Using the Internet and Email for Health Purposes: The Impact of Health Status*

Melinda Goldner, *Union College*

Objective. Increasingly, people use the Internet and email for health purposes; however, we know little about whether this varies by health status. This study examines whether sick or healthy people are more likely to access the Internet, conduct online health searches, and exchange emails regarding health issues. *Methods.* We conduct multivariate analysis on a random sample of 2,038 adults. *Results.* Despite greater Internet access, respondents in excellent/good health are less likely to say they conduct online health searches because they have no health concerns or are satisfied with other health sources. In contrast, sick and disabled respondents are more likely to seek medical information online, and do so more frequently. They are also more likely to exchange health emails with friends and physicians. *Conclusions.* Practitioners especially need to educate their sicker patients about the uneven quality of online health information since they are more likely than healthier patients to conduct online health searches.

Increasingly people use the Internet and email for health purposes; however, we know little about whether this varies by health status. Somewhere between 36–80 percent of the people online search for health-related information (Baker et al., 2003; Cotten and Gupta, 2004), and 6–37 percent exchange emails regarding health issues with physicians, family, or friends (Baker et al., 2003; Lacher et al., 2000; Neill et al., 1994; Sittig, King, and Hazlehurst, 2001; Taylor, 2001a; Von Knoop et al., 2003). Some researchers have noted that "electronic communication promises to revolutionise the delivery of health care" (Car and Sheikh, 2004:439). Yet, we need more information on how specific populations use these technologies to better understand its impact. In particular, there is a lack of data on whether sick or healthy people are more likely to access the Internet, conduct health searches, or exchange health-related emails with family, friends, and physicians.

A small number of researchers are beginning to examine how health status impacts the use of the Internet and email for health-related activities, yet many questions remain. First, we have conflicting data on whether sick or healthy people are more likely to conduct online health searches. Second, no

*Direct correspondence to Melinda Goldner, Department of Sociology, Union College, Schenectady, NY 12308. The author acknowledges the anonymous reviewers for providing helpful comments, as well as the staff at the Pew Internet & American Life Project for making the data available, and answering questions concerning data analysis. The author will share all data and coding information with those interested.

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researchers have examined why people say they *do not* use the Internet as a source of health information and, consequently, whether this varies by health status. Third, we do not know whether there is health-status variation in terms of exchanging health-related emails with family or friends because the one existing study does not differentiate between emailing family and friends. Finally, we do not know how health status impacts the perceived benefit of using the Internet *and* email for health purposes because the one study on this topic does not distinguish between these two practices.

This study aims to fill these gaps by examining if health status affects a variety of health-related activities online. Specifically, we are interested in whether health status impacts the likelihood, duration, and frequency of *accessing the Internet* for any reason, as well as the likelihood, frequency, and perceived benefit of *conducting online health searches*. This study also examines the practice of *exchanging emails with family, friends, or physicians regarding health issues*, and if so, whether it is regarded as beneficial. We measured health status by inquiring about the presence of a medical condition *and* asking respondents to provide a self-report of their health status (e.g., excellent, good, fair, or poor), whereas most studies only use one measure of health status.

These research questions are important given the wide-ranging implications. For example, health-care practitioners need to know which patients are accessing online medical information and exchanging health emails with family or friends so that they can make sure that patients are obtaining accurate information, and seeking health care when necessary. Physicians contemplating email can obtain better information about which patients would be more interested in this type of access. Finally, website sponsors, such as hospitals and group practices, can better select their content if they know who is more likely to visit their sites.

Accessing the Internet

Before turning to online health searches, it is important to examine whether health status impacts the likelihood, duration, or frequency of Internet use for all types of activities. This includes not just finding health information, but checking stock prices, planning a trip, and so forth. First, the Pew Internet and American Life Project found that 38 percent of respondents with a chronic disease or disability went online as compared to 58 percent of all respondents (Fox and Fallows, 2003); however, Pew researchers did not control for any other variables that may affect health, such as age. Second, conducting multivariate analysis on another data set gathered by Pew, Houston and Allison (2002) found that individuals in "excellent" health had been online longer than individuals reporting "good" or "fair/poor" health. Third, we could not find any studies examining whether the frequency of Internet use varies by health status. Now we turn to using the Internet for health purposes.

Conducting Online Health Searches

Most studies focus on how demographic characteristics impact who is more likely to conduct health searches, rather than on health status. These studies find that women, affluent, higher-educated, and younger individuals are more likely to go online for health information (Baker et al., 2003; Brodie et al., 2000; Cotten and Gupta, 2004; Hu, 2000; Pandey, Hart, and Tiwary, 2003; Taylor, 2002a). Demographic characteristics impact health status such that younger, more highly educated, and more affluent individuals are generally in better health (Pamuk et al., 1998; Ross and Mirowsky, 1999). For example, Pamuk et al. found that adults with lower incomes were far more likely than those with higher incomes to report being in fair or poor health. Moreover, poor people were more likely to "report [an] unmet need for health care," which can negatively affect health status (1998:130). However, studies on online health searches rarely examine health status, so most researchers have not established a *direct* link between health status and online health activities.

