

Determinants of Vertical and Horizontal Online Health Information Behavior

Hye-Jin Paek
Hanyang University
hjpaek@gmail.com

Thomas Hove
Hanyang University
tbhove@gmail.com

Abstract

This study examines two types of online health information behavior: vertical, one-way online health information behavior oriented toward receiving messages from elites and professionals, and horizontal, two-way online health information behavior oriented toward sharing communication among ordinary Internet users. The purpose is to investigate how each type of behavior is associated with different demographic, psychographic, and lifestyle factors. The guiding theoretical arguments are based on the Uses and Gratifications (U&G) approach, Social Cognitive Theory, and The Theory of Reasoned Action/Theory of Planned Behavior. The dataset analyzed is the 2012 Health Information National Trends Survey, which was collected among 2238 nationally representative American adults who reported that they have used the Internet for health information. Logistic regression analysis shows two key findings: first, having a high income and education increased odds of engaging in vertical online health information behavior; second, being young and female and having trust in doctors and traditional media decreased odds of engaging in horizontal online health information behavior. This study contributes to broadening understanding of how people use health information online, and it suggests that health professionals and communicators should consider the different characteristics of people who tend toward either vertical or horizontal online health information behavior.

1. Introduction

In recent years, more and more people have been using a wide variety of online health information sources. Several studies on this topic have pursued the following goals: to determine the characteristics of people who use the Internet for health information; to capture their online information seeking patterns; and to gauge how much they trust health information online compared to that from other types of sources [1-5]. However, these studies are limited in scope because

they conceive all types of online health information as similar in kind. In doing so they focus almost exclusively on behaviors that fall under the category of information seeking. As a result, they overlook the existence of other types of online health information, as well as the different purposes for which people use them.

Now that so many people use Web 2.0, health communication researchers need to pay closer attention to the new types of media uses and habits it has generated. For example, some people may use the Internet simply as an extension of offline health care by searching for health care providers or looking up personal health records on hospital websites. This is a “vertical” type of health communication because it generally proceeds from professional or official sources at the “top” of the process downward to lay receivers and consumers at the “bottom” [6]. Other Internet users have a greater tendency to share their own health-related knowledge and experiences with anyone else who is interested. This is a “horizontal” type of health communication in which people have relatively equal power to make their own contributions to the process [6]. To refer to a broad array of online communication and information-seeking activities that might belong to either of these types, we hereafter use the terms vertical and horizontal *online health information behavior*.

The idea that people have different motives for engaging in specific types of online health information behavior is supported by the Uses and Gratifications (U&G) approach to media research [7,8]. U&G assumes that people have a variety of motives for using media in a variety of ways, for example as information, communication, entertainment, self-expression, and so on. In the context of online health information behavior, researchers should examine more media uses than information seeking, and they should consider other types of online health information behavior. One notable type of behavior is the active sharing of not only health information but also personal experiences and opinions with others through social networking

sites, blogs, and other platforms that enable group communication.

Expanding research in this way may be particularly important if it turns out that vertical and horizontal online health information behavior tend to be differentially associated with various demographic and psychographic characteristics. Such different associations would raise important implications for health care providers and communicators regarding how they should use the Internet for disseminating health information and communicating with patients.

To begin such an investigation, the current study examines how each type of online health information behavior is associated with different demographic, psychographic, and lifestyle factors. Existing literature has theoretically and empirically demonstrated that self-efficacy and trust in various sources play significant roles in online health information behavior [1-5]. Based on that research, the current study treats those factors as significant psychological determinants. It analyzes the 2012 Health Information National Trends Survey, which was collected among 2238 nationally representative American adults who reported that they have used the Internet for health information. Although this well-established dataset deals mainly with cancer, it also incorporates other important health information, including online information seeking behaviors, demographic factors, geographic factors, food and drug safety, and health-related lifestyles. Ultimately, the current study aims to broaden and enrich knowledge about how people use health information online and how such uses are related to other health information behaviors that occur offline.

2. Prevalence and Changing Landscape of Online Health Information

Now that the Internet provides much of the population with virtually instantaneous access to abundant health information, people are becoming more capable of making informed health decisions and effectively managing their own health [1,4]. While the majority of the population still regard doctors as the most credible sources of health information, more and more people regularly seek out health-related information without doctors' guidance, and they often use information supplied by Internet sources other than doctors [9]. Although health professionals and researchers continue to harbor doubts about the overall credibility of online health information, industry statistics regularly indicate that the Internet is the health information channel people use most frequently and find most convenient. For example, eight out of ten

Internet users report that they have used it to find and share health information [6].

