

Social structure, technological efficacy, and online health information seeking: A test of the integrative model of online health information seeking

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Abstract

Drawing warrant from Integrative Model of Online Health Information Seeking, this article examines the direct effects of race and socio – economic status (SES) on online health information seeking (OHIS). It also examines the mediating effect of technological efficacy on the influence of race and SES on OHIS. Using secondary data from survey (N = 3014) conducted by Pew Internet & American Life Project by Pew Research Center, results suggest that education and employment have direct effects on OHIS. Moreover, education and employment status influence OHIS through technological efficacy. In other words, people who completed higher levels of education and who were employed were likely to be competent in using the Internet, and in turn, were likely to engage in OHIS. Alarming, these findings partially support the claim that the unfavorable influence of social structures on knowledge, attitude, and practice with regard to health also permeates the Internet. Implications to health communication theory and research are discussed.

Key Words: Online health information seeking, Technological efficacy

Introduction

While the goal of “...healthier, more prosperous, and more productive lives” (Sebelius, 2013 April, About HHS) for all Americans may be noble, the state of health in the United States, in spite of the fact that 20% of the GDP is devoted to healthcare (Brill, 2013 March), is in complete mess (Navarro, 2003). Increase in mortality due to heart disease, cancer, and stroke, compounded by uncontained health inequity (Hoyert, 2012), has prevented most Americans from believing that the goal of health for all is possible.

Central to the issue of health is affordability and accessibility of healthcare coverage, that is, “more than one in five Americans remain uninsured” (Bass, 2013 April, sub – headline). As healthcare access becomes inequitable, those from marginalized populations are systematically pushed to receive the first blow (Agency for Healthcare Research and Quality, 2012). At present however, little is known about the mechanisms into which social structures exert unfavorable influence on healthcare.

Health and communication are moving in opposite directions, that is, while communication, particularly new media, is advancing, health is

deteriorating. Critically addressing this divergence is one of the ways that health communication has used to gain legitimacy. As the Internet continues to penetrate American society within the larger landscape of a healthcare system that is close to collapse, the need to examine the ways in which people use new media to achieve better health is long overdue.

Drawing warrant from the Integrative Model of Online Health Information Seeking (IMOHIS hereafter) (Dutta, Bodie, & Basu, 2008) and evidence from Pew Internet & American Life Project (2012), this article intends to address three objectives. First, it examines the influence of socio – economic status (SES hereafter) and race on online health information – seeking (OHIS hereafter). Second, it examines the influence of technological efficacy on OHIS. Third, it examines the extent to which technological efficacy explains the influence of SES and race on OHIS.

This article attempts to contribute to health communication in terms of theory and research. By engaging IMOHIS, it partially addresses the concern towards a dominantly atheoretical scholarship in health communication (Kim, Park, Yoo, & Shen, 2010). Moreover, this article provides tentative evidence for IMOHIS based on large and representative secondary survey data from Pew Internet & American Life Project (2012).

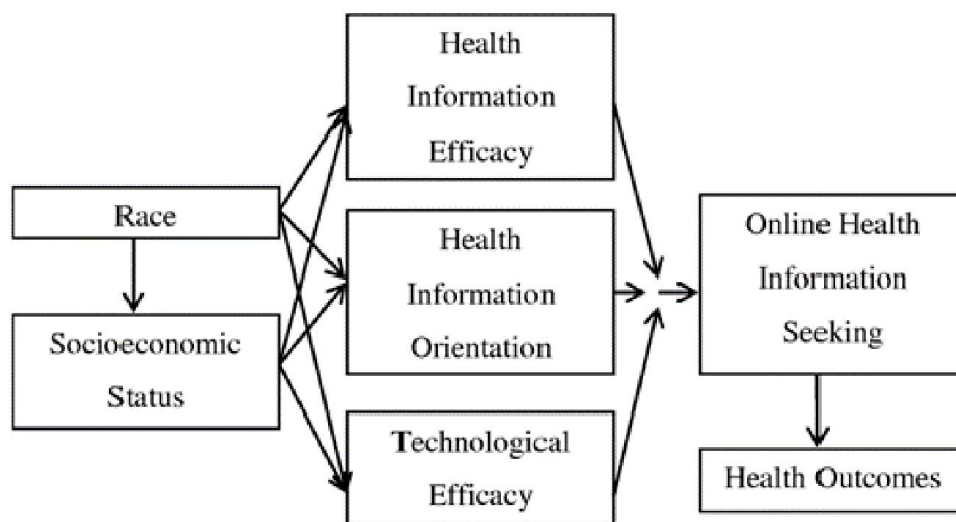
Conceptual framework, proposed technological efficacy – mediation model, and hypotheses