A few notable exceptions have examined how health status is linked to the incidence and frequency of online health searches. First, Baker et al. (2003) found that individuals in poorer health were more likely to go online for health information, while Cotten and Gupta (2004) found that healthier individuals were more likely to do so.[1] Thus, we have conflicting data. Related to this, no researchers have examined why people say they *do not* use the Internet as a source of health information so it is unknown whether there would be variation by health status. Second, consumers infrequently search for health information (Baker et al., 2003), but there is an inverse relationship between frequency and health status. Fox et al. (2000) found that 32 percent of individuals in poorer health, but only 23 percent of individuals in excellent health, search online at least once per week. Houston and Allison (2002) also found that individuals who report being in just "fair" or "poor" health were more likely to search the Internet for health information on a weekly basis.

It is important to understand if health status impacts whether or not people believe the Internet has improved their health knowledge and services. Von Knoop et al. (2003) found that more than 90 percent of patients said the Internet has improved their medical knowledge, but the authors do not analyze these data by health status. Houston and Allison (2002) found that the perceived benefit of online information did not vary significantly by health status; however, their study only asked whether respondents "learned something new" during their last search online. Baker et al. also found no

[1]Pandey, Hart, and Tiwary (2003) also found that health status and Internet use was positively correlated among women; however, self-reported health status was no longer significant in the multivariate model. The presence of one of nine health conditions was not tested in the multivariate model.

difference by health status since 30 percent of both healthy and sick respondents said that using the Internet "improved my ability to manage my health care needs without visiting a doctor or other health care provider" (Baker et al., 2003:2404). Thus, we have little information on whether sicker people perceive the Internet to be more beneficial for health purposes, especially since perceived benefit can be measured in many ways beyond the above questions.

This also means that we know little about how the Internet compares against other sources of health information, and whether health status affects people's choices. Health-care providers are typically the most common source of information (Johnson and Meischke, 1991; Pandey, Hart, and Tiwary, 2003), and are considered more trustworthy than the Internet (Pennbridge and Rodrigues, 1999). Yet, people also consult with family and friends (Hsia, 1987; Tardy and Hale, 1998), as well as the media (Brodie et al., 1999; Kassulke et al., 1993; Kurtz et al., 2001). "Often, the various forms of communication function interdependently" (Napoli, 2001:81), especially since people typically consult multiple sources of health information (Hofstetter, Schultz, and Mulvihill, 1992). Although the media exposes people to general health information, people turn to health-care providers, family, and friends when "specific information is being sought" (Napoli, 2001:90). The above studies do not examine health information seeking by health status. Several researchers overcome this limitation (Feick, Herrmann, and Warland, 1986; Kassulke et al., 1993; Probart et al., 1989; Rakowski et al., 1990), but they do not examine the Internet. For example, Feick, Herrmann, and Warland (1986) found that sicker individuals were more likely to seek nutritional information from books, pamphlets, and health professionals than from food labels, magazines, newspapers, family, friends, or television. Thus, we do not know whether the Internet has replaced more traditional sources of health information for healthy or sick people.

Exchanging Health Emails

Consumers increasingly use email to communicate with physicians; however, only one study examines whether this varies by health status. Prior literature has shown that anywhere from 6–37 percent of patients exchange emails with physicians (Baker et al., 2003; Lacher et al., 2000; Neill et al., 1994; Sittig, King, and Hazlehurst, 2001; Taylor, 2001a; UCLA, 2003; Von Knoop et al., 2003).[2] Several studies found that only 6–7 percent of patients exchanged emails with their physicians (Baker et al., 2003; Lacher et al., 2000; Sittig, King, and Hazlehurst, 2001). On the other end of the spec-

[2]Moyer et al. (1999) has an older literature review on email exchanges between doctors and patients.

trum, Von Knoop et al. found that 25 percent of physicians communicate with patients via the Internet, including scheduling appointments, diagnosing "common ailments," sending test results, and sharing information (2003:20). Eighty-nine percent of these physicians used email to communicate, rather than "other online interfaces offered by vendors such as MyDocOnline and RelayHealth (formerly Healinx)" (2003:20). Baker et al. (2003) are the only researchers who examine variation by health status, and they found no significant differences between sicker and healthier patients in emailing physicians.

