Understanding Health Literacy for Strategic Health Marketing: eHealth Literacy, Health Disparities, and the Digital Divide

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ABSTRACT. Even despite policy efforts aimed at reducing health-related disparities, evidence mounts that population-level gaps in literacy and healthcare quality are increasing. This widening of disparities in American culture is likely to worsen over the coming years due, in part, to our increasing reliance on Internet-based technologies to disseminate health information and services. The purpose of the current article is to incorporate health literacy into an Integrative Model of eHealth Use. We argue for this theoretical understanding of eHealth literacy and propose that macro-level disparities in social structures are connected to health disparities through the micro-level conduits of eHealth literacy, motivation, and ability. In other words, structural inequities reinforce themselves and continue to contribute to healthcare disparities through the differential distribution of technologies that simultaneously enhance and impede literacy, motivation, and ability of different groups (and individuals) in the

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population. We conclude the article by suggesting pragmatic implications of our analysis.

The importance of literacy in today's society has been clearly marked by reports such as the National Assessment of Adult Literacy (Kutner et al., 2006). Data from 2003 shows that individuals with lower levels of functional literacy–the ability to use "printed and written information to function in society, to achieve one's goals, and to develop one's knowledge and potential" (p. 2)–are less likely to be employed full- or part-time and earn over $500 per week when employed full-time; to be involved in civic engagement activities such as voting and volunteering; to obtain information about current events, public affairs, and the government from any source other than television; and to use e-mail or the Internet for any purpose. Moreover, children of low-literacy adults are more likely to experience trouble in their own literacy development both in the home and within formal educational settings (Purcell-Gates, 1996; Snow et al., 1991).

Perhaps one of the most important contexts for literacy is in the realm of health. The difference between being functionally literate and being functionally illiterate in the context of processing, understanding, and being able to make appropriate decisions with health information might mean the difference between taking a recommended or fatal dosage of medication or the difference between adhering to and seemingly ignoring the advice of a physician. In fact, Rudd et al. (2004) claim that health literacy "may be a contributing factor to the wide disparities that have been observed in the quality of healthcare that many receive" (p. 1). Understanding health literacy is particularly relevant for health marketers as it (a) provides guidelines for health marketers to develop targeted and tailored communication materials for relevant consumer segments, and (b) suggests appropriate strategies for training the health illiterate segment of the population.

Several reports and studies converge to suggest a stable relationship between health literacy skills and several health outcomes (see Berkman et al., 2004). For instance, as health literacy increases, the utilization of healthcare services including preventative services such

as mammography and Pap smears and knowledge of specific behaviors or conditions (e.g., smoking, contraception, HIV/AIDS) also increases. That markers of literacy and markers of healthcare quality are closely related provides ground for theoretical development and pragmatic attention. In this context then, one of the key tasks facing health marketers is the development of relevant programming designed to improve the health literacy levels of the population, and to develop appropriate health messages that meet the health literacy levels of the target segment.

The importance of these differences in health literacy is further highlighted by the fact that typical patterns of inequality are found between those high and low on these skills. As reported by Rudd et al. (2004), performance on health literacy tasks is related to education, income, country of birth, age, and race/ethnicity. Specifically, individuals who report more educational attainment, higher income, and Caucasian race also have higher mean health literacy scores. Similarly, individuals born outside the US as well as elderly individuals (age 65 and over) are more likely to score in levels below average. Paralleling these results, studies continually show that when compared to Whites, racial and ethnic minorities are less likely to have access to healthcare and more likely to be impacted by and die from most major diseases (e.g., cancer, diabetes); similar findings are reported within socio-economic class (Bassett and Krieger, 1986; Feldman and Fulwood, 1999; Smith and Kington, 1997). This is even more discouraging considering that the majority of chronic diseases are preventable (CDC, 2004). Increasing evidence that population-level gaps in literacy and healthcare quality are increasing or staying stagnant, even among younger Americans (Perie and Moran, 2005; Shi and Stevens, 2005) and despite some policy efforts to reduce health disparities (e.g., Beal, 2004; Molnar, 2000a, 2000b), should sound alarm bells to scholars, activists, practitioners, and policy makers alike. This widening of disparities in American culture is likely to worsen over the coming years due to several factors, one of which is the increasing reliance on Internet-based technologies to disseminate health information and services (Dutta-Bergman, 2005).

The advent of the Internet has drastically changed the health information landscape with recent estimates indicating 80%of Internet users having searched for health-related information online (Fox, 2005b); this translates to approximately 117 million adults having accessed the Internet in search of health information in the past year

(Krane, 2005). However, the population-level disparities highlighted above in the context of health disparities are mirrored by an equally troubling disparity in access to and use of online health information (Dutta et al., in press; Talosig-Garcia and Davis, 2005) and other eHealth services (Hsu et al., 2005).