The Internet differs from other information sources in that it not only provides users with quick and convenient access to a wide range of information but also enables them to have computer-mediated interactions, many of which would not have been possible through other media [4,10-13]. Moreover, the Internet enables people to search for tailored and personalized information. Despite continuing problems with information quality and equality of access [10,14,15], the Internet seems to have become a primary source of health information.

In recent years, the landscape of online health information has been significantly transformed by the emergence of Web 2.0. Characterized by user-generated media, media and information sharing, and social networking, Web 2.0 has changed the way people seek, gather, use, and exchange health-related information online. To acknowledge these changes, researchers should no longer treat the Internet as a place where people engage in only one kind of health information behavior—that is, information seeking. For example, Fox and Bernhardt (2011) note that many people might use a variety of health information sources simultaneously, such as websites managed by medical experts (mayoclinic.com, webmd.com), news outlets (*New York Times*, BBC), a friend's blog, or a Facebook page. Moreover, people can usually make distinctions among these different types of health information sources [6].

Fox and Bernhardt also report that, of those who go online for health information, 59% have done at least one of the following activities: read someone else's commentary or experience about health or medical issues in an online newsgroup, website, or blog; consulted online rankings or reviews of doctors, health care providers, or hospitals and medical facilities; signed up to receive updates about health or medical issues; or listened to a podcast about health or medical issues. Furthermore, 28% of e-patients, who once would have only sought for and shared online health information, are taking more active communication roles: tagging or categorizing online content about health or medical issues; posting comments about health or medical matters in online discussions, blogs, listservs, or other online group forums; posting online reviews of doctors or hospitals; and sharing photos, videos, or audio files online about health or medical issues. These statistics have been showing a steady increase. For example, the percentage of Internet users who read blogs rose from 17% in 2004 to 27% in 2005 and 32% in 2008. Such trends indicate that people are no longer just passive receivers of online health

information but active providers and disseminators of it.

These active roles and varied motives are built into the theoretical assumptions of the Uses and Gratifications approach to media research [7-8]. This approach assumes that people use media actively and deliberately. The basic needs and motives for media use include learning new things (information seeking), escaping from problems and seeking relaxation (entertainment), and sharing feelings and communicating with others (social integration). According to research based on the U&G approach, Internet users tend to be more motivated to search for information when they believe it can meet their goals and expectations [16,17]. If we apply these insights to the context of online health information behavior, we should expect people to have various motives for not only seeking health information and advice from professionals but also sharing health information with other laypeople who may have similar concerns and interests. Expanding health communication research into these areas is particularly important because people's demographic and psychographic characteristics might be differentially associated with these behaviors. The current study attempts to fill in this knowledge gap.

3. The Current Study

3.1. Types of online health information

Recognizing the different ways people communicate and seek information about health, researchers have begun to distinguish between vertical and horizontal media channels, or Health Communication 1.0 versus Health Communication 2.0. Vertical health communication "often involves the one-way delivery of health information from expert sources to nonexpert receivers through mass communication channels (e.g., televised public service announcements) or through interpersonal channels (e.g., physicians to patients)" [6, p. 262]. In this type of health communication, there is typically an expert or authority at the top of the process who "pushes" messages and information to relatively passive layperson receivers. For Internet users, online health information behaviors that relate to vertical health communication include looking up personal health records or seeking information on doctors, health care providers, or hospitals.

By contrast, horizontal health information behavior involves "exchanging health information between 'real people' who seek out or 'pull' health information when, where, how, and from whom they want it" [6, p.

263]. Online channels of horizontal health communication include email, text messaging, listservs, newsgroups, chat rooms, bulletin boards, wikis, media-sharing services, blogs and vlogs, social networking sites, games, and even virtual worlds.

Since these two channels differ, it is important to sort out how people's two types of online health information behaviors can be differentially associated with various factors that have been identified as important determinants of how people seek and use health information on the Internet.