Baker et al. (2003) also found that 25.5 percent of respondents had used email (or the Internet) to discuss health matters with a family member or friend, and that those in worse health were significantly more likely to engage in this practice. Yet, Baker et al.'s (2003) data do not differentiate between emailing family members versus friends, so we do not know the relative significance of emailing these different groups.

No studies ask about health-status variation regarding people's attitudes toward exchanging health emails. Neill et al. (1994) found that their respondents thought positively of their email exchanges with physicians. While 89 percent were satisfied with this communication mode, 67 percent were very satisfied. Yet, the authors do not examine their data by health status. Baker et al. (2003) inquire whether sicker people are more likely to believe exchanging health emails is beneficial; however, they combine this question with the perceived benefit of online health information. So we do not have separate data on whether health status impacts the perceived benefit of email exchanges specifically.

Overall, most of the above studies do not examine online health searches by health status, do not use multivariate analysis, or only use one measure of health status. Given the wide-ranging consequences for consumers and practitioners, this study aims to fill these gaps by examining if health status affects whether one accesses the Internet; who is more likely to search for health-related information online, and how often; whether one believes that the Internet has improved the health information and services he or she receives; and whether one exchanges emails with family, friends, or physicians regarding health issues, as well as the perceived usefulness of doing so. We hypothesize that healthier individuals (as measured by a self-report *and* the presence of a medical condition or disability) will be more likely to access the Internet, will have been online longer, and will search the Internet more frequently than sicker individuals. Despite this, we expect that sicker individuals will be more likely to conduct medical searches, and do so more frequently. Consequently, we hypothesize that healthy individuals will be more likely to say that they do not engage in online health searches because they have no health concerns and/or are satisfied with other health sources; however, we do not believe that health status will be related to saying that they do not use the Internet for health searches because they cannot trust the information, or because they did not know where to look. We also expect

that sicker individuals will be more likely to believe that the Internet has improved the health information and services they receive. Finally, we hypothesize that sicker individuals will be more likely to email family, friends, and physicians, and will perceive these health exchanges as more beneficial than will healthier people.

Methods

Sample

This study uses data collected by the Pew Internet and American Life Project, which examines the social impact of the Internet in the United States. Specifically, we use data from a daily tracking survey that was conducted by Princeton Survey Research Associates between November 25 and December 22, 2002. The sample included 2,038 adults aged 18 and older. After selecting an area code, telephone exchange, and bank number, researchers found specific respondents by randomly generating the last two digits of the telephone number. Researchers called potential respondents at various times and days, and called at least 10 times to complete the survey. The data are weighted using a "special analysis" of the Census Bureau's Current Population Survey (March 2001) (Fox and Fallows, 2003:34).[3] We can say with 95 percent confidence that the margin of sampling error is plus or minus two percentage points for the total sample and plus or minus three percentage points for the results based on Internet users. Fox and Fallows (2003) have written a report based on these data; however, they did not conduct multivariate analyses. This study only analyzes the 57.4 percent of respondents who go online, except for the initial regression regarding Internet access, which is discussed next.

Dependent Variables

Researchers asked respondents about a variety of topics relating to the Internet; however, this study focuses on their Internet access, as well as their online health searches and exchanges. Respondents were first asked whether they access the Internet (or use email), and if so, how many years they have had access and how frequently they go online. Internet frequency was coded several times a day, about once a day, three to five days a week, one to two days a week, every few weeks, and less often. Since there are some problems

[3]They produced "population parameters for the demographic characteristics of adults age 18 or older, living in households that contain a telephone," which "are then compared with the sample characteristics to construct sample weights. The weights are derived using an iterative technique that simultaneously balances the distribution of all weighting parameters" (Fox and Fallows, 2003:34).

with running regressions on ordinal data (see below under "Method of Analysis" for more information), we also coded Internet frequency as 1 if the respondents said they went online once or several times a day and 0 if they said they used the Internet less than this (three to five days/week, one to two days/week, every few weeks, or less often) in order to run a logistic regression. Researchers asked whether the respondent looks for health or medical information online. If not, they were asked separate questions about whether it was because they could not trust the online information, had no health concerns, were satisfied with other health sources, or did not know where to look. These questions were coded 1 if they said this was a "major" or "minor" reason why they did not go online for health information and 0 if they said that it was "not a reason at all."