Digital Divide is the term used to define the gap between people who have and people who do not have access to Internet technology (NTIA, 2000); it is the differences between the technological ''haves'' and ''have nots'' (Bertot, 2003; Gunkel, 2003). The digital divide literature is based on the argument that the Internet is an enabler that catalyzes and contributes to economic, professional, and social success of individuals and communities. Unfortunately, patterns of computer and Internet penetration levels show substantive differences between different racial, ethnic, and socioeconomic groups in the United States (Czerwinski and Abramowitz, 2001; Fogel et al., 2003; Fox, 2005a). Moreover, recent research suggests simply giving people access to the Internet is not enough to remedy these social disparities (Jackson et al., 2004). This argument has been applied by in the realm of eHealth (Bertot, 2003; Brodie et al., 2000; Dutta-Bergman, 2004a, 2004d; Dutta and Bodie, in press; Dutta et al., in press; Hsu et al., 2005; Skinner et al., 2003; Wagner et al., 2005) such that even within patient populations with equal access to online health information, individuals vary in the amount of time they spend online, the reasons for accessing the Internet for health purposes, and the concerns to which they attend (e.g., credibility, usefulness) (Cline and Haynes, 2001; Dutta-Bergman, 2004c). Thus, in addition to innovative ways to provide access to healthcare information that is the focus of most intervention strategies, we are equally in need of innovative ways to present information that can be understood by and serve to aid in patient decision making and to motivate the search for this information from various sources by a population that is less prone to search for information in general and less able to comprehend that information when found (i.e., those with below basic literacy skills) (Dutta et al., in press).

The current article focuses its concern with literacy within the context of health with a specific focus on the abilities needed to engage successfully with Internet-based healthcare. This focus on eHealth literacy has received relatively little attention compared to general health literacy. This is surprising given the exponential growth in eHealth applications and information about health distributed over

the Internet (Lyman and Varian, 2003) and eHealth research in general. The first published presentation of eHealth literacy was an exercise in defining the term and proposing skill sets necessary for a high level of eHealth literacy. Specifically, eHealth literacy was defined as ''the ability to seek, find, understand, and appraise health information from electronic sources and apply the knowledge gained to addressing or solving a health problem'' (Norman and Skinner, 2006, p. 2). Thus, although these authors provide us with a preliminary investigation into the construct of eHealth literacy theoretical sophistication is still needed; drawing from other relevant literatures will help in this task.

Ours is a theoretical investigation into the role of eHealth literacy within a specific model of how people use the Internet for health purposes. Specifically, this investigation will uncover one potential causal structure of eHealth literacy on perceptions of health information and Internet delivery. Such theoretical sophistication is needed to support conjectures of best practices on how to serve various populations. In service of our goal, we will first present an overview of literacy. The main focus of the paper is to explicate a theoretical framework capable of aiding our understanding of how eHealth literacy and health disparities are related. Thus, within the confines of an Integrative Model of eHealth Use (Dutta-Bergman, 2006; see also, Dutta and Bodie, in press) several concepts will be introduced, defined, and related to their impact on health literacy within the domain of Internet-related technologies and the disparities found within literature on the digital divide. A final section will illustrate the utility of the model for advancing theoretical understanding of eHealth literacy and in serving as a model for policy recommendations.

THE CONCEPTUALIZATION AND MEASUREMENT OF LITERACY

Early definitions of literacy referenced abilities such as reading and writing but quickly evolved to include other skills necessary to function in society such as problem solving and reasoning. This evolution is captured by the official definition of literacy coined in 1991 by the United States Congress National Literacy Act (''Public Law 102–73: The National Literacy Act of 1991'', 1991). Section Three of this act defines literacy as ''an individual's ability to read, write, and speak in

English, and compute and solve problems at levels of proficiency necessary to function on the job and in society, to achieve one's goals, and develop one's knowledge and potential.'' Using this definition of literacy, the US Department of Education launched the first national assessment of adult literacy in 1992. A follow up survey in 2003 found 14% of Americans aged 16 and older (30 million) possessed below basic prose literacy levels, 12% (25.7 million) possessed below basic document literacy levels, and 22% (47 million) possessed below basic quantitative literacy levels meaning that these individuals have ''no more than the most simple and concrete literacy skills'' (Kutner et al., 2005). Individuals scoring below literate levels were more likely to be of racial minorities, have low levels of educational attainment, be over the age of 65, speak Spanish before starting school, and have one or more disabilities. Moreover, these populations constituted a disproportionate percentage of the below basic literacy category relative to their percent contribution to the NAALs population.