3.2. Factors associated with types of online health information use

3.2.1. Demographics and health-related online activity. Studies have consistently reported that the people who are more likely to use the Internet for health information are female, younger, white, more educated, high earning, and covered by a healthcare plan [1,2,6,11,18,19]. An analysis of the 2007 HINTS data examining people's selection of media channels found that younger, white, and higher-income people tended to select the Internet as their primary source of health information. Also, females, older, and more educated people were more likely to use multiple other channels for health information alongside the Internet [9]. Besides having these demographic characteristics, online health information seekers also reported having better physical and mental health [9,11]. With these studies in mind, we propose the first research question to inquire how demographic characteristics, including self-reported health status, would be differentially associated with vertical versus horizontal online health information behavior.

RQ1: Will major demographic characteristics be differentially associated with vertical versus horizontal online health information behavior?

3.2.2. Psychographics and health-related online activity: trust in source and self-efficacy. In addition to demographic characteristics, several psychological factors have been found to determine use of the Internet as a source of health information. One that plays a particularly important role in motivating people to choose certain sources is trust [19]. If people trust a source, they are more likely to use it; if they distrust it, less likely. Furthermore, distrust toward one source of health information may nudge people toward other sources. For example, Rains (2007) assessed the relationship between people's perceptions of traditional media and interpersonal sources and their use of the Internet to acquire health information [5]. The study

found that distrust of health care providers, family, and mass media outlets increased odds that respondents would use the Internet for acquiring health information. However, results of another study on cancer information seeking indicate that, although people trust healthcare providers the most, they tend to go to the Internet first [19]. In other words, trust of a health information source and frequency of using it may be irrelevant depending on people's needs and their access to the source. As for the role of healthcare coverage, one study found that people without it tend to rely on mass media channels, even though they have only moderate or low levels of trust in the mass media [20].

These inconsistent findings may stem from the fact that trust in other sources is differentially associated with different kinds of online health information behaviors. In particular, doctors worry that people who rely on online health information because it is so easy to access may turn away from their advice or trust them less. Such possibilities raise some important questions: How much do people trust health information sources such as doctors and traditional media? And will people's trust in different sources differ according to the type of online health information behavior they tend to engage in? We can expect that people who share health information and communicate with other people online (horizontal online health information behavior) may trust the Internet more than those who focus on looking for doctors and looking up their own health records (vertical online health information behavior). At the same time, it is also possible that those who engage in horizontal online health information behavior do so because they distrust other sources of health information such as doctors and traditional media.

Another strong predictor of health information behavior may be self-efficacy. *Self-efficacy* in the context of health refers to a person's own conviction of being able to successfully execute a healthy behavior to achieve a desired outcome [21]. The important role of self-efficacy in predicting such behavior is highlighted in prominent health behavior theories, such as the Health Belief Model, Social Cognitive Theory, and the Theory of Reasoned Action/Theory of Planned Behavior [22,23]. Self-efficacy applies to online health information behavior in that people who believe they can perform or manage a certain behavior are more likely to take actions for preventing disease and managing health [24]. Moreover, when people high in self-efficacy make health-related decisions, they actively consult a variety of sources [25]. By contrast, people low in self-efficacy are more likely to rely on their doctor alone because they feel less confident about their ability to understand the health information

they find through other channels.

Taken together, the studies reviewed above suggest that researchers could improve understanding of people's health information behavior by examining a variety of factors that might be associated with it. These include demographic, structural, lifestyle, and psychological characteristics. However, these studies generally treat health information acquired from the Internet as uniform in kind. Accordingly, our main inquiry is to examine how these important determinants of seeking online health information are differentially related to vertical versus horizontal online health information behaviors. Existing studies have hypothesized the directionality of the relationship between the key determinants (e.g., trust, self-efficacy) and online information seeking behavior in general. However, few studies, if any, have more closely examined different types of online health information behavior and each of the key determinants' differential roles in predicting those behaviors. Because such research is scarce, we cannot formulate hypotheses but must instead raise the following two research questions.

RQ2: Will trust in (1) doctors, (2) traditional media, and (3) Internet sources of health information be differentially associated with vertical versus horizontal online health information behavior?

RQ3: Will self-efficacy be differentially associated with vertical versus horizontal online health information behavior?

3.2.3. Health-specific media use and health-related online activity. When people look for health information, they tend to consult several sources at once, not just one to the exclusion of others. At the turn of the Millennium, some media scholars predicted that new media such as the Internet would eventually replace people's use of traditional media [26,27]. According to others, it is more accurate to say that the Internet can extend, complement, or supplement people's media usage behaviors [12,28]. For example, cancer patients who actively seek for health information online also tend to be more attentive to health or medical topics in traditional media such as newspapers, magazines, television, and radio [29].