If respondents did search the Internet for medical information, they were asked a series of follow-up questions. First, respondents were asked how frequently they go online for health information. They could reply every day, several times a week, several times a month, every few months, or less often. We ran ordinary least squares (OLS) regression (see below under "Method of Analysis"); however, we also ran logistic regression. To do this, we recoded frequency as 1 if they said they did this "every day" or "several times a week" and 0 if they said they did this "several times a month," "every few months," or "less often." Second, we examined whether the Internet improved the health information or services respondents receive. We coded perceived benefit as 1 if they said the Internet information "improved," or 0 if they said the Internet had "not improved," the health information and services they received. We omitted the 66 responses that the Internet had done "both or neither" because Pew combined these into the same response, rendering it too ambiguous to analyze. Finally, respondents were asked separately whether they exchange emails about health issues with family, friends, or physicians, and if so, how useful they found this practice. A dependent variable was created for this last question, which was coded 1 if they found emailing "somewhat" or "very" useful and 0 if they found this "not too" or "not at all" useful.

Independent Variables

The primary independent variables pertain to health status. First, respondents were asked whether they had a "disability, handicap or chronic disease" that kept them from "participating fully in work, school, housework, or other activities." This question was coded 1 if they said yes or 0 if they said no. Second, respondents were asked: "In general, how would you rate your own health—excellent, good, only fair, or poor?" Self-reported health status was coded 1 for "excellent" and "good," and 0 for "only fair" and "poor." Several studies have shown that this type of health-status variable can predict morbidity and mortality and thus is a valid measure (e.g., Benyamini, Leventhal, and Leventhal, 2003).

The other independent variables are included as controls. Studies have found that women, affluent, higher-educated, and younger individuals are more likely to go online for health information (Baker et al., 2003; Brodie et al., 2000; Cotten and Gupta, 2004; Hu, 2000; Pandey, Hart, and Tiwary, 2003; Taylor, 2002a). Health status is also affected by these same demographic characteristics (Hayward and Heron, 1999; Marmot, 2002; Pamuk et al., 1998; Waldron, 1994). Consequently, we include controls for sex, race/ethnicity, income, education, and age. Sex was coded 1 for male and 0 for female. Respondents were asked two questions about their race and ethnicity. These were combined and coded into a series of dummy variables (non-Hispanic blacks, Hispanic or Latino, and other, which includes Asian or Pacific Islander, Native American or American Indian, mixed, or other) with non-Hispanic whites as the comparison group. Income, asked as total income from all sources before taxes, was coded as less than $10,000, $10,000 to under $20,000, $20,000 to under $30,000, $30,000 to under $40,000, $40,000 to under $50,000, $50,000 to under $75,000, $75,000 to under $100,000, and $100,000 or more. These responses were recoded into a series of dummy variables (less than $20,000, $20,000–49,999, $50,000–74,999) with $75,000 or more as the comparison group. Education, asking for the last grade or class completed, was coded none, or Grades 1–8; high school incomplete; high school graduate; business, technical, or vocational school after high school; some college; college graduate; and postgraduate training/professional school after college. This was recoded as 1 for college degree or higher and 0 for less than a college degree. Age was included as a continuous variable.

We also controlled for marital status because research has shown that married people are healthier (see Ross, Mirowsky, and Goldsteen, 1990 for a review of this literature). Marital status was coded 1 for married or ''living as married'' and 0 for never married, divorced, separated, or widowed.

Method of Analysis

This study used OLS and logistic regression analysis to test relationships between the variables. Most dependent variables were discrete, so in these cases we used logistic regression analysis. To analyze years of Internet access, we used OLS regression since the responses are interval-level data. In the few cases where there were ordinal data, we ran two types of analyses. In regard to the frequency of Internet use and online health searching, we ran OLS regression since there were at least five response categories, and responses were not concentrated in just a few categories. ''Although some small error may accompany the treatment of ordinal variables as interval, this is offset by the use of more powerful, more sensitive, better developed, and more clearly interpretable statistics with known sampling error'' (Labovitz, 1970:515). Since the use of regression with ordinal data introduces some error, we also

made the responses discrete and used logistic regression. Researchers at the Pew Internet and American Life Project are not responsible for the interpretations or conclusions presented here.

Results and Discussion

Table 1 reports the descriptive statistics for the dependent and independent variables, but here we just discuss the independent variables. Eighty-four percent of respondents rated their health as "excellent" or "good," while only 16 percent rated their health as "only fair" or "poor." Eighty-five percent had no "disabilities, handicaps or chronic diseases that kept them from full participation in [their] activities." Women comprised 51.4 percent of the sample. Eighty-six percent completed high school, 25 percent completed college, and 10 percent held a graduate degree. Combining the questions on race and ethnicity yielded 74.9 percent non-Hispanic whites, 10.7 percent non-Hispanic African Americans, 9.9 percent Hispanics, and 4.5 percent other. Fifty-five percent were currently married or "living as married" while 23 percent had never been married. The mean family income fell in the $40,000–50,000 range, and 20 percent made $75,000 or more. Ages ranged from 18 (the minimum age to be eligible) to 94 with a mean of 46.

