direct exposure was negatively associated with utility of the Internet (Hartoonian et al., 2014), the current finding shows that it is not significant. This insignificant relationship suggests that whether patients with specific illness consider the Internet use as useful and reliable is still unclear. On the one hand, a negative association between direct experience and utility of the Internet is plausible. Patients with direct experience of an illness may not perceive the Internet as useful largely due to the frustrating, confusing, and overwhelming online information environments (Jiang & Street, 2017b). Given such an experience, patients might turn to doctors for more professional assistance. On the other hand, a positive relationship is also possible. For example, patients may continue searching for information on the Internet that provides greater access to diverse information and perspectives, saves time and cost, and reduces the inconvenience of travel for consultation to a hospital (Cline & Haynes, 2001). The final antecedent personal relevance, belief (i.e., self-efficacy), has a strong association with the likelihood of finding the Internet useful for information searching. Individuals who believe they are capable of targeting their search and selecting quality health information are likely to find the medium useful and engage in online HISB.

Johnson, Andrews, and Allard (2001) noted that tests of the information carrier factors – characteristics and utility in health situations – suggest they work best with authoritative channels such as physicians. The current finding shows that this relationship between the medium factors can apply to the Internet as well. In other words, greater perceived trustworthiness of health-related information obtained from the Internet can lead to greater perceived utility of the medium for such information. Specifically, trust of the Internet strongly predicts likelihood of searching for illness-related information online. There is a strong positive relationship between utility, which is one's belief that information found online is useful, and his or her engagement in active information seeking online. This finding is supported by Technology Acceptance Model (TAM, Davis, 1989). TAM emphasizes that when people have positive attitudes towards a technology, they might actively use it for health information. In addition, people who perceive the technology as more useful would make greater efforts in overcoming any difficulty encountered during the usage process, and use the technology more frequently for desired information and reap more benefits.

Despite these findings, our study has several limitations. First, the use of Internet survey could limit the generalization of the findings. There is a selection bias that makes it impossible to apply our findings from Internet users to the general population. Future research should use probability samples to overcome this limitation. Furthermore, respondents in the study are mostly young people, thus reducing the representativeness of our sample in view of the larger population. Second, although SEM suggests a direction of influence, due to the cross-sectional research design, the causal relationships among variables could only be inferred. Future studies should ideally use longitudinal data or experiments to test the proposed model. Also, we have tested the modified CMIS model fit without accounting for between-model specification errors with the original CMIS model. Notwithstanding that results showed the specified extended model in current study fitting the data very well, we recommend future studies looking to extend the model to consider accounting for specification errors between models (see Fan, Thompson, & Wang, 1999). Third, two limitations relate to the measurement of online health information seeking. A single item was used. Future research should use multiple items to assess this construct. Also, we only asked respondents whether they used the Internet in their most recent health information search. Internet use is a multidimensional concept. Future research should consider the diversity of the Internet use. In addition, this study ignored different functions of Internet use. Given that the Internet is an omnibus channel that contains various functions, it is important to distinguish between different facets of Internet use (e.g., website browsing vs. search engine vs. social media). Without differentiating Internet use in this manner, significant effects may be obscured, hindering theoretical development. Fourth, due to the lack of information about the sampling frame, we failed to calculate the response rate. It is critical to understand the response rate as a low response rate could weaken the overall representativeness of the survey and the validity of the study. Last, survey studies have limitations due to self-reported data. In this study, participants may have forgotten their recent health-information-seeking behavior or over-/underestimated prior media use, which could impact our findings.

Despite these limitations, this study has important theoretical implications. First, it modified the original CMIS by adding prior media use as an antecedent factor, and separating salience into susceptibility and severity. This could enhance

the explanatory power of CMIS. Second, we offer new empirical evidence to the literature on CMIS by focusing on general health information seeking rather than a specific health issue. This strengthens the applicability of CMIS to predict health information seeking across health contexts. Third, our study demonstrates that the original CMIS not only predicts general health information seeking but also searches in an online environment. Last, this study supports the hypothesis that CMIS, which was proposed and primarily tested in Western societies, can be well applied to the Indian context. This opens up new research opportunities for health communication scholars to test theoretical frameworks cross-culturally. There are also some practical implications for health education and intervention in this digital era. To effectively motivate people to search for health information online, health communicators should encourage participants to use the Internet more frequently, even for non-health purposes. Further, given the difficulties they might encounter during online searching, interventions are needed to help people use the Internet more effectively and mitigate barriers (e.g., information overload, seeking credible information sources). In addition, considering the importance of self-efficacy, health-care organizations and providers should empower patients in the course of care and increase their self-efficacy skills to use various health information sources to manage their own health.

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