In fact, studies show that people turn to more than one media channel for health information. For example, analysis of the 2007 HINTS data revealed that about 60% (N = 3374) of the respondents were using more than one source to seek health information [9]. In the same study, people who reported that they use the Internet as a primary channel of health information also reported using supplementary

channels such as health care providers (38%), print media (41%), and interpersonal channels (21%).

These findings suggest that people who are attentive to health-specific media in any form—offline or online, traditional or new, mass or interpersonal—may also use health information online. A particularly relevant study examined generational differences for online health information use compared to that of information on other media [28]. It found that younger cancer patients were more likely than senior patients to acquire information about health incidentally through their use of the Internet, and to use it to find health information for others. In addition, senior cancer patients supplemented active health information seeking with incidental health information use online, while younger patients tended to use health information alternatingly between traditional media channels and the Internet.

Aside from these studies, little research has been done on how people's attention to various media for health information is differentially associated with different types of online health information behaviors. Thus, we ask the following research question.

RQ4. Will attention to health-related news on various media be differentially associated with vertical or horizontal online health information behavior?

4. Methods

4.1. Data

This study used a subsample of the data collected in the 2012 Health Information National Trends Survey (HINTS). HINTS is a nationally representative survey of American adults administered by the National Cancer Institute every two to three years. Its purpose is to monitor patterns related to health, especially people's cancer-related beliefs, knowledge, perception, behavior, use of traditional and digital media to seek health information, and other health communication trends [30]. Alongside the cancer-related information, the data also include other information about health behaviors such as sleeping, eating, exercise, use of tanning beds, and various food and drug safety issues.

Survey data were collected between October 2011 and February 2012 exclusively by mail. Participation was encouraged by a \$2 monetary incentive. Mailings were sent to a stratified sample of addresses selected from a file of residential addresses. The sampled households were randomly assigned to one of the two respondent selection methods: either the Next Birthday (NB) Method, which asks only the adult with the next birthday to complete the questionnaire, or the All Adult

(AA) Method, which asks all the adults in the household to complete one questionnaire each. Response rates were calculated separately for each selection method using the RR2 formula of the American Association of Public Opinion Research (AAPOR): for NB Method, response rate = 37.9%; for AA Method, response rate = 35.3% [31].

4.2. Sample characteristics

The subsample of data analyzed in this study consisted of responses only from people who reported that they looked for health information online in the past 12 months ($N = 2238$; 56.5% of the total sample). Of those in the subsample used for this study, 61.3% were females, 66.2% Whites, 12.8% Blacks, 10.3% Hispanics, and the mean age at the time was approximately 49.3 ($SD = 15.02$). Most respondents indicated some college or higher level of education (77.2%) and were well distributed across incomes (less than \$35,000 = 28.6%; \$35,000 – 74,999 = 31.9%; \$75,000 or more = 38.4%). Also, 89.9% had at least one type of health care coverage.

4.3. Measures

For various types of online health information behavior, respondents were asked whether or not they used the Internet for health information purposes in the last twelve months. Questions identified as referring to vertical online health information behavior asked whether respondents (1) used email or Internet to communicate with a doctor or doctor's office, (2) looked online for a health care provider, and (3) kept track of personal health information online. Questions identified as referring to horizontal online health information behavior asked whether respondents (1) participated in an online support group for people with a similar health or medical issue, (2) visited a social-networking site to read and communicate about medical topics, and (3) wrote in an online diary or blog about any type of health topic.

Exploratory factor analysis (EFA) with the principal component method and varimax rotation indicated two distinct factors based on the eigenvalue criteria of 1 or higher. The first factor (the three question items for vertical online health information behavior) explained 28.87% of total variance in the model (factor loadings = .799, .484, .755, in that order). The second factor (the three question items for horizontal online health information behavior) explained 19.61% of total variance (factor loadings = .734, .564, .744, in that order). While about 42.2% of the respondents reported that they searched for health

care providers, only about 4% (N = 80) of those reported that they had written in an online diary or blog about any type of health topic. Averaging the three respective question items produced the result that about 57.7% did not engage in vertical online health information behavior at all, whereas 81.3% did not engage in horizontal online health information behavior at all. Because of this skewness, we further recoded vertical and horizontal online health information behavior variables into a binary scale: *Yes* (1) = those who have done at least one of the vertical or horizontal online health information behaviors; *No* (0) = those who have never done either of the two online health information behaviors. The result was that 42.3% of respondents engaged in vertical online health information behavior, while 18.7% engaged in horizontal online health information behavior. These two binary variables served as dependent variables.