This survey also recognized the importance of domain-specific conceptualization and measurement of literacy. One such domain that was included in the 2003 NAALs assessment that had been ignored since this date was the concept of health literacy (White and Dillow, 2005, p. 8). However, this assessment defines health literacy in a manner consistent with its conceptualization of literacy, consisting of prose, document, and quantitative abilities. Ultimately, in this report, health literacy is the ability to read materials such as prescription bottles, physician orders, and other medical information. Arguments relevant to proposing domain-specific conceptualization and measurement of literacy are also relevant to the expansion and specification of different types of health literacy. Recently, Norman and Skinner (2006) proposed health literacy as one of three context-specific skills that constitute eHealth literacy. Combining health literacy with computer literacy and science literacy as well as a group of three analytical skills (information literacy, traditional literacy/ numeracy, and media literacy) that ''are applicable to a broad range of information sources irrespective of the topic or context'' these authors proposed the Lily model of eHealth literacy. The following sections extend the Lily model to argue that eHealth literacy should be a theoretical term, located within a particular framework and used to describe individual differences within specific health domains. Specifically, we situate our definition of eHealth literacy within the Integrative Model of E-Health Use (Dutta-Bergman, 2006). The role

of eHealth literacy within this model and how our model sheds light into the relationship between literacy and health disparities will be followed by a concluding section that shows the pragmatic potential of this analysis.

Health Literacy

Current definitions of health literacy encompass skills beyond reading and writing and include social and cognitive skills as well. For instance, the World Health Organization (WHO) defines health literacy as "the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain good health" (Nutbeam, 1998, p. 10). The most readily cited definition of health literacy is offered in the Healthy People 2010 report as "the capacity to obtain, interpret, and understand basic health information and services and the competence to use such information and services to improve health" (US Department of Health and Human Services, 2000).

These definitions of health literacy highlight four important aspects of this construct. First, people need to not only have the ability to obtain relevant health information but they must also possess the motivation to do so. Although these two components are not mutually exclusive, they do constitute two qualitatively different and important aspects of the individual propensity to look for health-related information. Second, the health literate individual will be able to understand the information that he or she is motivated and able to gather. For instance, giving an individual access to the Internet may predispose that person to access a plethora of Web sites; however, this does not translate into the ability to assess the quality of the information provided or the ability to understand which information might be most useful for his or her health or well-being. Consistent with this logic, research suggests that individuals with low health literacy gather less health information overall from all sources (print Internet, friends/family, healthcare workers) (Kutner et al., 2006) and have a harder time comprehending that information that they do gather (Birru et al., 2004) even if it is written in a grade-level suitable for an audience of their educational attainment.

Third, health literacy also involves the confidence and competence to utilize health information. This may include actions that do not involve reading or writing at all, including asking a physician a

question or being able to comprehend a radio- or television-based public service announcement. For an individual to be considered health literate he or she must possess basic reading, writing and problem solving skills proposed in conceptualizations of traditional literacy and must also possess the social and cognitive skills that allow him or her to seek out and use the health information. In his research on consumption patterns of health information channels, Dutta-Bergman (2004d) posits that traditional health information campaigns contribute to knowledge gaps by choosing information-rich media and crafting information-heavy messages, thus not attending to varying patterns of health literacy in the population. Therefore, health literacy is a key construct in guiding campaign strategy as it ought to provide the basis for selecting media types and developing messages, attending to the fit between the communication strategies used for the campaign and the literacy levels of the audience that the campaign seeks to reach. This is particularly relevant in light of the growing healthcare disparities within the US, where health disparity patters typically tend to mirror inequities in health literacy.

Finally, these definitions suggest that possessing the motivation and ability to gather, understand, and use health information in the appropriate ways should have a positive impact on health and well-being. Research has continually shown that lower health literacy rates are associated with a range of negative outcomes including poorer physician-patient communication, unhealthy behaviors, reduced treatment adherence, increased risk for disease, and strain on the nation's healthcare expenditures (for reviews see Bernhardt and Cameron, 2003; Rudd et al., 1999).

What these definitions ignore, however, is the domain specific nature of health information. Sources of health information used by consumers include healthcare providers, other patients, friends and family members; media such as newspapers, magazines, television, radio and the Internet; as well as government agencies and health services organizations (Brashers et al., 2000; Dutta-Bergman, 2004a, 2004d). Consumers demonstrate a great deal of variance in the extent to which they search for health information and the types of health information channels to which they go (Carlsson, 2000; Cline and Haynes, 2001; Dutta-Bergman, 2004a). In addition to the variance in the amount of health information sought, consumers demonstrate variance in the ways in which they process health information (Dutta-Bergman, 2004b, 2004d).

Extant research suggests that communication channels may be categorized into active and passive channel types (Dutta-Bergman, 2004a, 2004b). Active channels require cognitive effort on behalf of the reader/viewer/listener whereas passive channels are minimally involving. In addition, active channels call for motivated effort on behalf of the consumer. On the other hand, passive channels require minimal cognitive effort and are typically categorized as low involvement channels. Thus, when consuming passive channels, the consumer typically pays attention to environmental or peripheral cues (e.g. source liking, credibility) as opposed to argument quality or other, more relevant criteria that are processed more systematically when highly motivated and able consumers are processing information from active channels. Existing research demonstrates systematic variance within the population with respect to the use of active and passive channels of health information. In general, individuals with low levels of health literacy tend to get their health information from more passive sources such as the television and spend little, if any, time gathering health information from active sources such as the Internet (Dutta-Bergman, 2004a, 2004b; Kutner et al., 2006; Rudd et al., 2004). Such variance in attention paid to and consumer use of information channels suggests that health information channel might moderate the effects of health information on relevant outcome variables. This also highlights the need to consider health literacy within specific theoretical frameworks, particularly in the realm of communication strategy that guides the choice of channels.