Accessing the Internet

Respondents were first asked whether they go online, and if so, how many years they have had Internet access and how frequently they go online.[4] Health status was only significantly related to whether respondents accessed the Internet (including email). Specifically, the odds of going online are over two times as large for those in excellent or good health as opposed to those reporting only fair or poor health (antilog of 2.138). Thus, we found support for our hypothesis on incidence, but not duration or frequency. The overall model was significant according to the model chi-square statistic. See Table 2.

Conducting Online Health Searches

One of the unique aspects of these data is that they provide insight into why people report that they *do not* go online for medical information. As predicted, there were no significant differences in relation to not trusting or not knowing where to look. Also supporting our hypotheses, respondents

[4]Neither health-status measure was significant in the logistic or OLS regression on Internet frequency.

TABLE 1

Descriptive Statistics for Dependent and Independent Variables

	Mean	*SD*	Minimum	Maximum
Dependent Variables				
Access the Internet	0.5736	0.49463	0	1
Years of access	7.01	13.194	0	99
Frequency online	0.6413	0.47973	0	1
Online health searching	0.6620	0.47313	0	1
Don't trust information	0.3697	0.48305	0	1
No health concerns	0.6303	0.48304	0	1
Satisfied with other health sources	0.6481	0.47789	0	1
Don't know where to look online	0.2731	0.44585	0	1
Frequency health searching	0.0652	0.24693	0	1
Beneficial	0.8368	0.36971	0	1
Email family	0.2327	0.42265	0	1
Email friends	0.2098	0.40728	0	1
Email physician	0.0706	0.25619	0	1
Email family useful	0.9005	0.29971	0	1
Email friends useful	0.9229	0.26704	0	1
Email physician useful	0.9302	0.25573	0	1
Independent Variables				
Self-reported health status	0.8403	0.36638	0	1
Medical condition	0.1477	0.35486	0	1
Sex	0.4865	0.49989	0	1
Education	0.2518	0.43411	0	1
Non-Hispanic whites	0.7484	0.43402	0	1
Non-Hispanic blacks	0.1071	0.30928	0	1
Hispanics	0.0994	0.29918	0	1
Other races	0.0452	0.20775	0	1
Marital status	0.5509	0.49747	0	1
<$20,000	0.2078	0.40581	0	1
$20,000–49,999	0.4155	0.49288	0	1
$50,000–74,999	0.1741	0.37927	0	1
>$74,999	0.2026	0.40202	0	1
Age	45.5083	17.63791	18	94

SOURCE: Pew Internet and American Life Project (2002), weighted data.

reporting excellent or good health were more likely to say that they did not go online for health information because they had no health concerns (antilog of 2.275), or were satisfied with the health information they obtain from other sources (antilog of 3.813). The odds of being satisfied with other sources are also nearly three times as large for those individuals with a medical condition (antilog of 2.762). This is surprising since these same individuals were significantly more likely to search for health information online. All the overall models were significant according to the model chi-square statistic. See Table 3.

TABLE 2

Logistic Regression Coefficients for Accessing the Internet

Independent Variables	Internet Access
Self-reported health status	0.760**
	(0.141)
Medical condition	0.253
	(0.143)
Sex	0.033
	(0.091)
Education	0.955**
	(0.121)
Non-Hispanic blacks	−0.522**
	(0.144)
Hispanics	−0.452**
	(0.155)
Other races	−0.245
	(0.227)
Marital status	−0.269**
	(0.100)
<$20,000	−2.246**
	(0.177)
$20,000–49,999	−1.169**
	(0.144)
$50,000–74,999	−0.155
	(0.169)
Age	−0.043**
	(0.003)
Constant	2.773**
Model chi-square	875.626**

*$p < 0.05$; **$p < 0.01$ (two-tailed tests) (standard errors in parentheses).

SOURCE: Pew Internet and American Life Project (2002), weighted data.

Having a medical condition was significantly related to the likelihood and frequency of searching the Internet for health-related information. As predicted, logistic regression analysis showed that respondents who had a "disability, handicap or chronic disease" that kept them from full participation in work, school, housework, or other activities were more likely to look online for health information (antilog of 2.168), and did so more frequently (antilog of 2.109).[5] This means that individuals diagnosed with a medical condition were more likely to search the Internet for health information "every day" or "several times a week." Both the overall models were significant according to the model chi-square statistic. See Table 3. The finding on incidence supports Baker et al. (2003), but runs counter to Cotten and Gupta (2004). These results also support prior literature that has found that

[5]We also ran OLS regression ($b = -0.278$, standard error = 0.093, P value = 0.003).