At the core of IMOHIS is the claim that “macro – level disparities in social structures play out in the realm of individual level – differences in motivation and ability, thus connecting the broader structures in social systems with the micro – level or individual contexts” (Dutta et al., 2008, p. 181). It focuses on race and SES as social structural factors and health information orientation, health information efficacy, and technological efficacy as individual factors that may facilitate or limit “the interaction of an individual—consumer, patient, caregiver, or professional—with or through an electronic device or communication technology to access or transmit

health information or to receive guidance and support on a health – related issue” (Robinson, Patrick, Eng, & Gustafson, 1998, p. 1264).

As a conceptual framework, IMOHIS puts emphasis on consumers (Dutta & Bodie, 2008) and supports the shift from biomedical to social constructionist approach in health communication (Sharf & Vanderford, 2003). While it places premium on consumers, IMOHIS also posits that motivation and ability are shaped by “the larger picture in which the potential user operates, an information system is developed and operates, and potential information may become available” (Rice, McCreedinlie, & Chang, 2001, p. 56). Figure 1 illustrates the Integrative Model of One Health Information Seeking.

Figure 1 Integrative Model of Online Health Information Seeking



Source: Dutta et al., 2008

IMOHIS claims that the influence of racial and ethnic disparities on health extends to the Internet as manifested by OHIS, that is, Whites are more likely to reside in households with computers that have modems and broadband connection as opposed to non-Whites (Dutta et al., 2008). Comparably, the influence of gaps in income, education, and employment status on health of Americans (Detsky, 2014 June 11) is also reflected in OHIS. Race and SES influence OHIS through psychological mechanisms such as health information orientation, health information efficacy, and/ or

technological efficacy (Dutta et al., 2008).

Among the three psychological mechanisms outlined by Dutta and colleagues (2008), efficacy in general has been consistently found to be a significant and positive predictor of health – promoting behaviors (Shaw et al., 2008). In terms of health information seeking, efficacy has been investigated using the conceptualization of self and response by Rosenstock, Strecher, and Becker (1988). Following the concept of self – efficacy, Bassu and Dutta (2008) proposed health information efficacy which is the “perceived ability of an individual to seek out health information as and when there is a need or desire to do so”

(p. 73).

Further expanding the psychological approaches to health information seeking is health information orientation or “the extent to which the individual is willing to look for health information” (Dutta – Bergman, 2004, p. 275). People with high level of involvement with regard to health, as Dutta – Bergman (2005) claims, are also highly likely to seek health information consciously. As IMOHIS further explains, the “motivation to engage in health producing behaviors triggers the active search for health information through a variety of channels, including the Internet” (Dutta & Bodie, 2008, p. 245).

In contrast to broad health information seeking frameworks, IMOHIS offers a more nuanced individual – level antecedent to OHIS in the form of technological efficacy. Dutta et al., (2008) conceptualized technological efficacy as “the extent to which individuals perceive their ability to navigate communication technologies” (p. 185). While all the mechanisms are important in providing a relatively complete explanation of OHIS as determined by race and SES, technological efficacy has not been given adequate attention. Figure 2 illustrates the proposed technological efficacy – mediation model.

Figure 2. Proposed technological efficacy – mediated model



Based on Figure 2, this article predicts that (H1a) race and (H1b) SES will influence OHIS. It is warranted to believe that race and SES will influence health behaviors in general (Taylor – Clark, Koh, & Viswanath, 2007) and health information seeking in particular (Johnson & Meischke, 1993). In contrast to non – Whites, Whites who were diagnosed with breast cancer were more likely to use the World Wide Web to seek information about breast health/women’s health issues (Fogel, Albert, Schnabel, Ditkoff, & Neugut, 2002). Likewise, Hispanic and African American breast cancer patients engaged in OHIS at an extremely low rate (Talosig – Garcia & Davis, 2005).