Computer Literacy

Bernhardt and Cameron (2003) argue that most early definitions of computer literacy included the ability to use hardware and software as well as program a computer while other definitions may or may not have included effective, ethical, and responsible use of computers. For purposes of the present analysis, computer literacy will be defined as the motivation and ability to use a computer to obtain, understand, and use information within a specific domain of interest. While there are not concrete statistics available on the number or percentage of Americans who are computer literate, there are statistics available regarding computer ownership, Internet access, and computers and Internet usage that may offer some insight into and speculation about the rates of computer literacy in this country.

According to the United Nations Statistical Division[1], 65.98 per 100 people in the United States owned a personal computer in 2002, and 55.58 per 100 people in the United States were Internet users in 2003. While we should be hesitant to assume that computer ownership or Internet usage equals computer literacy, it is promising to see that approximately 55% of Americans are using the Internet. Unfortunately, like health literacy, low computer access and usage is more common in certain populations. For instance, patterns of computer and Internet penetration levels show substantive differences between different racial and ethnic groups in the United States, and similar differences are also observed in the realm of online health information seeking (e.g., Czerwinski and Abramowitz, 2001; Fogel et al., 2003; Fox, 2005a) with Whites and Asians more likely to have access and use this access to search for health information than African-Americans, Hispanics, and Pacific Islanders. Similarly, individuals over the age of 65, with lower levels of income, with lower educational attainment, and those who live in rural areas have lower levels of access and usage as compared with their higher socioeconomic status and urban counterparts (Cotten and Gupta, 2004; Diaz et al., 2002; Dutta-Bergman, 2003; Eriksson-Backa, 2003; Hindman, 2000; Jackson et al., 2004; Lazarus and Wainer, 2005; Marks and Lutgendorf, 1999; Sudano and Baker, 2006).

Some scholars have argued that this "digital divide" is shrinking, citing studies that show Internet penetration among minorities and other vulnerable populations is increasing at rates that far surpass the White population, and the gap between "haves" and "have nots" is decreasing. These claims are flawed for two main reasons. First, they ignore the quality of computer and Internet access. For instance, the California Department of Education found schools with higher minority concentration have fewer computers per 100 students than schools with lower minority concentration. Similarly, racial minorities are less likely to have broadband access at home than their White or Asian counterparts (The Children's Partnership, 2005). Second, these claims ignore gaps in usage of the Internet. As Chen and Wellman (2003) argue, "ultimately, the digital divide is a matter of who uses the Internet, for what purpose, under what circumstances, and how this use affects socio-economic cohesion, inclusion, alienation, and prosperity" (p. 5). This reconceptualization legitimizes research that finds racial disparities in use after controlling for prior history, strict access, and socio-economic status (Jackson

et al., 2004; Jackson et al., 2006). Although several specific lines of research highlight the importance of not focusing solely on computer or Internet access to generalize about literacy, the quality of the information found on the Web as well as the level of trust individuals put into certain types of information they might find seems to be most relevant to our discussion.

Quality and Trust of Online Health Information

Those adults who access the Internet for health purposes tend to report the information found to be reliable enough to supplement information obtained from a physician (Krane, 2005). In a recent national survey, results indicated that ''credibility stands tall among the nine key reasons that users go to one Web site and not to another'' (Princeton Survey Research Associates, 2002, p. 3). However, an increasing amount of research has also concluded that the health information contained on the Internet is of substandard quality (for a review see Eysenbach et al., 2002). This has led to the quality of health information becoming a major concern of government and other entities and has even led the U.S. Department of Health and Human Services to include an objective in their *Healthy People 2010* publication to ''increase the proportion of health-related World Wide Websites that disclose information that can be used to assess the quality of the site.'' This is especially a concern with non-English Web sites (Cardelle and Rodriguez, 2005) and Web sites targeted to other ethnic minorities. Given that health information quality influences the quality, cost, and effectiveness of healthcare received and other health-related consumer outcomes, such disparities are an important but often overlooked component of the digital divide.

Published criteria in the area of Internet use for health include source credibility, accuracy, completeness, relevance, and applicability (Dutta-Bergman, 2003, 2004c; Eysenbach, 2000; Rice, 2001). However, the evaluation of quality is a heterogeneous process that varies with the information needs of the consumer. Whereas certain quality criteria might be particularly relevant for purchasing medication online (e.g., evaluating the privacy policy of the Web site), the consumer who is simply surfing the Web for health information may attend to other criteria (e.g., credibility of the information source). Moreover, consumers may have different levels of knowledge of and competence for the successful implementation of certain quality criteria.