Key independent variables included self-efficacy, trust in health information sources (doctors, traditional media, and the Internet), and attention to health-specific news in media.

Two types of *self-efficacy* were measured: self-efficacy in getting health information and self-efficacy in managing health. Respondents were asked how confident they are about (1) getting advice or information about health or medical topics if they need it, and (2) taking good care of their health. Both items were measured with a 5-point Likert scale ranging from 1 = not at all confident to 5 = completely confident. Respondents had a slightly higher than average degree of self-efficacy in seeking information (M = 3.83, SD = 0.94) and in managing their health (M = 3.87, SD = 0.87).

We included three types of *trust in information sources*: trust in traditional media, trust in the Internet, and trust in doctors. For measurement, respondents were asked to rate the degree to which they trust health or medical information from various information sources (4-point Likert scale from 1 = not at all trust to 4 = trust a lot). Among these, trust in news magazines, radio, and TV were averaged to construct trust in traditional media (alpha = .79; M = 2.27, SD = 0.64). Trust in the Internet (M = 3.06, SD = 0.64) and trust in doctors (M = 3.66, SD = 0.58) were measured as single items.

For *attention to health-related news*, respondents were asked, "How much attention do you pay to information about health or medical topics from: (1) online newspapers, (2) print newspapers, (3) special health or medical magazines or newspapers, (4) the Internet, (5) the radio, (6) local TV news programs, (7) national or cable television news programs (1 = none, 2 = a little, 3 = some, 4 = a lot)." Exploratory factor analysis indicated one factor with 49.5% of total

variance explained. Reliability analysis also indicated a strong internal consistency (alpha = .82). All seven items were averaged together to construct the attention to health-related news variable (M = 2.39, SD = .56).

Socio-demographic, health status, and other control variables. Socio-demographic variables used in this study were gender (female = 1, male = 0), age (18 to 92), race/ethnicity (white = 1, others = 0), annual household income (less than \$9,999, \$10,000-14,999, \$15,000-19,999, \$20,000-34,999, \$35,000-49,999, \$50,000-74,999, \$75,000-99,999, \$100,000-199,999, \$200,000 or more), and education level (less than 8 years, 8 to 11 years, 12 years or completed high school, post high school training other than college, some college, college graduate, and postgraduate). Health status was measured with a single item asking respondents to assess their health status using a 5-point Likert scale ranging from 1 = poor to 5 = excellent (M = 3.53, SD = 0.93). Additionally for control purposes, the model included other questions that asked whether respondents have healthcare coverage and how often they visited a doctor in the past 12 months (0 = none to 6 = 10 or more times). These variables were included because an analysis of large-scale secondary survey data among 6119 representative samples from the state of Georgia indicated that access to the health care system was positively linked with online health information seeking behavior, even after several socio-demographic characteristics were controlled [15]. The current study highlights the importance of considering uses of and access to health care to determine what factors are associated with online health information behaviors. On average, the respondents went to see a doctor or other health professionals two to three times (M = 2.86, SD = 1.89).

4.4. Analytic Strategy

To answer the research questions, two binary logistic regression models were estimated separately using the dependent variable of vertical and horizontal online health information behaviors. Sociodemographic characteristics—including age, gender (female = 1, male = 0), education level, income, ethnicity (white = 1, others = 0), general health status, health care coverage, and frequency of doctor visits—were included as the predictors of engaging in vertical and horizontal online health information behaviors. Entered in the next block as additional predictors were self-efficacy in seeking health information and managing one's health, trust in traditional media, trust in the Internet, and trust in doctors. In the last block, attention to health news on various media was included as a predictor of each of the dependent variables. Tables 1 and 2 summarize the regression results.

5. Results

Research Question 1 asked about the differential role of demographic characteristics in predicting vertical and horizontal online health information behaviors. Among age, gender, education, income, and race, people with higher education and income were more likely to engage in vertical online health information behavior, while younger and female respondents were more likely to engage in horizontal online health information behavior. In addition to these demographic characteristics, people who visited doctors frequently were more likely to engage in both vertical and horizontal online health information behaviors.