TABLE 3

Logistic Regression Coefficients for Questions Regarding Online Health Searches

Independent Variables	No Health Concerns	Satisfied with Other Health Sources	Conducted Online Health Searches	Frequency of Online Health Searching
Self-reported health status	0.822*	1.338**	−0.131	−0.084
	(0.372)	(0.389)	(0.222)	(0.424)
Medical condition	−0.609	1.016*	0.774**	0.746*
	(0.386)	(0.456)	(0.217)	(0.334)
Sex	0.499**	0.164	−0.732**	0.007
	(0.185)	(0.187)	(0.108)	(0.207)
Education	0.380	0.278	−0.107	0.299
	(0.209)	(0.211)	(0.118)	(0.224)
Non-Hispanic blacks	−0.523	−0.825**	−0.202	−0.383
	(0.305)	(0.308)	(0.191)	(0.486)
Hispanics	−0.247	−0.544*	−0.756**	1.039**
	(0.285)	(0.276)	(0.178)	(0.285)
Other races	−0.484	0.034	−0.186	0.510
	(0.384)	(0.387)	(0.236)	(0.392)
Marital status	0.411*	−0.022	0.381**	0.056
	(0.201)	(0.204)	(0.118)	(0.234)
<$20,000	−0.123	−0.226	−0.695**	−0.383
	(0.327)	(0.335)	(0.209)	(0.419)
$20,000–49,999	−0.314	−0.250	0.001	−0.278
	(0.241)	(0.249)	(0.143)	(0.263)
$50,000–74,999	0.331	−0.206	0.087	−0.892**
	(0.278)	(0.270)	(0.153)	(0.334)
Age	−0.016*	0.023**	−0.002	−0.023*
	(0.007)	(0.007)	(0.004)	(0.009)
Constant	−0.039	−1.451*	1.214**	−1.671**
Model chi-square	55.595**	57.523**	115.250**	40.098**

*$p<0.05$; **$p<0.01$ (two-tailed tests) (standard errors in parentheses).

NOTE: This shows the results from four separate multivariate logistic regressions.

SOURCE: Pew Internet and American Life Project (2002), weighted data.

frequency increases as health status decreases (Fox et al., 2000; Houston and Allison, 2002).

Respondents were asked whether the Internet improved the health information or services they receive; however, none of the health-status measures were significant so we did not find support for our hypotheses. Houston and Allison (2002) also found that the perceived benefit of online information did not vary significantly by health status. However, their data only asked whether respondents had "learned something new" during their last search online.

Exchanging Health Emails

Respondents were asked whether they exchange emails about health issues with family, friends, or physicians, and if so, how useful they found this practice. Having a medical condition increased the odds of exchanging health emails with friends by over two times (antilog of 2.336) and physicians by over 3.5 times (antilog of 3.585); thus these hypotheses were supported. Both the overall models were significant according to the model chi-square statistic. See Table 4. Emailing physicians is not a common practice yet (Casebeer et al., 2002), so it is important to note that people with a medical condition were more likely to do this, especially since the only study examining this found no significant relationship (Baker et al.,

TABLE 4

Logistic Regression Coefficients for Questions Pertaining to Exchanging Health Emails

Independent Variables	Emailing Friends	Emailing Physicians
Self-reported health status	−0.049	−0.069
	(0.260)	(0.374)
Medical condition	0.849**	1.277**
	(0.209)	(0.282)
Sex	−0.704**	0.023
	(0.129)	(0.200)
Education	0.289*	0.529*
	(0.134)	(0.212)
Non-Hispanic blacks	−0.755*	−0.662
	(0.300)	(0.533)
Hispanics	−0.098	0.570
	(0.225)	(0.312)
Other races	0.0762	0.405
	(0.289)	(0.398)
Marital status	−0.036	0.291
	(0.140)	(0.231)
<$20,000	−0.740**	−0.955
	(0.282)	(0.501)
$20,000–49,999	−0.296	−0.231
	(0.166)	(0.249)
$50,000–74,999	−0.004	−0.829**
	(0.170)	(0.309)
Age	−0.002	−0.001
	(0.005)	(0.008)
Constant	−0.810*	−2.814**
Model chi-square	68.285**	52.463**

*$p < 0.05$; **$p < 0.01$ (two-tailed tests) (standard errors in parentheses).

NOTE: This shows the results from two separate multivariate logistic regressions.

SOURCE: Pew Internet and American Life Project (2002), weighted data.

2003). Neither health-status measure was significantly related to emailing family members, so we did not find support for these hypotheses. Baker et al. (2003) found that those in worse health were more likely to email family/friends but, unlike our study, they combined these two groups into one measure. So we cannot tell whether our results are similar in terms of emailing friends and family. Finally, neither health-status measure was significantly related to perceiving email exchanges with family, friends, or physicians as "useful for communicating about health or medical issues," so these hypotheses were not supported.