Consistent with this, large scale surveys indicate that individuals differ in their vigilance about verifying credibility of any given Web site. Fox and Raine (2000) placed participants into three broad groups: those that are "vigilant about verifying a site's information," those that are concerned about information quality but are more relaxed about their criteria, and those that "rely on their own common sense and rarely check the source of the information, the date when the information was posted, or a site's privacy policy" (p. 6; see also Stavri et al., 2003). Fogg et al. (2002) asked participants to navigate and evaluate the level of credibility of live Web sites. Open-ended comments suggested that, in the area of health information, consumers seemed more concerned about information focus and information usefulness than they were about other factors such as advertising and customer service.

Attributions of credibility are also enhanced when searchers find the same information on multiple Web sites or if the information they find agrees with what they previously knew (Fox and Rainie, 2000). In a self-report study of patients at one primary care hospital, Diaz et al. (2002) found that important factors of a "'reliable' Internet health site" included sponsorship by a medical society, recommendation of the site by a physician or healthcare professional, sponsorship by a university, and sponsorship by a hospital/HMO. In a national survey of Internet users, Princeton Survey Research Associates (2002) found that nearly 70% of users said being able to identify the sources of information on a site is very important (see also Fox and Rainie, 2000, who found this same result with a more modest 42% of participants). Thus, the ability to judge credibility is likely to increase as familiarity and comfort with navigating around individual Web sites, the ability to use Web search engines to find multiple sites for the same topic, and prior health knowledge also increase; all of these characteristics seem to speak to a high level of eHealth literacy.

There also seems to be some discrepancy between the criteria people report as important and the criteria they actually use when attempting to find answers to health-related questions. Eysenbach and Köhler (2002) conducted a three-part study using focus group, naturalistic observation of search and retrieval processes, and in-depth interviews. The focus groups were designed to assess top-of-mind credibility criteria. Several themes emerged, most of which are consistent with past research (e.g., source authority, layout and

appearance, presence of advertising, readability, quality seal, third party endorsements). However, when participants were instructed to search for answers to health-related questions, their actual search strategies did not reflect these concerns. For instance, instead of starting at established medical sites, all participants started their search using a search engine and choosing "one of the first results displayed by the search engine and then rephrased their search rather than turning to the second page and exploring further results" (p. 575). Most surprising was the finding that "none of the participants actively searched for information on who stood behind the sites or how the information had been complied; often they did not even visit the home page" (p. 576). When asked which Web sites they used to obtain information in subsequent in-depth interviews, few could recall names or sources behind the sites. Thus, what participants say about their search strategies and trust may not actually be the way they actually search for information. This finding might speak to issues of eHealth literacy such that individuals with higher levels of particular literacies may not only know more but be more motivated and able to use certain criteria relevant to health Web site veracity judgments. This is in line with a dual-process logic such that individuals who are highly motivated and able to process information are more likely to attend to and process all available information, whereas their low motivated and unable counterparts base their judgments more on peripheral features of sites (Eastin, 2001).

Summary

In sum, the concept of eHealth literacy can be conceptualized as a combination of context-specific and analytical skills needed to successfully navigate online health information (Norman and Skinner, 2006). At the most basic level, eHealth literacy consists of skills related to health literacy such as actively processing and being able to use health information to make informed decisions and computer and Web navigation skills. Population-level differences in health literacy mirror the disparities found in the literature on healthcare and the literature on the digital divide mandating an explanation of these connections. Thus, the remainder of this article will locate eHealth literacy within a theoretical framework that connects the broader structures in social systems with individual eHealth use and health outcomes.

THE INTEGRATIVE MODEL OF E-HEALTH USE

Using the Internet for health purposes has become a ubiquitous part of consumer decision making. However, differential patterns of use also exist. Research has found variability in eHealth use depending on situational, historical, and personal variables with these differences contributing to health disparities and a digital divide among the population (Dutta-Bergman, 2006). As mentioned above, published research on the digital divide points out lower SES groups, minority populations, people with preventable health problems, and the uninsured face a variety of barriers that are seemingly tied together with literacy (Eng et al. 1998; Rice, 2001).

The prevalence of eHealth is growing and will continue to grow because of the advantages Internet-based health communication offers (Bernhardt et al., 2004) and the profit companies stand to gain from its implementation. These and other features of Internet-based health communication may suggest why previous research indicates the great potential of the Internet for disseminating health information to the general public as well as a tool that can be utilized to reach low-income, less educated, and minority populations (Cotten and Gupta, 2004). This is where the concern of eHealth literacy is elucidated: low literacy levels and low computer usage is more prevalent among those populations that eHealth is hoping to address, namely low-income, less educated, minority, and older populations. Thus, our model is particularly relevant for examining eHealth literacy which, as seen in Figure 1, is conceptualized as an individual-level variable comprised of health literacy and computer literacy (see above). The issues of eHealth literacy and usability are ultimately tied in with the goal of reaching out to those underserved segments of the population that have minimal access to both technology and health resources.