Research Question 2 asked the extent to which trust in different health information sources—doctors, traditional mass media, and the Internet—would be differentially associated with vertical versus horizontal online health information behaviors. No trust variables significantly predicted the odds of performing vertical online health information behaviors. However, trust in doctor (OR = .712, $p < .001$) and trust in traditional media (OR = .794, $p < .05$) significantly decreased the odds of horizontal online health information behavior. In other words, every unit increase in trust in doctor and trust in traditional media decreases the odds of performing horizontal online health behavior by a factor of .712 and .794 respectively.

Research Question 3 asked about the role of two types of self-efficacy—confidence in getting health information and perceived ability to take care of one’s health. Neither type significantly predicted vertical or horizontal online health information behavior.

Research Question 4 asked the extent to which people’s attention to health-related news on various media would be differentially associated with vertical versus horizontal online health information behavior. The binary logistic regression analysis indicated that attention to health-related news on various media significantly increased the odds of vertical online health information behavior (OR = 1.522, $p < .001$) and horizontal online health information behavior (OR = 1.409, $p < .001$).

6. Discussion

Existing studies show that people do in fact frequently use the Internet as a source of health information [9]. But research on this topic is only beginning to grasp the constantly changing online health communication environment. Particularly needed is a clearer understanding of what types of

online health information behavior people perform and who engages in either vertical or horizontal online health information behavior. The current study tested how various factors relating to people’s demographics, psychographics, and media use are differentially associated with these two different types of online health information behavior.

As the results show, those who engage in vertical online health information behavior do indeed have different demographic and psychographic characteristics from those who engage in horizontal online health information behavior. Those who engage in vertical online health information behavior do such things as search for physicians and look up their own health records, and they tend to have high education and income levels. Those who engage in horizontal online health information behavior do such things as sharing and posting health information through social networking sites, and they tend to be younger and female.

Table 1. Binary Logistic Regression Analysis: Vertical Online Health Information Behavior

Predictors	B	S.E.	Odds Ratio
1st block			
Age	.002	.003	1.002
Gender (female)	-.069	.100	.933
Education	.138	.038	1.148***
Income	.091	.026	1.096***
Race (white)	.120	.106	1.127
Health status	.037	.065	1.038
Health coverage	-.055	.182	.947
FreqGoDoctor	.118	.027	1.125***
2nd block			
Trust_Internet	.079	.082	1.083
Trust_doctor	-.127	.089	.881
Trust_tradmedia	-.083	.094	.920
Self-efficacy1	-.045	.082	.956
Self-efficacy2	.088	.070	1.092
3rd block			
Attention to news	.343	.101	1.409***

* $p \leq .05$; ** $p \leq .01$, *** $p \leq .001$

Note: FreqGoDoctor indicates frequency of visiting doctors. Self-efficacy1 indicates own ability to take care of health and self-efficacy2 indicates confidence in getting health information. Trust_tradmedia indicates trust in traditional media such as TV, radio, and print. Attention to news indicates attention to health-related news on various media including local and national TV, radio, newspaper, magazines, and the Internet. Nagelkerke R-square = .066.

These demographic differences make sense to the extent that young people tend to be more tech-savvy and use social media on a daily basis to express themselves and share their thoughts. To be sure, recent years have seen an increase of e-patients, who go online not only to seek health information but also share it with others [6]. Nevertheless, the increasing number of people who use participatory health information seems more skewed toward younger rather than older generations.

Another sharp contrast between those who engage in vertical and horizontal online health information behavior is that trust in doctors and traditional media significantly decreases the odds of horizontal online health information behavior but not vertical. This contrast makes sense to the extent that vertical online health information behavior includes communicating with or searching for authoritative and credible sources, which are behaviors that are likely to be extensions of health care activities already occurring offline.

By contrast, those who engage in horizontal online health information behavior may become more distrustful of doctors and traditional media and turn instead to online health information, particularly from peers and similar types of people with whom they might also share information. Even though analysis of cross-sectional survey data cannot establish the exact causal sequence between trust and horizontal online health information behavior, this finding may alarm doctors and healthcare professionals who want to encourage their patients to use the Internet as a supplementary source of health information. In addition, the different relationships between trust in other sources of health information and vertical versus horizontal online health information behavior may explain the inconsistent findings of existing research and affirm the importance of discerning these different types of online health information behavior. Specifically, some studies found that distrust toward health care providers, family members, and mass media outlets increased respondents' odds of using the Internet for acquiring health information [5], while other studies found less relevance between trust and use of the Internet as a source of health information [19,20].