When framed from IMOHIS, the findings of Fogel et al., (2002) and Talosig – Garcia and Davis (2005) reveal that minorities in the United States do not necessarily benefit from increasing amounts of online health information. Most recently, Song, Cramer, and Roy (2014) found that the Internet was the least likely source of health information among minority men who are at risk of prostate cancer. Aside

from race (Hong, 2008), SES also influences OHIS, that is, the extent to which Americans may benefit from seeking health information online depends on their educational background and household income (Rains, 2008).

Consistent with knowledge – gap hypothesis (Donohue, Tichenor, & Olien, 1975; Tichenor, Donohue, & Olien, 1970) and more recently the structural influence model of communication (SIM) (Taylor – Clark et al., 2007), IMOHIS claims OHIS is socially influenced (Rice et al., 2001) particularly by education, income, and employment status (Dutta et al., 2008). Drawing secondary survey data from 2000 General Social Survey, Cotten and Gupta (2003) found that Americans who engaged in OHIS differed from those who did not in terms of education and income. For example, online health seekers were more likely to have undergraduate degrees or higher unlike non – seekers (Cotten & Gupta, 2003).

In their survey with 224 women, Satterlund, McCaul, and Sandgren (2003) found that continuous online health information seeking even after breast cancer treatment was more likely to occur among those who completed longer years of education. Peterson and Fretz (2003) also found that in contrast to those who are Internet

users, patients who do not use the Internet reported to have completed high school education or less. As Anker, Reinhart, and Feeley (2011) claim, education and race predispose people to engage in health information seeking behavior.

Does household income influence OHIS in the same way that race and education do? Evidence suggests that people who earn more likely to seek information online (Fogel, Morgan, & Davis, 2005; Rice, 2006). In their survey with 161 women diagnosed with breast cancer, Fogel et al., (2005) found that Internet users differed significantly from non – Internet users in terms of household income. On the one hand, 92 non – internet users, 34 had family income lower than 60,000USD (Fogel et al., 2005). On the other hand, among 69 Internet users 35 had family income higher than 100,000USD (Fogel et al., 2005).

Similar to other SES, does employment status facilitate OHIS? Compared to education and income, employment status is not well examined. However, Rice (2006) noted that those who were not employed full time were more likely to engage in OHIS than their full-time employed counterparts. Based on a Pew Internet and American Life Project data set ($N=2,109$), Rice (2006) found that employment was one of the strongest predictors to engage in OHIS. One of the probable explanations as to why those who were not employed full – time were more likely to engage in OHIS is economic constraints on access to information (Rice et al., 2001).

Referring to Figure 2, this article also predicts that (H2) technological efficacy will influence OHIS. Dutta et al., (2008) noted that “technological efficacy impacts the extent to which the youth are likely to navigate communication technologies to fulfill their health information needs” (p. 185). In contrast to race and SES, technological efficacy focuses on perceived ability or actual behavior of using the Internet to engage in OHIS. For example, those who are familiar with features of the World Wide Web as manifested in their occasional use of email are likely to engage in OHIS.

The claim of IMOHIS that OHIS is related to disposition towards and/ or ability to use channels and/ or sources of information is consistent with the Comprehensive Model of Information Seeking (CMIS), that is, information carrier characteristics and utility influence the extent to which women seek cancer – related information from magazines (Johnson & Meishcke, 1993). To illustrate, Oh, Zhou, Kreps, and Kim (2013) found that trust in health information found in the Internet was positively related to reading online health information. Consistent with

the evidence for CMIS, Anker et al., (2013) note that “frequency of information source/ channel use”, “information/source credibility”, and “information sources channels utilized” (p. 348) predict health information seeking behavior.