Specifically, our theory suggests macro-level disparities in social structures (e.g., demographics) are connected to health disparities through the micro-level conduits of eHealth literacy, motivation, and ability. In other words, structural inequities reinforce themselves and continue to contribute to healthcare disparities through the differential distribution of technologies that simultaneously enhance and impede literacy, motivation, and ability of different groups (and individuals) in the population. As graphically depicted in Figure 1, the Integrative Model of eHealth Use (IMeHU) suggests the

FIGURE 1. The Updated Integrative Model of eHealth Use
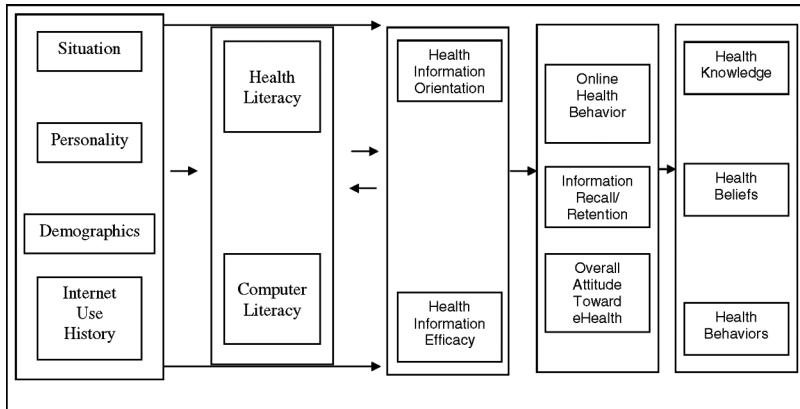
underlying social structure affects an individual's level of health and computer literacy, his or her intrinsic interest in health (motivation), and the perceived ability to use the Internet for health purposes. Although health literacy is a product of structural barriers and access (e.g., differential opportunities based on race, class, and gender), it is also reciprocally related to individual motivation to use the Internet for health and the perceived ability to gather and use health information when making decisions.

eHealth literacy is both a function and influencer of individual motivation and ability to use the Internet for health purposes. Individuals with low eHealth literacy are, according to the IMeHU, less motivated to utilize the Internet for health information, and have lower efficacy, or see themselves as less able to utilize the Internet for health information. Similarly, an individual's motivation and ability to use online health resources is likely to influence his or her level of health and computer literacy (e.g., individuals who use online health resources often are likely to increase their level of eHealth literacy; individuals who acquire greater degrees of eHealth literacy are likely to be more motivated and able to use the Internet for health purposes). These micro-level variables result in differential patterns of online health behavior-non-use of the Internet for health information or mis-use of the Internet for health information; this differential use of the Internet subsequently impacts health-related

outcomes. For instance, in the realm of online health information seeking (Dutta and Bodie, in press), we would expect elderly minorities of lower socio-economic class to be the least intrinsically motivated and have the least perceived ability to use computer and Internet technologies to search out health information as well as have lower scores on functional health and computer literacy when asked to navigate health Web sites (see above discussion on *Quality and trust of online health information*).

Motivation to Use the Internet for Health: Health Information Orientation

Dual process theories of information processing point out that motivation triggers an individual's intrinsic interest in a particular issue or topic, leading to active engagement in cognitions, attitudes, and behaviors related to that specific issue/topic (Chaiken and Trope, 1999). A high level of motivation increases the amount of attention an individual directs to all available information and the comprehension of this information. It also increases the active information search for issue-based information (e.g., health information quality). Therefore, a health motivated consumer actively participates in health-related issues, actively searches out relevant health information, and is better able to recall this information when appropriate (Celsi and Olson, 1988; Dutta-Bergman, 2004a; MacInnis et al., 1991; Moorman and Matulich, 1993; Park and Mittal, 1985).

Health information orientation reflects the intrinsic consumer interest in issues of health and fundamentally contributes to the consumer motivation to use information technologies for health purposes (Dutta-Bergman, 2004a). The high health information oriented individual actively monitors his or her environment for preventative health opportunities as compared to the low health information oriented individual who is less likely to search for health information beyond the doctor (Dutta-Bergman, 2004a). Also, the health information oriented individual is more likely to learn health information from active communication channels such as the Internet as opposed to the individual that is not health information oriented who receives his or her health information from passive communication channels such as television (Dutta-Bergman, 2004a, 2004b, 2004d). As highlighted in the HALS survey (Rudd et al., 2004) and other research studies (e.g., Doak et al., 1998; Weiss et al., 1995), individuals with

demographic characteristics associated with low literacy are more likely to obtain their health information from television and other passive sources. Thus, those with a high level of health information orientation are critical consumers of health information, more likely to carefully listen to and read a variety of sources (including the Internet) with quality criteria in mind.

Health information orientation is embedded within the structural context, being shaped and socially constituted through the culture within which individuals come to understand and operate in society. This suggests that motivation in health-related issues is greater among those segments of the population that are associated with better quality healthcare in general. Johnson and Meischke (1991) and Rice (2001) have both noted that people with a lower socioeconomic status (SES) tend to report lower levels of health orientation; they are less motivated to seek out health information than those with greater access to health information resources. Likewise, individuals who have reason to seek out health information or for whom health is highly salient (those who are extrinsically motivated) are more likely to pay attention to such information (Dutta-Bergman, 2004a). Therefore, variables such as illness diagnosis, state or stage of disease, and caregiving responsibilities of aging parents might influence the motivation to search out health information online as will variables typically studied in research on the digital divide.