Conclusion

Using data collected from a random sample of adults for the Pew Internet and American Life Project, we found that health status impacted Internet access, online health searches, and health exchanges via email. For example, sick respondents were more likely to search the Internet for medical information and exchange health emails with friends and physicians, even though they were less likely to go online. Overall, we found support for most of our hypotheses; however, we were surprised that self-reported health status was not a better predictor of online health activities. Few studies have examined these questions in relation to health status. Yet, our findings lend support to the health-needs model proposed by Pandey et al. (2003), which argues that online health searches are motivated by a desire to learn about symptoms or a medical condition. This is in contrast to the health and wellness model, which argues that "health conscious" people use the Internet to maintain their health (Pandey et al., 2003:182).

Our data on online health searches have important implications for health-care practitioners, especially physicians. First, practitioners need to be aware that sicker patients are visiting these sites more frequently, even though they have less Internet access. This means that practitioners need to educate these patients about the uneven quality of online health information (Berland et al., 2001; Crocco, Villasis-Keever, and Jada, 2002). Fortunately, sicker individuals are more likely than healthier individuals to talk to their physician about the health information they find online, according to Houston and Allison (2002), but we do not know whether this is also true in our data set. Since health-care practitioners and organizations often sponsor websites for their patients, website designers should know that sick people are interested in a wide range of content. Using the same data, we report elsewhere that sick respondents were more likely to seek information on 13 of 16 health topics, including specific diseases or conditions, medical treatments or procedures, experimental treatments or medicines, alternative treatments or medicines, pharmaceutical or over-the-counter drugs, diet, immunizations, smoking cessation, depression, sexual health, environmental health hazards, a particular physician or hospital, and Medicaid/Medicare

(Goldner, forthcoming). Sick respondents were not significantly more likely to search for information on fitness or exercise, drug or alcohol problems, or health insurance, and self-reported health status was not significant in any of the above regressions.

Second, health-care practitioners need to educate healthy individuals about how to evaluate online content on symptoms and disease in case they become sick; however, they should also educate healthy individuals about the range of health and wellness information on the Internet since they are less likely to conduct online health searches. For example, many websites contain information on fitness, exercise, nutrition, and stress relief, which healthy people can utilize to maintain their health. Overall, physicians are an important link in the information exchange between patients and the Internet, especially since patients are more trusting of health information provided by physicians than they are of that found on the Internet (Pennbridge and Rodrigues, 1999). We are well aware that the ability to implement these recommendations is hampered by increasing time constraints placed on physicians, especially given newer reimbursement mechanisms.

Our data on how health status impacts the exchange of health emails also has important policy implications. First, people diagnosed with a disease or disability were more likely to exchange email with friends regarding health issues, just as Baker et al. (2003) found. Again, health-care practitioners should encourage their patients to consult them if these emails involve new information or cause concern. Second, emailing physicians is not a common practice yet (Baker et al., 2003; Casebeer et al., 2002; Lacher et al., 2000; Sittig, King, and Hazlehurst, 2001; Taylor, 2001a; Von Knoop et al., 2003), so it is important to note that people with a medical condition were more likely to exchange health emails with physicians. Studies show that many more patients would like to email their physicians (Mold, Cacy, and Barton, 1998; Taylor, 2002b), especially for tasks such as renewing prescriptions and asking general medical questions (Hassol et al., 2004);[6] however, many physicians are reluctant due to issues of privacy, reimbursement, and malpractice (Taylor, 2001b). Von Knoop et al. (2003) found that the majority of physicians (51 percent) cite patient demand as the reason they allow email communication despite these concerns. These issues need to be resolved for email to become a more common practice between patients and health-care practitioners. To aid in this effort, the American Medical Informatics Association has established some guidelines. For example, it advises health-care providers to place a hard copy of each email in the patient's file, and inform patients about who will see their messages (Rollins, 2000). In addition, Mandl, Kohane, and Brandt (1998) recommend that email not be used for urgent problems, test results, or an initial diagnosis.

[6]Moyer et al. (2002) found no difference regarding interest in emailing physicians by health status, though.