Equally interesting is that the second – level digital divide (Hargittai, 2002) can be appropriately framed within IMOHIS. Hargittai (2002) proposed the need to go beyond the first – level digital divide that is centered on access (St. Amant, 2011) by focusing on differences in online skills. For example, Buente and Robin (2008) found that experience was as important as access in managing digital divide. The finding of Buente and Robin was echoed by Zillien and Hargittai (2009) by noting that “Digital inequalities might be mitigated by improving people’s Internet equipment and digital experience, but they do not account for all the status differential in use” (p. 274).

If race, SES, and technological efficacy influence OHIS, is it conceptually and empirically conceivable to believe that race and SES indirectly influence OHIS through technological efficacy? As illustrated in Figure 2, this article hypothesizes that (H3) technological efficacy will mediate the influence of (a) race and (b) socio – economic status on OHIS. IMOHIS claims that technological efficacy is one of the mechanisms that can explain why structural level factors are likely to limit OHIS (Dutta & Bodie, 2008). It also reinforces the point that infrastructure access must be coupled with training programs related to use and evaluation aimed at improving digital skills (van Deursen & van Dijk, 2011). Dutta et al., (2008) further elaborated that “Dispositions come from social, cultural, and economic surroundings and are reinforced (rather than changed) by school and peer environments” (p. 185).

The claim of IMOHIS is further conceptually warranted by first – and second – level digital divide (Hargittai, 2002) and “technocapital” (Rojas, Straubhaar, Roychowdhury, & Okur, 2004, p. 108). Hargittai (2002) explains that race and SES reinforce digital divide not just through differential access but also with differential attitude and skills, that is, “People may have technical access, but they may still continue to lack effective access in that they may not know how to extract information for their needs from the Web” (¶ 40). Drawing insight from the sociology of Bourdieu, Rojas et al., (2004) proposed “technocapital” (p. 108) which reflects the importance of cultural capital within the backdrop of Internet use.

The extent to which technological efficacy can reduce or reinforce the unfavorable influence of race and SES has been partially tested by introducing technologies into underserved communities and providing training to users. Drawing evidence from breast cancer patients, Gustafson et al., (2005) reported an increase in use of Comprehensive Health Enhancement Support System (CHESS) among women after training. Similarly, Salovey et

al., (2009) found that peer – to – peer training improved OHIS of parents with children who were enrolled in community technology centers (CTC).

As outlined above, there are conceptual and programmatic reasons to focus on technological efficacy. First, technological efficacy is germane to OHIS but has been overlooked in health communication. Second, it further explains first – and second – level digital divide (Hargittai, 2002). Aside from being the first to problematize the link between race and SES and OHIS through technological efficacy, this article is also the first to frame digital divide in health communication based on IMOHIS.

Third, programs designed to improve OHIS among underprivileged groups can proceed with training after improving access. For example, the introduction of Internet – based system among low – income women in Wisconsin and Michigan (Gustafson et al., 2005) can become sustainable by strengthening technological efficacy of recipients.

In summary, evidence points that race and SES directly influence OHIS. Likewise, race and education exert their influence through individual – level variables related to disposition towards and competence in using the Internet. While evidence towards first – and second – level digital divide has relatively progressed, theoretical or conceptual efforts have been extremely limited. Through IMOHIS, the claim that social structural factors influence OHIS through technological efficacy becomes justifiable.

Methods, Measures, and Analytic Strategy

This article used secondary data from interview – assisted survey of adults ($N = 3014$) in the United States as part of Pew Internet & American Life Project by Pew Research Center and is reported in *Health Online 2013* (Pew Research Center, 2013 January 15). Data were collected from August 7 to September 6, 2012 using English and Spanish (Pew Internet & American Life Project, 2012). Using landline and mobile random digital dial samples, Pew Internet & American Life Project (2012) included respondents who had access to either landline or mobile phones.

Findings from Pew Internet & American Life Project by Pew Research Center have been cited in a number of studies (e.g., Cline & Haynes, 2001; Prestin & Chou, 2014). Increased validity of survey questions is also supported (Neumark, Lopez – Quintero, Feldman, Allen, & Shtarkshall, 2013). The outcome variable was OHIS and measured by the question of “Have you ever gone online specifically to try to figure out what medical condition you or

someone else might have?” While a “Yes” response was coded as 1, a “No” response was coded as 0.