Perceived Internet Use Ability: Health Information Efficacy

In addition to an individual's motivation to attend to relevant information, the IMeHU also stipulates that ability to utilize online health information predicts active engagement. Ability refers to those individual and situational variables that influence a person's capacity to search for and process online health information (see Petty and Wegener, 1999). The concept of health information efficacy is built on the existing research on self-efficacy (Bandura, 1986, 2002). In the realm of health, self-efficacy refers to the degree of confidence individuals have in their ability to perform health behaviors (Schwarzer, 1992) which positively predicts the adoption of the preventive behavior. Thus, health information efficacy refers to consumer's belief in his or her ability to search for and process health information; it is an individual's perceived ability to seek out health information and to do so in a way that is beneficial given seeking purposes.

As noted by Basu and Dutta (2006; emphasis in italics added), "Health information efficacy taps into the *perception* of access to or the availability of health information resources…[based on this individual difference approach to efficacy] an individual…[with] Internet access… might still have a low level of health information efficacy." Conceptualizing ability as a psychologically-based factor helps to explain why among those with access to the Internet or even those with high levels of eHealth literacy, individual felt efficacy is likely to fluctuate. For instance, it is possible for an individual with years of Internet experience who scores high on measures of health literacy to not be particularly confident in his or her online health search strategies. Moreover, efficacy is likely to vary based on the task with which the individual finds himself or herself responsible. Some individuals may have high levels of efficacy with regard to judging the quality of health Web sites and therefore use these criteria (assuming motivation to do so is high) in an effort to gather the most reliable information available. Other individuals may have low efficacy with regard to issues of quality and trust but see themselves as fully capable of gathering all available information on a topic for an individual who has asked them to do so.

Perceptions are, however, grounded in the well-documented reality of differential distribution and access of Internet technology. Thus, efficacy is shaped by the dispositional orientation of the consumer, his or her experience with the Internet, and his or her demographic characteristics. Of particular relevance are the demographic correlates of access and efficacy, given the technology-related gaps in the population. Like motivation, efficacy is structurally constituted and the perceived ability to use communication technologies to meet information needs is lower among vulnerable populations (e.g., Bodie et al., 2007; Dutta-Bergman, 2003; Dutta et al., in press; Rojas et al., 2004); with both motivation and ability, perceptual barriers in using eHealth technologies are constituted by population-level differentials in access to communication infrastructures as indicated in the literature on the digital divide.

eHealth Literacy as Mediator

As indicated by our literature review, we include health literacy and computer literacy as the two major components of eHealth literacy given that individuals could score in different functional categories within

each of these skills. Our notion of health literacy is similar to those of the US Department of Health and Human Services insofar as it incorporates notions of competences with respect to understanding and using health information. Computer literacy combines the skills that Norman and Skinner call computer literacy (ability to use computers to solve problems), information literacy (how to find and use information to make decisions), and media literacy (ability to critically think about media content). Thus, high eHealth literacy is not just the ability to use the Internet to find answers to health-related questions (e.g., devise appropriate search strategies, find information on poorly mapped sites); it also entails the ability to understand the information found (e.g., What does it mean? What does it mean for me?), evaluate the veracity of this information (e.g., Can I trust this source? Does the information found from multiple sites conflict or agree?), discern the quality of different health Web sites (e.g., Is this site sponsored by associations with potential conflicts of interest?), and use quality information to make informed decisions about health. These decisions might include whether to take ibuprofen or acetaminophen for a headache or to take certain newfound information to one's primary care physician for advice.

To date, there is no acceptable way to measure such a conceptualization of eHealth literacy. Norman and Skinner propose the only measure known to the authors. It is an 8-item self-report measure; however, this scale did not achieve convergent validity nor does it seem to possess face validity for the construct as defined above. Traditional measures of health literacy, indicators of computer literacy, and tasks developed by researchers investigating how individuals judge Web site credibility might, therefore, be adapted and merged to form an appropriate measure of this construct.[2] Such research would be the logical next step in coming to a better understanding of the concept of eHealth.

Health-Related Outcomes

Given the above, we suggest health information orientation, health information efficacy, and eHealth literacy as three primary pathways through which structural-level variables impact online health searching. That individuals who actively seek out health information from a variety of sources report better overall health and well-being suggests a multi-causal pathway from demographics to a whole host of health outcomes.

Although some of these variables have been considered in past research using the integrative model (Basu and Bodie, 2007; Bodie et al., 2007), the fact that online health information is so widespread and the quality of Web sites is continually questioned warrants a sophisticated theoretical account of how we can train people to become informed consumers of eHealth information. Our model points to several ways in which this might be accomplished. The final section of this article attempts to elucidate some of the advantages afforded by the present analysis.