We need more data to understand whether email affects the physician-patient relationship positively or negatively (Delbanco and Sands, 2004). On the one hand, time spent with patients has been declining due to managed care (Taylor, 2001b), and consequently, patients become frustrated. Email could alleviate some of these problems (Pal, 1999). To illustrate, ''e-mail provides new opportunities for patient education. Physicians may imbed links in their messages to direct patients to educational resource sites on the Internet. The physician also may compose his or her own educational materials and attach them to an e-mail message'' (Nettleman, Olchanski, and Perlin, 1998:139). Importantly, Patt et al. (2003) found that the physicians they interviewed said that email ''enhances chronic-disease management,'' ''improved continuity of care and increased flexibility in responding to nonurgent issues'' (www.umir.org/2003/2/39). In another study, Finnish physicians estimated that email could have replaced 2 percent of office visits and 21 percent of phone calls, while only 10 percent of emails necessitated an office visit (Castren, Niemi, and Virjo, 2005). Thus, email can potentially reduce office visits, thus cut health-care costs. On the other hand, email could increase ''inappropriate use of services'' because ''some patients may become nervous and seek urgent health care'' or ''some physicians may be less willing to reassure patients and may have a greater tendency to recommend health care visits or diagnostic testing'' (Mandl, Kohane, and Brandt, 1998:498). Email may also erode the doctor-patient relationship, for example, if confidentiality is compromised (Patt et al., 2003). Future research needs to continue to examine whether email changes the doctor-patient relationship (see also Von Knoop et al., 2003), and whether these changes are positive or negative. Of course, we do not know from this study whether respondents were emailing their physician or simply a physician they found online (see Oyston, 2000 for a discussion of critical issues involving receiving emails from ''unknown'' patients). From this study, we also do not know what types of exchanges took place. It is unclear whether respondents were simply renewing prescriptions and scheduling appointments, or doing something more substantial, such as discussing a diagnosis. So future research needs to examine these exchanges in greater detail in order to understand how email alters the doctor-patient relationship. Only then can we devise policies to improve the health status of individuals and the functioning of our health-care system.

This study has other limitations. First, we cannot determine causality given the cross-sectional study design. Only longitudinal data could analyze how online health information seeking changes over time and whether, for example, most people only begin to use the Internet once they experience symptoms. Second, we cannot determine from this data set the way in which health status impacts how people use online health information. For example, are sick individuals more likely to change their attitudes or behaviors in response to this information? Third, the data set contained some other measures of Internet usage, but they were not used in this analysis because of

their limited use. For example, it would be helpful to know whether people were searching for health information related to their own health concerns or someone else's needs; however, the question only asked about this for the last time the respondent went online for health information. Finally, there was a slightly higher percentage of non-Hispanic whites in this study than in the general population (74.9 percent vs. 69.1 percent) (www.census.gov). Thus, future research should examine racial differences, especially since African Americans have less access to the Internet (Lenhart et al., 2000).

One of the strengths of this study is that we used two different measures of health status while most studies only use one. In terms of examining the presence of a medical condition, some studies only ask about a small number of specific diseases, such as cancer, while this data set asked about *any* medical condition or disease. In terms of analyzing self-reported health status, some compare those in excellent health to all others (Fox et al., 2000), while others combine some of these categories, such as those in excellent and good health (Cotten and Gupta, 2004; Houston and Allison, 2002). We ran the analysis both ways and there were some interesting differences between the two versions.[7] We just report the results comparing the healthiest (i.e., those in excellent or good health) to all others. Even though this means that our health-status measures are statistically significant in fewer regressions, it makes it easier to compare our work to the three academic articles on this topic because they also use these categories. This means that future research needs to explain the difference between our two measures of health status since self-reported health status was only significant in three regressions. Perhaps it is more accurate to ask respondents about a particular medical problem since self-reported health status is a less objective measure. For example, two respondents could both report good health even if one has been diagnosed with a disease while the other has not. This runs counter to the studies documenting that the self-reported health status measure can predict morbidity and mortality, thereby confirming the validity of this measure (e.g., Benyamini, Leventhal, and Leventhal, 2003). So the more likely explanation may be that our measure of disease status was better able to tap into health status than prior studies since it was limited to those respondents who could not participate "fully in work, school, housework, or other activities." Of course, it would also be helpful to know the specific disease or medical condition that respondents faced, as well as to obtain some more objective measure of health status that is not based on self-reports.

[7]Comparing those in excellent health to all others, our two health-status measures are no longer significant in the logistic regression on whether respondents do not search for health information online because they are satisfied with other sources; however, both measures become significant in the logistic regression on not searching because they do not know where to look. Self-reported health status becomes significant in the logistic regressions on emailing physicians and perceived benefit, while medical condition becomes significant in the logistic regression on emailing family.

Our study is one of the first to examine how health status impacts using the Internet for health searches and exchanges. This answers the call of researchers such as Houston and Allison (2002), as well as Cotten and Gupta (2004). Though few have explored this topic, it provides insight into how the Internet is changing our health behaviors and the health-care system in the United States. Future research needs to continue to examine how health status affects web use. Does online health information change people's attitudes or behaviors and, most importantly, does this vary by health status? Only then we will have a better sense of how to maximize the Internet's potential.

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