The predictor variables were race, SES, and technological efficacy. Respondents were asked to report their education, income, and employment status. Dummy variables were coded for race (“White” = 0 and “Others” = 1) and employment status (“Employed full – time”, “Employed “part – time”, and “Have own business/self – employed” = 0 and “Others” = 1). Technological efficacy was measured by the question of “Do you send or receive email, at least occasionally?” While a “Yes” response was coded as 1, a “No” response was coded as 0. Using “Do you send or receive email, at least occasionally?” as proxy measure for technological efficacy is warranted for it partially indicates disposition and ability.

To test H1a, H1b, and H2, three binary logistic regressions were conducted using IBM SPSS Statistics 22. Using binary logistic regression was appropriate because OHIS and technological efficacy were categorical variables. To test H3a and H3b, $Z_{Mediation}$ was used for OHIS was categorical (Iacobucci, 2012). Through $Z_{Mediation}$ that “allows for the translation and combination of OLS and logistic regression results” (Iacobucci, 2012, p. 593), it is now possible to engage with mediation analyses with categorical outcome variable.

Results

H1a, H1b, and H2 were tested by binomial logistic regression analysis. While H1a was not supported, H1b was partially supported. Race was not a predictor of OHIS, that is, being white did not increase the likelihood of seeking health information online for self or others. H1b was partially supported because education and employment status predicted OHIS while income did not. Education positively predicted OHIS, that is, people who completed longer years of education were highly likely to seek health information online.

Surprisingly, it was not income but employment status that influenced—albeit in a different direction—OHIS. Increased income was not likely to result in seeking of health information. With regard to employment status, people who are employed are highly likely to seek health information in contrast to their unemployed counterparts. Meanwhile, four separate $Z_{Mediation}$ were conducted to test H3a and H3b by following the steps specified by Iacobucci (2012).

Consistent with H1a, H3a was not supported. Technological efficacy did not mediate the influence of race on OHIS. Similar to H1b, H3b was partially supported. Technological efficacy mediated the influence of education and employment status but not income on OHIS. Tables 1 and 2 show the results of a three – step $Z_{Mediation}$ procedure to test the mediating influence of technological efficacy.

Table 1 Test of Technological efficacy as a Mediator between Education and Online Health Information

Seeking

Steps	Z _{Mediation}
1	Education influences online health information seeking (B = -.069, SE = .026)
2	Education influences technological efficacy (a = -.568, S _a = .029)
3	Education and technological efficacy influence online health information seeking (b = -.478, S _b = .199)
4.	Technological efficacy mediates the influence of education on online health information seeking (Z _{Mediation} = 2.37 > 1.96 , a = 0.05)

Table 2 Test of Technological efficacy as a Mediator between Employment Status and Online Health Information Seeking

Steps	Z _{Mediation}
1	Employment status influences online health information seeking (B = -.371, SE = .099)
2	Employment influences technological efficacy (a = -1.256, S _a = .087)
3	Employment status and technological efficacy influence online health information seeking (b = -.532, S _b = .196)
4.	Technological efficacy mediates the influence of income on online health information seeking (Z _{Mediation} = 2.66 > 1.96 , a = 0.05)

The mediating influence of technological efficacy on the relationship between education and OHIS is captured in Table 1. Aside from illustrating the influence of education on technological efficacy and OHIS, Table 1 reveals that OHIS is also influenced when education and technological efficacy are simultaneously considered.

In the same way, Table 2 shows the mediating influence of technological efficacy on the relationship between employment status and OHIS. It also reveals that OHIS is also influenced when employment status and technological efficacy are taken into account. In summary, the results provide partial yet nuanced support for IMOHIS, that is, education and employment status exert their influence on OHIS through technological efficacy.

Discussion and Limitations

The objective of this article was three – fold. First, it examined the influence of race and SES on OHIS. Next, it examined the influence of technological efficacy on OHIS. Third, it examined the extent to which the influence of race and SES on OHIS can be explained by technological efficacy. While race and income do not influence OHIS, education and employment do – albeit in different ways. In addition, technological efficacy promotes OHIS. Most interestingly, the process into which education and employment lead to OHIS can be explained by technological efficacy. In the context of seeking online health information, the results – when taken together – suggest that education is a “double – edged sword”.