CONCLUSION

The IMeHU provides a contextual framework for understanding the ways in which structural disparities play out in the realm of eHealth literacy. Extending Norman and Skinner's analysis, we provide a theoretical framework for understanding the pathways from structural level disparities to individual health and well-being. We add to the argument that literacy should be domain specific insofar as we suggest discussions of health literacy should go beyond mere ability to read and understand prescription medication instructions or consent forms. One's ability to search out and understand online health information is likely to reflect more than reading ability or understanding medical terms. Thus, we add computer literacy and incorporate several skills from Norman and Skinner's typology. Our framework further suggests the importance of developing health marketing and health communication efforts that are directed at addressing the very structural characteristics that create and sustain conditions of low eHealth literacy. Efforts directed at addressing such structures ought to focus on the roles of community mobilizing, community organizing, and stakeholder building that is directed at creating basic community capacities.

That is, this model may provide a more parsimonious account of the connections between the digital divide, healthcare disparities, and the unequal distribution and use of communication technologies that is lacking from the extant literature. Based on reviews of existing theory and research, our model points out that in order to really address issues of the digital divide, health marketing and health communication efforts ought to focus on addressing the very structures that lead to healthcare disparities.

One way that our model suggests reaching low health literacy patients through the Interent is through the use of alternative means of online health information, means other than dry Web pages and hard to understand text. Some research finds that the majority of individuals with demographic characterisitics associated with low literacy obtain their health information from television (Weiss et al., 1995) and other passive or secondary sources (Doak et al., 1998). It is possible that since these individuals prefer to be informed about health in a more interactive format that requires less active processing of health information, a video-based library of information that could be browsed at the convenience of patients or caregivers is a needed addition to the current infrastructure of health information found on the Web. This is supported by research that shows adding illustrations (Giorgianni, 1998) or cartoons (Delp and Jones, 1996) to text can enhance understanding of the information, even if the reading level of the text-plus-illustration is higher than text-only (Michielutte et al., 1992). However, it is also likely that while videos may be more appropriate for presenting some information, text is likely suitable for presenting other information. For instance, it seems plausible that instructional information like how to use an inhaler or how to check one's blood sugar level with a particular device might be best presented in an interactive, video-based format that is easy to understand and follow.

Some research and community involvement programs are heading in this direction and show promise for shrinking one aspect of the digital divide – that is, gaps in usage patterns among those with physical access to the Internet. The use of video to communicate vital health information is a recent development in this area. Two empirical studies have simultaneously assessed comprehension of health information from text and video (Meade et al., 1994; Murphy et al., 2000). In the first study Meade et al. presented individuals with information about colon caner in the form of a brochure or in the form of a video. Although the two experimental groups did not differ from each other, systematic differences in patient literacy level were not assessed. It is possible that individuals with lower literacy levels understood the video-based presentation better than the text. Such a proposition is warranted given findings from Murphy et al. This study presents results from a sample of low- and high-literate sleep apnea patients that were presented with health material written at a 12th grade level. This same material was also presented in video format and knowledge about sleep apnea was assessed post-test.

One potential limitation of both of these studies, however, is that text-based information was simply put in a video format; thus, the level of processing required was similar as was the necessity of having a high level of literacy to understand the content regardless of the channel through which it was communicated. Studies that experimentally separate these aspects would shed light on whether video versus text-based presentation is more or less appropriate depending on level of literacy. Moreover, investigating the types of literacy that are the most important moderators of the impact of type of presentation on understanding, comprehension, and other dependent variables also seems fruitful.

In addition to how information is presented to a variety of consumer segments, the marriage of health marketing and health communication principles might also inform the development of training programs (products) offered at affordable prices at appropriate places to the underserved segments of the populations. Through the use of a variety of edutainment strategies, such programs might emphasize creating opportunities for building literacy levels in the underserved segments of the populations. Here, local contexts and cultural characteristics would drive the development of culturally meaningful communication programs that are responsive to the needs of the underserved segments of the population (see Dutta, 2007).

Finally, this framework suggests the use of more participatory processes in developing communication strategies utilizing new media technologies. Given the interactive nature of new media technologies, these technologies may be utilized to create participatory platforms that involve underserved segments of the population. It is through these participatory platforms that communication strategies can be co-constructed and directed at changing and challenging the unhealthy structures within social systems. In this sense, eHealth literacy moves beyond the realm of simply learning about the tools and techniques of eHealth to becoming keenly aware of the structural features that create and sustain conditions of poor health. Though this awareness, health information orientation (motivation) is likely to increase among marginalized groups. Moreover, through this keen awareness of unhealthy structures, points of activism are more likely created. eHealth literacy ultimately manifests itself in the form of awareness and consciousness of the deep-rooted structures through the uses of technology, and the subsequent application of technology to alter these structures for both participants and practitioners.

NOTES

1. The numbers presented here were obtained from http://unstats.un.org/unsd/default.htm by instituting a search for "computer access AND US" on March 14, 2007. These numbers also conform to Pew statistics (see www.pewinternet.org) as of this date.

2. While completing this article, the authors were informed of a newly formed scale that could perhaps be adapted for this need (Earnheardt et al., 2007)

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