Despite this stark difference between vertical and horizontal online health information behavior, our findings also show an important similarity. Both types of behavior have significant relationships with attention to health-related news on various traditional and new media outlets. Unlike mere exposure, which involves passive reception of information that appears in media, attention to media involves active and elaborate information processing [32]. People who

search for health information and/or actively share it with others are therefore more likely to be motivated to get it from other media and deliberately process it. This reasoning is supported by existing arguments that new media channels do not altogether replace older media ones but instead can extend, complement, or supplement people's other media use behaviors [12,28].

Table 2. Binary Logistic Regression Analysis: Horizontal Online Health Information Behavior

Predictors	B	S.E.	Odds Ratio
1st block			
Age	-.034	.004	.966***
Gender (female)	.417	.136	1.517**
Education	-.050	.047	.952
Income	-.057	.033	.944
Race (white)	-.104	.132	.901
Health status	-.070	.081	.932
Health coverage	-.322	.220	.724
FreqGoDoctor	.107	.034	1.113**
2nd block			
Trust_Internet	.049	.103	1.050
Trust_doctor	-.340	.107	.712***
Trust_tradmedia	-.231	.121	.794*
Self-efficacy1	-.045	.082	.956
Self-efficacy2	.088	.070	1.092
3rd block			
Attention to news	.420	.128	1.522***

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$

Note: FreqGoDoctor indicates frequency of visiting doctors. Self-efficacy1 indicates own ability to take care of health and self-efficacy2 indicates confidence in getting health information. Trust_tradmedia indicates trust in traditional media such as TV, radio, and print. Attention to news indicates attention to health-related news on various media including local and national TV, radio, newspaper, magazines, and the Internet. Nagelkerke R-square = .104.

Several limitations should be noted. First, while secondary data such as HINTS have the advantage of a large and nationally representative sample, they of course have disadvantages such as single item measures with less than ideal validity. For example, our dependent variables—vertical and horizontal online health information behavior—were treated as binary variables, which reduce their variability. Also, some key independent variables—e.g., trust and self-efficacy—were measured with single items. Another limitation related to measurement is that some important question items for online health information behavior may be missing. One such item could be

whether people have sought for health information from official or professional health care websites. As a result of this absence, the question items constructing the vertical and horizontal online health information behaviors may be somewhat unbalanced and insufficiently comprehensive. Future research should develop more rigorous measures for these types of online health information behavior and the key independent variables.

A second limitation is that cross-sectional survey data provide only associative relationships among the key variables. However, causal relationships would be well worth exploring. Most notably, do specific types of online health information behavior (horizontal online health information behavior in our study) lead to distrust of doctors and traditional media? Or do distrust of doctors and traditional media make people turn to social networking sites where they can communicate with others similar to themselves? To answer such interesting questions, future studies would need to conduct field experiments in online health communities and/or longitudinal research with more tailored question items.

Despite these limitations, this study has practical implications for how people use online health information. First and foremost, it reinforces the idea that people do not use and seek health information online according to any uniform pattern or paradigmatic behavior. Specifically, younger people who tend to share health-related information with their peers seem to have less trust in established sources of health information such as doctors and traditional media, perhaps because they prefer getting their health information from like-minded people. If that is indeed the case, health communicators would need to try to reach them by using different sources, message appeals, and media platforms from the ones that they use with people who use health information in vertical ways. For example, younger people may perceive peers' testimonials on social media to be more credible than doctors' demonstrations. And while health agencies and health clinics have already tried reaching out to young people on social media, their efforts may be more or less positively received depending on the way young people use specific social media platforms and the messages that are available on them.

By contrast, given the fact that people with higher income and education tend to seek out health care providers and look up personal health records, there may still be a health information gap based on socio-economic status, which may further aggravate social disparities related to health. If such an information gap could be verified, it would serve as additional evidence to justify continuing and improving efforts to help people with low SES get access to the Internet and

learn how to use it for finding useful and reliable health information. While information gaps between people with high and low SES have been widely studied in the field of health information [33,34], this lingering issue deserves special attention. Online health information behavior is a new area where similar information gaps might be discovered between people with little education and those with a lot.

Lastly, the finding that both types of vertical and horizontal users of health information are also attentive to health-specific news on various media may highlight the importance of disseminating health messages over multiple channels. If health communicators acquire better understanding of people's preferences and types of online health information behavior, they may develop health communication strategies that are more effectively tailored.

7. References

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