First – level digital divide in health

communication is an issue closer to education than income – although they are difficult to separate. Seeking online health information, similar to the findings of Cheong (2007), Satterlund et al., (2003), and van Deursen and van Dijk (2011), is more difficult for people with low level of education than those with high level of education. As a framework, IMOHIS emphasizes that disparities in education are reflected in health behaviors (Dutta et al., 2008), such that, people with longer years of formal education are likely to evaluate the completeness of online health messages with ease (Dutta – Bergman, 2004). Education provides people with cognitive resources necessary for making sense of various, difficult, and often conflicting health messages found online. Likewise, it sharpens the skills of individuals to cope with the fast changing hard – and software technologies that serve as platform to disseminate health information.

As characterized by IMOHIS, structural deprivation is not monolithic and needs to be situated in the overall status of individuals (Dutta et al., 2008). Consistent with IMOHIS, ecological models (Cheong, 2007), knowledge – gap hypothesis (Donohue et al., 1975; Tichenor, et al., 1970) and SIM (Taylor – Clark et al., 2007) locate health behaviors in broader healthcare landscape by including socio – economic and cultural factors (Berkman & Glass, 2000). However, evidence suggests that income may have limited influence on OHIS—a departure from the finding of Cotten and Gupta (2004) and Ginossar and Nelson (2010) yet consistent with that of Rains (2008). A potential explanation is the availability of health websites that do not require payment ranging from Medline Plus (Cline & Haynes, 2001) to blogs (Rains & Keating, 2015). Yet availability of health web pages does not necessarily result in their use because literacy and computer skills

matter more for OHIS. While it is good news for people who earn less, the finding is another bad news for those who are less educated. As opposed to their counterparts with high levels of literacy and skills, people who have limited education are less likely to engage in OHIS. During OHIS, they continue to face barriers including – but not limited to – overwhelming quantity and poor quality of information (Owen, Fotheringham, & Marcus, 2002).

As raised by Orgad (2006), the Internet is dominated by values, in this case that of medicine, that tends to exclude other meanings. Instead of blindly perpetuating the unquestionable value of education as the first and only solution to reduce health inequity, there is a further justification to cut the constricting thread that binds the Internet to a medical – centric perspective. Blaming the less educated for their health outcomes has become theoretically unproductive for health communication. In support of Gallant, Irizarry, Boone and Ruiz – Gordon (2010), this article highlights the need to shift the puzzle from “Why do less educated people have difficult time in seeking health information?” to “Why is health information in general and online health information particular too difficult to seek and understand?”. By asking a different question, health information sources become accountable for health inequity.

In showing the extent to which education can prohibit OHIS, this article offers potential research and programmatic directions to reduce health inequity resulting from explosion of health information in the Internet. First, research concerning OHIS should not disregard socio – economic status in general and education in particular. To conceive online health behaviors as partially determined by structural factors is not without warrant specifically if framed through IMOHIS. Second, the heuristic value of IMOHIS can be enhanced by incorporating health literacy or “degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions” (Parker & Ratzan, 2010, p. 20). Even with Internet access, low levels of health literacy reduced the use of an Internet – based portal among patients diagnosed with diabetes (Sarkar et al., 2010). Third, caution must be exercised in implementing health promotion or education programs without regard to their consequences on knowledge – gap.

The effect of education, compounded by online disposition and skills with regard to the Internet, extends to the ability of people to seek online health information for themselves and others. Consistent with a long line of research about efficacy in general (Bandura, 1997) and health efficacy in

particular (Shaw et al., 2008), this article reinforces the extent to which cognitive processes relate to health – enhancing behaviors. Likewise, it extends the boundaries of the relationship between efficacy and health information seeking from interpersonal and traditional mediated sources to the Internet (Basu & Dutta, 2008). However, it differs from the literature in at least two ways. First, instead of perpetuating the unhelpful dichotomy between individual and structural factors, this article engages both to account for differences in health behaviors. To be more specific, it offers evidence that education constraints OHIS through efficacy. Second, instead of focusing on broad or different conceptualizations (i.e., self or response), this article focuses on technological efficacy. As proposed by Bandura (1997), efficacy should be conceptualized and measured based on the domain of specific interest – in this case online health information seeking. While Van Deursen and van Dijk (2011) identified medium – and content – related Internet skills, this article illustrates that these skills can be integrated at the conceptual level at least in terms of OHIS. Technological efficacy enriches the operational experience of individuals which partially explains the influence of education and OHIS. To date, this article is one of the few to use and offer evidence for IMOHIS.

What does it mean for health communication programs? At first, it may seem that health information for those who do not have advanced degrees should be disseminated in media or interpersonal sources other than the Internet. For example, among African – Americans, television was the most frequent source of information followed by mothers (Kurtz, Kurtz, Johnson, & Cooper, 2001). It is worthy to note that frequent seeking of information using a number of sources and channels does not necessarily mean preference. People may seek information from other sources primarily based on contextual or situational factors such as accessibility (Lambert & Loisele, 2007; Laz & Berenson, 2013) and trust (Oh et al., 2013). By showing that technological efficacy mediates the relationship between education and OHIS, this article further extends “technocapital” (Rojas et al., 2004, p. 108) in the context of health behaviors. To understand further the second – level digital divide (Hargittai, 2002), Rojas et al., (2004) proposed that cognition, motivation, and skills related to OHIS must be examined together with cultural, social, and economic resources. Underserved communities may seek information from the most immediately available source. But when given access to Internet, is there evidence that underserved communities will use the medium to seek for health information?

While this article does not have data to answer the question, it draws evidence from Gustafson et al., (2005), Laz and Berenson (2013), and Salovey et al., (2009) who found that women from underserved communities are likely

to seek health information online when given access. An important condition that needs to be emphasized is that access to Internet does not necessarily result in OHIS (Bass et al., 2006; Sarkar et al., 2010) particularly for people with limited education. The Internet, despite its shortcomings, continues to be a promising source and/ or channel for health information when further training is given to intended audiences. Information and strategic Internet skills must be given attention during training programs (van Deursen & van Dijk, 2011). As illustrated by this article, “The absence of capacity – building infrastructures in minority communities (such as training programs, educational opportunities in schools, support networks promoting technology, and technology – promoting messages) systematically contribute – butes to the low levels of technological efficacy in these underserved communities” (Dutta et al., 2008, pp. 185 – 186). A lesson to be reinforced is that when designing health communication programs online for marginalized populations there is a need to prioritize their dispositions and skills before actual implementation. In addition, continuous support must be available as they might encounter barriers while engaging in OHIS. With low level of technological efficacy, “people may be discouraged by the difficulties of finding information on the Web and thus may end up spending less time with the medium” (Hargittai, 2002, ¶39).

Improving technological efficacy to reduce the negative effects of education on health behaviors is warranted by IMOHIS and this article. Health

communication programs with training components have shown that by enhancing “technocapital” (Rojas et al., 2004, p. 108) of patients as well as their social networks can promote positive health behaviors. Technological efficacy can explain why patients who had hands – on experience with CHES had more psychological resources than those who were exposed to educational videos (Gustafson et al., 2005). To enhance knowledge about computers and cancer health information seeking, Salovey et al., (2009) included operational, formal, information, and strategic Internet skills (van Deursen & van Dijk, 2011) in their computer training programs.

Results outlined in this article must be interpreted with caution based on limitations resulting from secondary data. First, a relatively complete explanation as to why race and SES exert their influence can be forwarded if all mediators have been tested. Second, OHIS was measured without taking into account the extent or variance. Third, this article relied on single and categorical item to measure technological efficacy. Despite the limitations, this article has substantial contribution to health communication.

At the conceptual level, it is the one of the few articles to link first – and second – level digital divide to IMOHIS. Aside from using population – based data to test IMOHIS, this article contributes to method by testing mediation analysis of categorical outcome variable through *ZMediation*. Compared to other articles based on secondary data, this article is strongly informed by theory. As indicated by the results, programs aimed at increasing the amounts of health information online must take into account both access of and training across underserved communities.

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